



A paradigm shift for the Great Bifurcation

Wolfgang Hofkirchner^{a,b}

^a GSIS, The Institute for a Global Sustainable Information Society, Steinbrechergasse 15, 1220, Vienna, Austria

^b TU Wien, Institute of Visual Computing and Human-Centered Technology, Austria

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ABSTRACT

This paper is an attempt to achieve an understanding of the situation the evolution of humanity is confronted with in the age of global challenges. Since global challenges are problems of unprecedented complexity, it is argued that a secular paradigm shift is required away from the overemphasis on allegedly neutral standpoints, on a mechanistic picture of the world and on deductive logics towards accounts of emergence, of systemicity, informationality and conviviality, building upon each other and providing together a transdisciplinary edifice of the sciences, in the end, for, and by the inclusion of, citizens. Viewed from such a combined perspective, the current social evolution is punctuated by a Great Bifurcation similar to bifurcations other emergent systems have been facing. On the one hand, humankind is on the brink of extinction. It is the world occurrence of the enclosure of commons that is detrimental to sharing the systemic synergy effects and thus to the cohesion of social systems. On the other hand, humanity is on the threshold of a planetary society. Another leap in integration would be the appropriate response to the complexity confronted with. Humans and their social systems are informational agents and, as such, they are able to generate requisite information and use it to catch up with the complex challenges. They can establish convivial rules of living together in that they disclose the commons world-wide. By doing so, they would accomplish another evolutionary step in anthroposociogenesis. The concept of the Global Sustainable Information Society describes the framework of necessary conditions of conviviality under the new circumstances.

1. Introduction

The seemingly disruptive advent of the COVID-19 pandemic outshone the climate change that has been gaining obvious momentum since the last fifty years to an extent that it threatens with a much more decisive rupture if science, technology and society are not unwilling to learn from the pandemic that there is nonlinear growth with complex challenges be they small or large and that human actors are not completely doomed to helplessness though. For such a lesson to learn, a secular shift in thinking and acting throughout sciences and everyday life is required because human actors need to be capacitated to cope with complex challenges such as the global problems.

A shift is already underway though not yet hegemonic. This shift has to overcome three prejudices of conventional science:

- The outdated ideology of value-free scientific research. The absence of values would make science distinct from biased everyday thought. But that's not the distinction. Any research is driven by societal interests even if mediated by personal curiosity. Any research implies

particular values, reflected or not if not even camouflaged. Of course, these values must not divert the findings of research, quite the contrary, they shall stimulate evidence-based research – and that's the distinction from biased opinion of everyday. Science can critique opinions. In the last two decades, several labels have become aspirational for scientists: research shall be responsible, university research shall be aware of its third mission, namely, to serve the common good, applied research shall be replaced by use-inspired basic research, research shall become practically transdisciplinary in that it transcends science towards, and include in science, the values of everyday people that are affected by the results of research, best by letting them participate in research. These are attempts in the right direction: the acceptance that there is a limited controllability of what can be done. As everyday-thinking and -acting, science has limited controllability over its impact on society but within that certain limit it is capable of controlling and thus it must aim at doing so in a precautious way. Neither phantasies of omnipotence nor of impotence are called for but a deliberate activism is (Hofkirchner, 2013a, 62–71). Not everything that might be feasible is also

E-mail address: wolfgang.hofkirchner@gsis.at.

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desirable and not everything that might be desirable is also feasible. The feasible and the desirable need to be made compatible with each other.

- The outdated mechanistic picture of the world. Cause-effect relationships are fancied as if pertaining to a machine constructed by humans. Cause and effect would obey laws of strict determinacy such that the effect would follow necessarily from the cause. But that is true only for a small subdivision of effective causality – causes can have different effects and effects can be brought about by different causes –, let alone final, material and formal causality (Hofkirchner, 2013a, 86–95). Laws of nature and other parts of the world are not given for eternity. The late Karl Raimund Popper called those laws propensities – an asymmetrical, contingent behaviour of the universe (1990). This shows the right direction. Strict determinism as well as indeterminism are false alternatives. Less-than-strict determinism avoids both fallacies.
- The outdated preponderance of methodologies that are based on deductive logics. Deductivism is an attempt to deduce that which shall be explained or predicted from premises such that the phenomenon can be subsumed under a proposition of the form of a universal implication that covers the phenomenon. The premises suffice by definition for the conclusion, the phenomenon is thus reduced to a sufficient condition. But, in fact, those conditions are rarely sufficient. There is the search for alternative logics such as the hype for abduction or claims for a *trans*-classical logic (Günther, 1990). And there is the Logic in Reality of Joseph Brenner (2008) who grounds logic in reality, that is, he gives primacy to how reality works in principle when postulating logical principles. Anyway, it needs to be accepted that explanation and prediction are incomplete and that they should focus on the adjacent necessary instead, that is, a necessary condition that might rarely be sufficient but should form a basis of understanding as close as possible to the phenomenon that shall be explained or predicted (Hofkirchner, 2013a, 131–139; 1998). Neither deductivism nor irrationalism – for which anything would go – can convince but a reflexive rationalism that accepts incomplete deducibility with an ascendance from the abstract to the concrete where by each step a new assumption is introduced without deduction. The build-up of such a specification hierarchy is important for the transdisciplinarity in its theoretical sense – the consideration of as many facets of the phenomena as possible in order to achieve a unified understanding.

The removal of those impediments for the progress of science are the milestones that the paradigm shift has to master. Only if they will have been achieved, humanity will be ready to confront the global challenges in a way that safeguards mankind against man-made extinction. The next sections substantiate how, on the three pillars of deliberate activism, less-than-strict determinism and reflexive rationalism, a new understanding of the current situation of world society can be erected and how it can make the disciplines of the whole edifice of science responsive to that task. The sections will proceed from a systemic level to an informational level to a convivialist level.

2. Emergentist systemism

‘Emergentist systemism’ is a term introduced by Poe Yu-ze Wan (2011) in the context of social theory, after it had been used in the field of social work in Switzerland to characterise the approach of philosopher of science, Mario Bunge. Bunge himself was rather used to terms such as ‘emergentist materialism’ to signify, e.g., his position in the field of the mind-body problem. However, he defined systemism in a broader sense, namely as ‘Ontology: Everything is either a system or a component of some system. Epistemology: Every piece of knowledge is or ought to become a member of a conceptual system, such as a theory. Axiology: Every value is or ought to become a component of a system of interrelated values’ (Bunge, 2012, 189). And he defined emergence as

‘[...] advent of qualitative novelty. A property of systems’ (Bunge, 2012, 185). Thus, emergentism is ‘a world view or an approach’ that focuses on emergence (Bunge, 2003, Bunge, 2003, 38). ‘Systemism, or emergentism’, as he said (Bunge, 2003, 38–39), ‘is seem to subsume four general but one-sided approaches: 1. *Holism* [...] 2. *Individualism* [...] 3. *Environmentalism* [...] 4. *Structuralism* [...] Each of these four views holds a grain of truth. In putting them together, systemism (or emergentism) helps avoid four common fallacies.’

This is by and large the sense in which emergentist systemism is understood here (Hofkirchner, 2017a) – as *weltanschauung*, that is, a world view that is not value-free (a German term by which Mark Davidson 1983 summed up Ludwig von Bertalanffy’s General System Theory and which will be subsumed here under the term praxiology), as conception of the world (ontology) and as way of thinking to generate knowledge about the world (epistemology). In a nutshell, emergent systemism means that, practically, humans intervene as a rule for the betterment of social life in real-world systems they conceive of by patterns they have already identified and that these systems are emergent from the co-operation of other systems that become or are their elements. This is called self-organisation. Since the idea of emergent systems implies a kind of evolution, these systems are also known by the term evolutionary systems. Evolutionary Systems Theory – a term coined by Ervin Laszlo (1987), Vilmos Csanyi (1989) and Susantha Goonatilake (1991) but extended here to cover the meaning it received after the seminar held at the Konrad Lorenz Institute for Evolution and Cognition Research in Vienna 1995 (Van de Vijver et al., 1998) – is the proper theory of self-organisation, a merger of systems theory and evolutionary theory by which the first was enabled to include more than ideas of maintaining systems only and the latter could emancipate from mechanistic interpretations of the Darwinian model. Self-organisation is characterised by evolvability and systemicity. That means that matter, nature, real-world events or entities evolve such that systems materialise as organisation of components (Hofkirchner, 2013a, 58–59).

Applying emergentist systemism to the edifice of science(s) brings a profound change (Hofkirchner, 2017a).

How is the old paradigm’s view of that edifice? Let’s start with philosophy, composed of epistemology, ontology and praxiology (ethics, aesthetics and else) as the most abstract enterprise and put it in the background. Before that background, you have the three categories of formal sciences, real world sciences and applied sciences in juxtaposition. The formal sciences include logics and mathematics as disciplines. The real-world sciences comprise disciplines that investigate nature, on the one hand, and were called typically physics, chemistry, biology and else, and disciplines that investigate the social world, on the other, nowadays summarised under the term social and human sciences including sociology, cultural, political, and economic sciences and else. Applied sciences assemble engineering, management, arts and else. Every discipline is divided by sub-disciplines and sub-sub-disciplines. Besides all having their own legitimation as basic research, formal sciences are known for providing instruments for gaining knowledge in the real-world sciences, real-world sciences are needed for the provision of evidence for developing technologies, organisation, pieces of art. However, what makes the co-operation of sciences difficult is that they are siloed against each other by impermeable boundaries. Connection between those mono-disciplines can be attempted only by heaping some of them together in a multi-disciplinary approach, which is no connection at all, or by peripheral exchanges in an interdisciplinary approach, which does not admit internal changes and keeps the disciplines as alien to each other as they have been before.

Driven by the confrontation with complex problems, things have begun to change already in the direction of semi-permeability of disciplinary boundaries, which, in the long run, paves the way for the establishment of new stable relations between them. Emergentist systemism is not another discipline that just adds to the picture of the old disciplines. It causes rather a paradigm shift that has the potential to transform the whole edifice of science(s). Philosophy that was deprived

of fruitful relations to the disciplines of science in what had become normal science turns into systems philosophy now; formal sciences turn into formal as well as non-formal systems methodology; real-world sciences turn into sciences of real-world systems, that is, material, living or social systems; and, finally, applied sciences turn into a science that makes artefacts by designing systems and, in doing so, integrates them with social systems. So, at one blow, connectedness is unveiled between all inhabitants of the edifice. Transgressions from one scientific endeavour to another can be mediated via jumping forth and back over shared levels of scientific knowledge. Those levels form now a specification hierarchy. Jumping from one specific level to a more general level allows comparison and adjustment of both levels. It allows the initial level to instigate knowledge adaptations on the target level or adoption of knowledge on re-entry from the target level. In addition, a more general level works as bridge for jumping up the ladder to even higher levels or down to different lower levels so as to help understand that their knowledge is just another specification of the knowledge they share at a higher level. This makes the sciences of evolutionary systems a transdiscipline and its inherent emergentist systemism makes the edifice of disciplines a transdisciplinary, common endeavour of all science. Semi-permeability does not lift the boundaries. Relative autonomy of disciplines is maintained in the overall transdisciplinary network.

3. Emergentist informationism

Paraphrasing Bunge, informationism is a term used here to denote a praxiological perspective on, an ontological conception of, and an epistemological way of thinking about, information, which takes centre stage in this tenet. For the sake of consistence, information is set to be based upon, and concretise further, systems, in particular, emergent information shall easily relate to emergent systems. This can be achieved through the assumption of informational agents – agents being emergent systems. Thus, the generation of information is enshrined in the self-organisation of systems. Any time a system self-organises, its agency brings forth information. An evolutionary system can be defined as ‘a collection of (1) elements E that interact such that (2) relations R emerge that – because of providing synergistic effects – dominate their interaction in (3) a dynamics D . This yields a distinction between micro-level (E) and macro-level (R) and a process (D) that links both levels in a feedback loop’ (Hofkirchner, 2013a, 105). With reference to, but in modification of, a triadic semiotics after Charles Sanders Peirce (2000), laying emphasis on the intrinsic connection of self-organisation with negentropy after Edgar Morin (1992, 350 and 368) and by usage of the term ‘perturbation’ introduced by Humberto Maturana and Francesco Varela (1980), information can be defined as ‘relation such that (1) the order O built up spontaneously (signans; the sign) (2) reflects some perturbation P (signandum/signatum; (to-be-)signified) (3) in the negentropic perspective of an Evolutionary System s_e (signator; the signmaker’ (Hofkirchner, 2013a, 171). ‘Information is generated if self-organising systems relate to some external perturbation by the spontaneous build-up of order they execute when exposed to this perturbation. In the terms of triadic semiotics, the self-organising systems, by doing so, assign a signification to the order and make it a sign which stands for the so signified perturbation’ (Hofkirchner, 2013a, 172).

This is the approach of a Unified Theory of Information (Hofkirchner, 2013a). It is worth noting that those assumptions attribute information generability to emergent systems according to the evolutionary type they represent. Not only social systems and their inhabitants are qualified as informational agents (this would import the acceptance of Umberto Eco’s threshold of semiosis applicable to the realm of human culture exclusively), not only biotic systems (this is the threshold of biosemiotics) but also physical systems in so far as they are able to self-organise are qualified to generate information in shades – as far as the respective evolutionary stages allow. Emergent systems of any kind produce emergent information.

As to the new scientific edifice, informationism is mounting

systemism. Systems philosophy becomes a systemic philosophy of information; systems methodology becomes a systemic information methodology; the sciences of real-world systems become sciences of information of real-world systems, that is, of material information, living information and social information; and the science of designing artificial systems becomes the science of designing information in artificial systems. All that information is emergent information.

4. Emergentist convivialism

Convivialism is a term denoting a social perspective (praxiology), a conception of the social world (ontology) and a social-scientific way of thinking (epistemology) for which conviviality is key. Conviviality as term was introduced by the Austrian-American writer, Ivan Illich, who published a book with the title *Tools for conviviality* (1973). It contained a philosophy of technology according to which technology should be socially controlled so as to reclaim personal freedom that is restricted by uncontrolled technological development. Conviviality – Illich was familiar with the Spanish term *convivialidad* – has Latin origins and means the quality of living together in the manner of dining together (*convivor*) of hosts (*convivator*) and guests (*conviva*) at common feasts (*convivium*). In the last decade, that term gained new attention when mainly about forty French intellectuals – among them Serge Latouche, Edgar Morin or Chantal Mouffe – opened the discussion on a political manifesto for the redesign of social relations. The first manifesto was followed by a second, up-dated one in 2020 (*Internationale convivialiste*). According to the latter (English quote after *Convivialisme*) convivialism ‘is the name given to everything that in doctrines and wisdom, existing or past, secular or religious, contributes to the search for principles that allow human beings to compete without massacring each other in order to cooperate better, and to advance us as human beings in a full awareness of the finiteness of natural resources and in a shared concern for the care of the world. Philosophy of the art of living together, it is not a new doctrine that would replace others by claiming to cancel them or radically overcome them. It is the movement of their mutual questioning based on a sense of extreme urgency in the face of multiple threats to the future of humanity. It intends to retain the most precious principles enshrined in the doctrines and wisdom which were handed down to us.’

Convivialism is emergentist if seen in the context of emergent systems and emergent information. Social systems are here considered as evolutionary systems, which is in stark contrast to how German sociologist Niklas Luhmann (1995) considered them (Wan, 2011). Though Luhmann originally claimed to start with General System Theory when elaborating his theory of social systems, a revisiting of Bertalanffy would lead to different conclusions (Hofkirchner, 2019). Such an approach has been pursued not only by Bunge but also by members of Ervin Laszlo’s General Evolution Research Group, among them Robert Artigiani (1991), by representatives of Critical Realism, in particular Margaret S. Archer (1995, 2003; 2007; 2010; 2012) and her project group on Social Morphogenesis at the Centre for Social Ontology, and workers departing from US sociologist Walter F. Buckley (1967), including the economist Tony Lawson (2013) and the relational sociologist Pierpaolo Donati (Donati, 2011; Donati and Archer, 2015). Of course, many other sociologists are worth mentioning; even if they do not explicitly share a systems approach, they have nevertheless contributed with important insights to such a framework (Giddens, 1984; Alexander, 1995; Muzel, 1995; Reckwitz, 1997).

Social systems are the evolutionary product of living systems but contain living systems that get a social shape. The elements of social systems as conceived here are social agents – humans called actors – and their organisational relations are social relations – called structure. Actors inhabit the micro-level of social systems, while the macro-level is where the structure is located. The structure is produced by the actors and it exerts a downward causation on the actors and their agency (Hofkirchner, 2013b, 136; Lawson, 2013). Thus, social systems

self-organise as living and material systems do, but they differ from living and material systems as to their mode of self-organisation. 'Social self-organisation goes beyond biotic self-organisation, which, in turn, goes beyond physico-chemical self-organisation' (Hofkirchner, 2014, 120). Social self-organisation does so in that it transcends, re-invents, creates the social systems through the action, interaction and co-action of their actors, who – as informational agents – cognise, communicate and co-operate mindfully when reproducing and transforming their social systems, which, in turn, can be considered as higher-level informational agents.

Social self-organisation is not conceivable without the generation of specific social information. The Triple-C Model postulates a hierarchy of information processes such that cognition is the necessary condition for the functioning of communication and communication the necessary condition for the functioning of co-operative information, in short, co-operation (Hofkirchner, 2013a). Psychic functions such as thought and others, the ability to speak and the ability to devise and manufacture artefacts, in particular, tools, are characteristic of humans. All of them are knit together in social information: 'Human thought is part of human cognition [...]; human language is part of communication [...]; human tools are part of work that belongs to human co-operation' (Hofkirchner, 2016, 286). Starting with work at the top (which refers to the structure on the system's macro-level), it is about constituting common goals and instituting common goals. Work is consensual. Co-operation involves finding and building consensus. What is needed here, are common intentions. Common intentionality provides the perspective of the whole We, the perspective of the social system. Consensualisation, in turn, presupposes a certain collaboration that designs specific tasks for reaching the shared goals and assigns these tasks to certain actors. That is done on the social information level below, on the level of language (which refers to the network of interactions the actors form on the system's micro-level). Communication functions as the means to realise that kind of collaboration that is needed for the upper level. That is, taking the perspective of the other facilitates collaboration. However, taking the perspective of the other is promoted by taking the perspective of the whole in which one's own and the others' roles are included. What is required here, is readiness for a dialogue with sense for concilience. Collaboration, in turn, presupposes a certain co-ordination that devises certain operations for fulfilling the tasks and supervises certain actors in performing the operations. That is worked out on the lowermost level, on the level of thought (which refers to the actions of the individual actors who are also located on the system's micro-level). Cognition allows the actors to understand what kind of co-ordination is needed by the upper level. It enables the actors to reflect upon the relationship between operations, tasks and goals. What is necessitated here, is reflexivity, the capacity to reflect the social context in which the cognising actor is embedded (Archer, 2010), and conceptuality, the capacity to use concepts, all of which are influenced by verbal language (Logan, 2007, 2014).

The rationale of every complex system is synergy (Corning, 1983, 2003). Agents produce synergetic effects when co-operating systemically – effects they could not produce when in isolation. In social systems, synergy 'takes on the form of some social good. Actors contribute together to the good and are common beneficiaries of that good – the good is a common good, it is a commons' (Hofkirchner, 2014, 121). The social relations are commoning relations.

Conviviality then, as a feature of emergent social systems with emergent social information, can be determined as the historical-concrete shape of the commoning relations. It is a social value that is highly esteemed, it is a theoretical conceptualisation of a social practice, and it is a measurand the value of which can be estimated by empirical studies – it is all of them in one because it is an expression of the quality of the commoning relations. It expresses how just those relations are constructed, how equitable, free and solidary, and to which degree they enclose or disclose the commons. Conviviality is visionary and longs for actualisation. Its actualisation would 'make the social systems inclusive

through the disclosing of the enclosed commons and, by doing so, [...] warrant eudaimonia, a good life in a good society, the flourishing of happy individuals in convivial social relations' (Hofkirchner, 2017b, 286).

Having defined the commons as social synergy and conviviality as measure of the actualisation of envisioned commoning relations, the Critical Theory perspective becomes apparent (Hofkirchner, 2015, 97–99) – the perspective of a Critical Social Systems Theory as part of the social systems sciences in the new edifice of disciplines.

Conviviality is emergent. It develops over time and changes its forms in a contingent way. Referring to Michael Tomasello's Shared Intentionality Hypothesis and his Interdependence Hypothesis (Tomasello et al., 2012; Tomasello, 2014, 2016), there have been two key steps in anthroposociogenesis (the becoming of humans and society) so far and, following the new systemic, informational and convivialist paradigm, a possible third one is imminent. The next subsections discuss those steps.

4.1. The dyads

Leaps in quality emerge in systems as novel organisation due to a change in the organisational relations. Thus, changes on the top-most levels of information generation and usage are decisive. All of them are shifts in co-operation.

If work, language and thought build the human/social hierarchical levels of information from a synchronic point of view, then, from the diachronic point of view, it may well be assumed 'that it is conditions of co-operation that made the difference in evolution. Evolutionary pressure unfolded a ratchet effect that yielded ever higher complex co-operation' (Hofkirchner, 2016, 287). The state of co-operation in the ancestors of humans is the origin of anthroposociogenesis. Self-reinforcing processes came about. Changes in the state of co-operation proliferated down to provoke changes on the level of communication – the development of human language – in order to propel co-operation and changes in the state of communication proliferated down to provoke changes on the cognition level – the development of thinking – in order to propel communication.

In the beginning, so Tomasello, there was a shift from individual to joint intentionality. Individual intentionality of common ancestors of chimpanzees and humans was the point of departure about six million years ago. As living together was driven by self-interest of animal monads, there was no need for taking in consideration common goals, no need for thinking on a level beyond the actual ego-centric perspective (Tomasello, 2014, 4, 30). Early humans began to speciate only when they took advantage of going beyond individual intentionality and adopted 'more complex forms of cooperative sociality' (31). A first step occurred 'in the context of collaborative foraging' (33), that is, the hunting of large game and gathering of plant foods, around 2 million years ago. This step culminated about 400.000 years ago, when joint intentionality emerged. Hunters and gatherers developed dyadic co-operations driven by a 'second-person morality' (2016, 6). Hence a need for acknowledging a common goal, that is, an understanding that the partner shares the goal and both are committed to act according to its achievement. Multiple and vanishing dyadic relationships formed in which early humans shared a joint goal. In order to support the negotiation of joint goals and the coordination of collaboration, human communication originated with 'a commitment to informing others of things honestly and accurately, that is, truthfully' (2014, 51). Cognitively, 'when early humans began engaging in obligate collaborative foraging, they schematized a cognitive model of the dual-level collaborative structure comprising a joint goal with individual roles and joint attention with individual perspectives' (69).

This was a premature state of conviviality. Dyadic co-operation guaranteed the common good for the included actors.

4.2. The triads

The shift from individual to joint intentionality was followed by a shift from joint to collective intentionality. Collective intentionality emerged with early humans about 150.000 to 100.000 years ago. This shift occurred with the advent of culture, that is, of separate and distinct cultural groups, the interdependence that caused co-operation reigned 'not just at the level of the collaborating dyad, and not just in the domain of foraging, but at the level of the entire cultural group, and in all domains of life' (Tomasello, 2016, 85). This step created objective morality (6). Co-operation became triadic. Since then a need for group-thinking has become characteristic of humanity, that is, knowing that any person belonging to the same group culture can be expected to share the same values and norms – by constructing a meta-level such that any group member can imagine the whole of the group, the roles taken, her own as well as others' replaceability. In line with that, communication was to start with discourses about 'objective' facts in need of compelling arguments and cognition had to turn into full-blown human reasoning; 'the individual no longer contrasted her own perspective with that of a specific other [...]; rather, she contrasted her own perspective with some kind of generic perspective of anyone and everyone about things that were objectively real, true and right from any perspective whatsoever' (Tomasello, 2014, 122). Cognition involved a new feature of generalisation capacity.

This was the next step of conviviality. The third of the triad is relations of society that relate individuals to each other with respect to the common good – even if the concrete content of the common good became a matter of disputation and conflict.

4.3. An omniad

And today, a third step of anthroposociogenesis can be hypothesised. There might be a shift from collective intentionality to one that is shared universally, that is, on a planetary scale. That would be the transition to another convivial regime – an extension of the triad to the whole of humanity, an omniad. This extension would be necessary because the conflict over the commons has reached an extension that endangers conviviality at all and the curbing of the extension of the conflict over the commons by extending the triad to an omniad can be considered possible, which is discussed in the sub-subsections to follow.

4.3.1. The Great Bifurcation

Another step is necessary, given that it is agreed that there shall be a human future, which is tantamount with a humane future (Hofkirchner, 2017b).

In the course of evolution, complex systems move on trajectories on which bifurcations occur. They occur if and when the provision of synergy effects becomes problematic. Bifurcations force the systems to change their trajectory. The old one cannot be continued any more. It bifurcates into a variety of possible future trajectories. There are two of them that span the whole variety in the possibility space between two extremes: systems might be able to achieve a leap from the previous level of evolution on which they could enjoy a steady state onto a higher level which forms part of a successful mega-evolution (Haefner, 1992, 314; Oeser, 1992, 103–104) – a breakthrough to a path that transforms the systems into what is called meta-system (*The Metasystem Transition*) or supra-system – or they might even not be in the position to avert devolution – a path that leads to the breakdown of the systems. Amplified fluctuations of parameters indicate the crossroads that demand taking one path or another. The nonlinear dynamics of complex systems make the crossroads appear in one as windows of opportunity to spiral upwards and as tipping points that let the systems spiral downwards into oblivion (Laszlo, 2001, 2006).

Complex systems that can be observed today are those that could manage so far to harness synergy.

The evolution of social systems is no exception. 'Today, enclosures of

the commons have been aggravated to such a degree that all of them morphed into global challenges. Global challenges drive an accumulation of crises that mark a decisive bifurcation' (Hofkirchner, 2017a, 10). Not only do global challenges cause a multi-crisis in the tension between, and among, social systems from the granularity of today's nation states down to the granularity of the smallest units made up by individualised actors, cutting across all social areas such as the cultural, the political, the economic, the ecological (eco-social) and the technological (techno-social) area and affect so humanity as a whole, but they also threaten, for the first time in human evolution, with the ultimate impact for humanity – with extinction. Thus, that decisive bifurcation, in which a branch is much sought after to lead out of a dead-end branch, is called here the Great Bifurcation. That term resembles Karl Polanyi's term of the Great Transformation (1944) in that it embeds the conflict of market capitalism with democracy – the point that was of utmost importance to Polanyi – in the complex systems context of anthroposociogenesis. 'Either the social systems that together constitute mankind undergo a metasystem transition onto a higher level of organisation that allows the continuation of social evolution on Earth or they, eventually, fall apart and discontinue anthropogenesis; either they succeed in rising their complexity such that they break through to a new step in the mega-evolution of humanity or there is a decline in complexity, a breakdown and devolution; either their differences can be integrated or they disintegrate themselves' (Hofkirchner, 2020a, 1).

4.3.2. The Global Sustainable Information Society

Another step is not only necessary for a surviving and flourishing humankind. It is also possible and the reason for that is not only that such a step is grounded objectively in the possibility space given by the bifurcation. Moreover, humans can be conceded the subjective potency to find the right way out of the crossroads, in particular, since the problems they come across are of anthropogenic origin and can be solved by a proper re-organisation of the social systems. They can view the evolution of humanity from the inside, explore and anticipate the way out and, finally, intervene accordingly (Laszlo, 1987, 2001; 2006). They belong to the first species on Earth that can overcome self-made problems in the sharing of synergy.

Any emergent system can boost emergent information to catch up with the complexity of the challenges. 'If there is a mismatch between the complexity of a system and the complexity of the problems faced by the system, that system can catch up. [...] Intelligence is the capability of self-organising systems to generate that information which contributes in the best way to solving problems. The better their collective intelligence, that is, the better their problem-solving capacity and the better their capability to generate information, the better their handling of the crisis and the order they can reach. Higher complexity not only signifies a higher degree of differentiation. At least as importantly, it signifies a new quality of integration. Only a new level of integration can deal with an intensification of differentiation' (Hofkirchner, 2017a, 10). This can be called the law of requisite information (Hofkirchner, 2020a, 3) that is elaborated on the basis of W. Ross Ashby's law of requisite variety (Ashby, 1956). According to the latter, a system is said to be able to steer another system, if the variety it disposes of corresponds, if not surpasses, the variety of the system to be steered. By departing from the narrow cyberneticist view through connecting variety with complexity and complexity with information and extending the reach of that which is to be steered from the outside to the inside, it can be concluded: 'Requisite information is that appropriate information a system has about the complexity of the exterior and interior environment. Requisite information safeguards the functioning of the system' (Hofkirchner, 2020a, 3).

Humanity entered the Great Bifurcation because 'the social relations of any partition of humanity are based on the principle of othering of partitions that are considered outside of them, thus not doing justice to legitimate self-interests of the rest of the partitions. Frictions [...] are caused by the lack of relations that would be valid for all partitions from

a bird's eye view, that is, from a meta-level perspective. The establishment of such relations would mean the abolition of those frictions by a new supra-system in which all existing systems take part and shape according to the new relations on a higher level, following the application of the subsidiary principle as a basis for the preservation of diversity and autonomous agency" (Hofkirchner et al., 2019, 455). Despite some literature based on biases due to biologism unable to imagine a transgression of the conceptual framework of the nation-state We, transnational relations have been taking shape. There is empirical evidence of co-operation between culturally homogeneous groups several tens of thousands of years ago, between cities around five thousand years ago, and between modern states since the seventeenth century (Messner and Weinlich, 2016; Neumann, 2016; Grimalda, 2016). 'This co-operation between collective actors like groups, cities and states has already been paving the way for co-operation among the whole of humankind in the same way that dyadic, interpersonal co-operation between individual actors opened up the space of possibilities for triadic, societal co-operation' (Hofkirchner et al., 2019, 455).

The term information society is gaining a new meaning. It does not mean a society that is only informatised, that is, penetrated by information technology as a report to France's president originally insinuated (Nora and Minc, 1978). It means an informatised society only if that society uses its informatisation for becoming informational in a non-technical sense. Becoming informational entails becoming sustainable and becoming sustainable entails, in turn, becoming global. Such is information society on the point of obtaining another meaning in the context of Critical Social Systems Theory, which crystallises as Critical Information Society Theory. It points towards the Global Sustainable Information Society as a framework (Hofkirchner, 2017c):

- Informationality of the Global Sustainable Information Society means 'the envisioned state of informedness of informational actors and systems in which they will catch up with the complexity they are challenged by the Great Bifurcation to such an extent that [...] they will dispose of the capacity to recognise the causes of the global challenges in order to accordingly re-organise human life on Earth to master those challenges' (Hofkirchner, 2020a, 2). Informationalisation signifies the provision of social information for the installation of safeguards against the deprivation of commons world-wide and thus a new step in the evolution of conviviality.
- The provision of such safeguards, in turn, is the process of executing sustainability. Sustainability in the framework of the Global Sustainable Information Society does so receive a new meaning too. It means 'the envisioned state of the world system that will be shaped and shaping the social relationships between all parts, and throughout any part, of humanity pursuant to the commoning relations on the higher level' such that 'dysfunctions in the working of the organisation of the social system are kept below a threshold the transgression of which would discontinue social evolution' (Hofkirchner, 2020a, 2).
- The higher level on which the commons shall be provided, is 'the envisioned state of world society as an integrated meta- and supra-system in which social relationships will connect all parts of humanity in all fields of human life', which, eventually, conveys a new meaning to globality in the context of the Global Sustainable Information Society. "These commoning relations need to be lifted onto the planetary level, and the emerging superordinate system will nest all actors and systems according to the new expanded commoning relations. By that, global governance is carried out" (Hofkirchner, 2020a, 2). Globalisation signifies the provision of the commons worldwide.

The notion of the Global Sustainable Information Society is far from a blueprint of the future society but describes which necessary conditions need to be met if the Great Bifurcation shall be successfully passed.

There are three imperatives of social information that must be

obeyed so as to enable actors to take that next step in the evolution of convivial humanity. On the co-operative level, normative, value-laden information must become hyper-commonist, that is, it must orient the consciousness and conscience of the actors towards the reclaiming of the commons in a universal manner; on the communicative level, dialogical information must become all-inclusive, that is, it must not exclude any actor in a universal conversation about the common good; on the cognitive level, reflexive information must become meta-reflexive, that is, it must be concerned about changes of the meta-level that is a universe for all actors (Hofkirchner, 2017c).

In order to accomplish that third step in conviviality, those imperatives, investigated by social sciences and humanities, need to be provided to civil society by translational sciences, all of them integrated and implemented by the new paradigm shift as transdisciplinary basis. Scientific thinking as well as everyday thinking need to support each other in the comprehension and tackling of the next step. Thus, emergentist systemism, informationism and convivialism, shifting research to a remedy for the global challenges, to a reconciliation of determinacy and indeterminacy, and to a logic of emergence, are no academic exercise of no avail. Also, common sense is, in principle, capable of understanding those issues of the paradigm shift as well as becoming activist on that premises. The step will be an unprecedented revolutionary one. Revolutionary thinking 'needs to focus on future social relations that are not yet actualised. It needs to anticipate them ideationally on a new meta-level, it needs to anticipate the meta-/suprasystem transition of the social systems.' And, taking up an idea of Ernst Bloch (1967), it 'does not only need to anticipate what is desirable but needs to explore which desirable is also possible in the here and now. Only what is potential can be actualised. Thus, it looks in the space of possibilities now for the foreshadowing of something that might become a future Third' (Hofkirchner, 2020b, 4).

5. Conclusion

The conclusion is that the current state of human evolution has been reached as emergent response to requirements of co-operation through two steps in anthroposociogenesis, namely, from the living together of individual monads towards a joint interaction in dyads and from that to a collective working together that was mediated by social relations – which are the social system's relations of the organisation of the commons – such that a triad has taken over the co-action of humans: a meta-level was constructed as a Third that relates the interaction of the group members as a Second and any action of a member as a First. Now that global conditions require global co-operation, the Third needs to be extended to another level ushering in a new phase.

Current discourses on whether or not our time shall be called Anthropocene or whether or not we can stop the climate change or prevent pandemics like the COVID-19 one, are dominated by pejorative connotations and negative imaginaries of the future. They lack a focus on the real potentialities of humanity that is just on the point of going through a possible next step of social evolution. Extermination is the risk of the crisis. Meta-reflexive global citizens, engaging in a global dialogue can kick off the emergence of global governance and thus solve the crisis.

Such an account can be reached by a paradigm shift towards emergentist systemism, on the basis of which emergentist informationism is elaborated, on the basis of which, in turn, emergentist convivialism is elaborated. From that perspective, the Great Bifurcation can be regarded as a problem of coming-of-age of humanity. By accomplishing that evolutionary step, the rise of co-operative organisation would enable 'the emergence of a coordinated and integrated global entity' (Stewart, 2014, 35) not seen before.

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