Reconstructing Main Epistemological Issues in Contemporary Social Thought: Contributions from Chaos/Complexity Theory

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This paper seeks to provide an extended critical overview of crucial issues and dilemmas within contemporary social thought, as well as within the wide field of social science theory and methodology. In this context, it offers some necessary theoretical stimulations and perspectives to re-think seriously and imaginatively and to re-decide about the persistent, complicated, ambiguous and highly disputed topics of predictability/unpredictability, reflexivity, and normativity (ethics). It is argued that useful synthetic insights from chaos/complexity theory can and should play a significant role in correcting well-established lines of thought (namely, realism and critical realism), as well as in adequately addressing these crucial general issues.

Key words: sociology, epistemology, knowledge, methodology, realism, chaos/complexity theory

1. Introduction

Chaos and complexity are frequently not fully understandable to many people. However, they both have undoubtedly altered – and continue to alter – the way in which we daily experience and confront ourselves, the others, and our social/physical environment. In the course of the last decades, they have gradually formed an overwhelming conceptual pair that has challenged, doubted and de-stabilized our "old", "traditional" or "received" analytic frameworks within which we perceive and perform our individual and collective lives.

Although "complexity theory" is usually involved with the spontaneous emergence of silence (well-organized behaviour) out of noise (many heterogeneous elements), while "chaos theory" explores how silence (sim-

ple systems) gives rise to noise (complicated unpredictable behaviour),[1] the present article will particularly refer to "chaos/complexity theory" as a (more or less) joint line of thought, as well as to "chaos/complexity" as an inherent natural and social force (an essential feature), in direct contrast to "order" – that is, an emerging human tendency.

It is exactly the latter tendency that often makes us to treat various instabilities, fragilities and uncertainties as fully predictable. In other words, it makes us suffer from the so-called "illusion of control", which assumes predictability and implicitly pervades all aspects of our "fluid" daily lives (with perhaps innumerable negative implications for our psychosocial well-being); it silently fools all of us "into thinking the future is more predictable and less uncertain than it really is" (Makridakis, Hogarth and Gaba, 2009: ix).

The chaos/complexity innovative analytic framework might possibly help us to reflect critically and responsibly upon this catastrophic social "illusion", as well as to understand better and explain (in a non-reductionistic way) the overwhelming, speedy, interdependent/interconnected and "relational" phenomena that increasingly surround us, such as globalization, cultural diversity (multiculturalism), religious or national fundamentalism, ethnic conflicts, technoscientific change, etc.

For instance, as Anthony Giddens smartly observes, "globalization itself is far more than just an economic phenomenon. It's a set of processes that increasingly links our personal lives, even intimate aspects of them, to global events – the controversy over the Islamic headscarf is just such an example... The stage is set for a return to the social" (Giddens, 2006).

Within the wide field of debate provided by chaos/complexity, in general, we can clearly see that contemporary "human complex systems" are not predictable – at least, not beyond a relatively short "predictability horizon". In fact, even if we know the very initial conditions of any system to an astonishingly high degree of accuracy, unpredictability still reigns. But nevertheless we do not actually need predictability, periodicity, stability and equilibrium, exactly because we do not need a hopeless, colourless, dull and boring world!

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[1] For Ken Hatt, there are two specific differences between chaos and complexity: "first, chaotic behaviour usually results from the nonlinear interaction of a few equations while in complex systems many components are interacting… second, chaotic behaviour exhibits a sensitivity to initial conditions, which is not the case for complex systems that are, in some cases, quite robust and capable of persisting in response to a variety of conditions… Chaos can be seen, then, as a possible precursor or manifestation of complexity" (Hatt, 2009: 317).

We can also see that interdisciplinarity/transdisciplinarity (and, eventually, non-disciplinarity), in its very synthetic and integrative "nature", potentially re-shapes the condition of contemporary social/sociological thought, allowing us to overcome decisively the harmful dualistic schemes of thinking about the individual and society, action and structure, agency and system, subjectivity and objectivity.

The present work turns a highly interdisciplinary/transdisciplinary lens of chaos/complexity to main social epistemological issues (such as reflexivity and normativity), which have not been previously rendered so directly connected to chaos/complexity. Thus, it highlights the chaos/complexity's potential theoretical and methodological contribution to the present and future of social thought.

By responsibly adjudicating between alternative theoretical/methodological propositions and thereby interconnecting the currently isolated schools of thought, the permanent search for truth and knowledge is arguably becoming "open not closed, dynamic not static, inclusive not exclusive, current not outdated, affirming not denying, innovative not conservative and most of all, living not dead" (Whitworth and Friedman, 2009).[2]

This paper seeks to present an updated overview of the exciting "installation" of chaos/complexity in the changing realm of social thought, as well as a fresh source of inspirations for the promising relationship between chaos/complexity and social/sociological theories.

Through the valuable prism of chaos and complexity, it offers an extended critical discussion of crucial issues and dilemmas within contemporary social thought, as well as within the wide field of social science theory and methodology (such as knowledge, objectivity/subjectivity, structure/agency, self-organization, ethics and values). In this analytical context, it formulates some necessary theoretical stimulations and methodological perspectives seriously and imaginatively to re-think and re-decide about the persistent, ambiguous, complicated and highly disputed topics of predictability/unpredictability, reflexivity, and normativity.

2. Science and models of science

The general priority of epistemology (theory of knowledge), as the undisputed and necessary pre-condition for any research area or scientific field, has overwhelmingly characterized human inquiry from the very beginning of the Enlightenment to the middle decades of the twentieth century (see

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[2] We thus need to open up decisively the social sciences "not only towards the world, but also internally. The barriers between the various scientific disciplines need to be crossed" (Cilliers, 1998: 127).

e.g. Taylor, 1995). The "epistemological primacy" over "ontological questions" (that is, over the very object of things under investigation) is sometimes known as *epistemic fallacy*. In other words, epistemic fallacy is the reduction of being in favour of knowledge: "there are instances where the prominence of knowledge about something rather than on the 'something'. That is to say, there is a tendency to emphasize what we know about and not the object of knowing" (Resca, 2009).

In the second part of the 20th century, however, the emerging will to avoid "epistemic fallacy" raised the systematic theoretical need to balance carefully between epistemology and ontology, or between subjectivism and objectivism/realism (given that they are not radically incommensurable). This increasingly turned social researchers' analytic attention to the very "nature" of models and modelling – that is, modes of representing social phenomena.

In such an analytical context, the so-called "isomorphism" (ontological correspondence) implies that the model and the "real" research object are structurally similar (or analogous). According to the Dutch Distinguished Professor of Philosophy Bastiaan Cornelis van Fraassen (1980), this signifies what exactly science aims to offer (van Fraassen, 1980):

- "science aims to give us theories which are empirically adequate: and acceptance of a theory involves as belief only that it is empirically adequate… such a theory has at least one model that all the actual phenomena fit inside [p. 12] ... To present a theory is to specify a family of structures, its models, and secondly, to specify certain parts of those models [the empirical substructures] as candidates for the direct representation of observable phenomena" (p. 64).
- "The structures which can be described in experimental and measurement reports we can call appearances: the theory is empirically adequate if it has some model such that all appearances are isomorphic to empirical substructures of that model" (p. 64).

In parallel, the UCLA Professor Bill McKelvey analytically juxtaposes these salient theoretical points with the "plausibility theory" thesis, mainly characterized by the following elements (McKelvey, 1999):

- The law-like propositions of any theory should also be "based on a model…which expresses the common ontology accepted by the community" (p. 391). That is, any theoretical model should more or less represent that part of the real social phenomena defined by the very scope of the theory (ontological adequacy).

- Both increasing experimental adequacy and ontological adequacy (which increase plausibility) "are inductive grounds for a claim of increasing verisimilitude…" (p. 391).
- "The content of a theory consists of a pair of models…, that is, both the descriptive [ontological adequacy] and the explanatory [experimental adequacy] model" (p. 393) should represent the real phenomena. As science evolves and progresses, this pair of models would merge into one model.

McKelvey (1999) concisely concludes that these elements lead to a "model centered strategy in science", or a "New Science", according to which the socially constructed and epistemically relativist (and fallible) model is located at the very heart of the scientific method. The social researcher thus develops and demonstrates the ontological adequacy and experimental adequacy of this model by reference to empirical substructures, observed phenomena and counter factual arguments.

This fruitful line of thought heavily draws on the realist philosophy of John Searle (1995), who comprehensively argued that "realism and a correspondence conception [of truth] are essential presuppositions of any sane philosophy, not to mention of any science" (Searle, 1995: xiii). In direct contrast to idealism, for Searle (1995: 150), "the world (or alternatively, reality or the universe) exists independently of our representations of it". Within such an analytic framework, empirical science should strategically seek to formulate true explanatory theories or, at least, to continue to challenge, question and criticize its theories, always keeping a distinction or hiatus between objective knowledge and subjective knowledge (see Popper, 1992). In the same line, Mario Bunge (2001) describes an objective reality (arranged in levels and distinctly different from the conceptual world), where qualitatively new phenomena can spontaneously emerge from lower levels (emergence). This argument was systematically elaborated by critical or relational realism.

3. The tradition of critical realism

In general, critical realism[3] primarily aims to re-explore the possibility of naturalism in the social sciences and can be characterized as a "third way" (a middle ground) between the positivist/naturalist tradition (philosophically grounded on the work of Hume, Comte, Mill, Mach, and the Vienna Circle) and the anti-positivist/anti-naturalist tradition (philosophically grounded on the work of Vico, Kant, Hegel, Dilthey, Husserl, and Wittgenstein).

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[3] "Critical realism" is a denomination that arose by the purposeful elision of the terms "transcendental realism" and "critical naturalism".

The main representative of critical realism, the British philosopher Roy Bhaskar, assertively argues that, within the mentioned analytical context of epistemic fallacy, ontology is (somehow, simply or sophisticatedly) reduced to "our ways of knowing" and "our knowledge of it" (Bhaskar, 1989: 181). In fact, as William Outhwaite comprehensively concludes, both empiricism and idealism "reduce ontology to epistemology, questions about being to questions about our knowledge of being. And in so doing they also retain an implicit ontology of the 'empirical world'" (Outhwaite, 1987: 32).

Moreover, the critical realist view is principally based on the distinction Roy Bhaskar made between the "intransitive" and "transitive" aspects of all scientific inquiry. Where "intransitive" aspects of scientific inquiry refer to those deep causes, sequences, mechanisms in the natural and social worlds which exist "independently of identification by human beings" (Bhaskar, 1989: 17), the "transitive" objects of science refer to human knowledge and understanding of the independently existing world of things (Bhaskar, 1989: 18).[4] That is, transitive objects of science refer to the "human descriptions of reality" and intransitive to the independent "reality which the [transitive descriptions] attempt to describe" (Outhwaite, 1987: 35).

Critical realists openly reject all forms of idealism, rationalism, or solipsistic relativism, insisting instead on a real world of things independent of human beings (that is, a real world which has not been constructed, defined or is in another way dependent on humans).

This is no less true in the human and social sciences as in the physical and natural realms. According to critical realism, there is a real physical and social world of independent phenomena which cannot be reduced to language or discourse or human constructions of knowledge.

But, by scholastically focusing on overcoming "epistemic fallacy", as well as on studying structure at the expense of culture and agency, critical realists (with the remarkable exception of William Outhwaite) have not paid adequate attention to meaning and language.

Nevertheless, language is indeed *real* and has to be systematically theorized as an irreducible "causal power", which silently structures the social and physical world *as meaningful*. So, critical realism does not really succeed to address efficiently the radical difference between two competing lines of thought:

(1) On the one hand, the Marxian tradition and the concomitant fear of committing the so-called "linguistic fallacy", or the "reification

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[4] Hence, Roy Bhaskar's analytical orientation is mostly upon the (unobservable) causal mechanisms creating the (observable) emergent properties of interdependent structural systems or ontological layers.

of language", which naively reduces the world to language (just as Rorty did), social action to "performance", and the human subject to an unstable patchwork of signifiers (the case of Baudrillard) or to an endless chain of discursive identifications, has unavoidably led to a serious underestimation of the causal power of language.

(2) On the other hand, the highly heterogeneous nexus of post-structuralism, post-modernism, deconstruction, psychoanalysis, feminism, gender and queer studies, archaeology/genealogy and other deconstructivist approaches, such as Rorty's neo-pragmatism, which often does not recognize anything "outside of the text" (Derrida) and has more or less tended to impede or delete the critical impetus of hermeneutics.[5]

4. The standpoint of chaos/complexity theory

More generally, Roy Bhaskar's persistent underestimation of language/meaning issues, as well as his monistic analytical emphasis upon the "rationality" of agents and the "reality" of entities, structures, generative mechanisms and causal powers, more or less abstracts his attention from the very *richness* of the social world and the human complex networks. This is exactly the field where new synthetic insights from chaos/complexity theory can offer useful corrections and orientations. In specific, chaos/complexity theory, elaborated below, can see what critical realism does not clearly recognize and acknowledge – that is, "the impossibility of connecting all elements together, the impossibility of complete observation and representation of phenomena that would require connecting each element with every other element" (Luhmann, 1995: 55).

According to David Byrne, the knowledge footsteps and epistemological claims of the scientific realism of Roy Bhaskar are fruitfully followed and creatively extended by chaos/complexity theory. He maintains that while "positivism was dead... and starting to smell" and the relativism of post-modernism was "bone idleness promoted to a metatheoretical programme" (Byrne, 1998: 37, 45), chaos/complexity is now offering the unique pos-

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[5] Unlike post-structuralism and post-modernism, hermeneutics does not, however, reduce the "sign" to a phantasmagoric play of "signifiers" without any "signified" (a real object or reference). It does not naively absorb or collapse the intransitive (ontological) into the transitive (epistemological) dimension. Language, after all, does not speak about itself, but about something else: being – whether this being is human or non-human (a cloud in the sky, a shower of sparks, the eruption of a volcano, a dog barking, or an airplane flying). What comes to language, what is expressed and "presents itself" in language is, in Gadamer's terms, "the world itself". Thanks to language, it has opened a window to the world itself *beyond language*.

sibility of "an engaged science not founded in pride, in the assertion of an absolute knowledge as the basis for social programmes, but rather in a humility about the complexity of the world coupled with a hopeful belief in the potential of human beings for doing something about it" (Byrne, 1998: 45). Moreover, for Byrne, "complexity accounts are foundationalist, although they are absolutely not reductionist and positivist… [and] are surely part of the modernist programme" (Byrne, 1998: 35). Of course, this brings critical realism and chaos/complexity theory very close.

For other scholars, however, complexity is best understood by postmodernists, particularly within the theoretical traditions of J. Derrida and J.-F. Lyotard, because their theories "have an implicit sensitivity for the complexity of the phenomena they deal with" (Cilliers, 1998: iix). Although Paul Cilliers agrees with Byrne that chaos/complexity is non-reductionist, anti-essentialist and anti-positivist, he notes that: "Claiming that self-organisation is an important property of complex systems is to argue against foundationalism. The dynamic nature of self-organisation, where the structure of the system is continuously transformed through the interaction of contingent, external factors and historical, internal factors, cannot be explained by resorting to a single origin or to an immutable principle… self-organisation provides the mechanism whereby complex structure can evolve without having to postulate first beginnings… It is exactly in this sense that postmodern theory contributes to our understanding of complex self-organising systems" (Cilliers, 1998: 106). Nevertheless, both authors reflect upon the chaos/complexity analytical framework as:

1. Directly opposed to both linearity and reductionism.
2. Hostile to the profound and unnecessary (even dangerous) relativism/nihilism of some strands of postmodernism.
3. Friendly to the (restrained) possibility of formal modelling in social research.

Let's now focus on the very "chaos/complexity turn". Especially since the early 1990s, the social sciences began to go "complex", with a significant array of relevant publications. Some innovative "popular" books within this field include Kauffman's *The Origins of Order*, Casti's *Complexification*, Arthur's *Increasing Returns and Path-Dependence in the Economy*, Nicolis' *Introduction to Non-Linear Science*, Luhmann's *Social Systems*, Krugman's *The Self-organizing Economy*, Jervis's *System Effects*, Rescher's *Complexity*, Holland's *Emergence*, Byrne's *Complexity Theory and the Social Sciences*, Kelly's *New Rules for the New Economy*, Cilliers' *Complexity and Post-modernism*, and Hayles' *How We Became Posthuman*.

From the chaos/complexity standpoint, the social world is seen as an open, non-linear and dynamic turbulent system, spontaneously self-produced, self-evolved and self-organized, within a continual flow of extremely rapid changes, an "infinite flux" (in Gilles Deleuze's terms) – with huge flows of information/communication, energy and matter flowing in and out.

The communicative system of Society, as Niklas Luhmann repeatedly and reflexively observed, has indeed "no centre and no head. Representation of the social totality is impossible and so is steering. The world may be adrift like a ship without moorings, but given that there is and can no longer be a captain on board to coordinate and steer the operations of the different subsystems, the rhetorics of anxiety of the critical theorists only show the superfluity of their normative mode of thought and their incapacity to come to terms with the hypercomplexity of modern societies" (Vandenberghe, 1999b: 55).

This novel analytical stance is consistently and creatively adopted by the new science called "Chaos" (originally developed and flourished within the field of physics). The science of Chaos (Gleick, 1987) is a science of change. It is the systematic study of non-linear processes, within dynamic turbulent systems (human or nonhuman). Characteristic examples of such systems are: the global economy and the global crisis, wars and armed conflicts, human beings and social organizations, romantic and intimate relationships, business and the stock market, science and technology, political campaigns and elections, the Olympic Games, football games and other sport events, the weather systems, the internet, World Wide Web, Web 2.0, journalism and journalism 2.0, etc.

We thus need to revise deeply the conventional ways of perceiving, conceiving and representing[6] the pluralized social universe. In such a messy context, leadership is no more a top-down phenomenon, an exercise of directly controlling outcomes and self-confidently predicting causes and effects (a tendency often found in the positivist school of thought). Traditional leaders must now realize the advent of new concepts and emergent paradigms.

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[6] Of course, representing the inherently complex social world *in toto* (as well as with full accuracy/certainty) is merely chimerical. Hence, the principal strategic aim of social simulation modelling should be variously to obtain a better (deeper) theoretical and empirical understanding of complex human processes, as well as of our own (scientific) meta-theories and hypotheses, rather than self-confidently and dogmatically to make accurate representations and full predictions – at least not beyond a relatively limited "predictability horizon". Additionally, the social researcher now learns peacefully to keep in mind "both how little the single scientist knows in relation to the total community of inquirers, and a respect for the complexity of reality" (Kalleberg, 2007: 141).

Keeping these in mind, and immersed in innovative social scientific efforts, complexity researchers systematically and methodologically explore the profound implications of local behaviours and actions for global structures and patterns, and conversely, the deep influence of global factualities on local discourses and individual choices (a dual, upward-downward, relational causality).

In this "relational" social research setting, where change is omnipresent, the social, (dis)order, (dis)organization and (mis)understanding reflexively come from chaos, heterogeneity, autopoiesis, agonistic competition, irreducible diversity, mutual evolution and emergence (there is always a disorderly low level).

In general, complexity research seeks to carefully identify, challenge and reconstruct some of the fundamental modes of thinking, living and working in contemporary human complex societies. These "networked" societies are inherently chaotic systems – that is, *both* deterministic *and* unpredictable (this sophisticatedly reconciles the unpredictability of non-linear dynamic systems with a sense of *order* and *structure*).

In other words, a chaotic system may appear completely random, but there is always an underlying generative "real" order, deeper mechanisms and hidden patterns, rules and norms, which patiently wait to be dis-covered and un-covered (*therefore, there is not such a thing as "luck"*). But even if (positivist, essentialist or realist) social scientists someday arrive at the very final stage of "total" or "absolute" knowledge about these "hidden patterns, rules and norms", they will not be capable of predicting!

To put it very simply, a human complex society (as well as any other non-linear dynamic system) can never be fully contained in any way – even by its own "creator" (i.e. in the special case of a computer-simulated artificial society). So, any ambitious, long-term planning is inescapably doomed to absolute failure. What is actually needed here, consequently, is to reflexively include ourselves, as *both* researchers *and* social actors, within this *inherent* general unpredictability.

But complexity theory comprehensively considers non-linear dynamic systems *in between*: they are *neither* absolutely simple *nor* completely random (encoding thus some, potentially useful, information). This clearly signifies a constant cycling between chaos and order-creation. The region of emergent order-creation exists somewhere *between the edges of order and chaos*. Complexity permanently moves between order and disorder, between pure determinism and pure chaos, between simplicity and randomness.

It is therefore not totally incompatible with the critical realist claim to truth and (reflexive) objectivity (e.g. the claim to discover fundamental

laws of social action and organizational dynamics). As far as "uncertainty" is theoretically concerned, social science can and should return to its study "rather than the attempt to overcome it, and thereby, re-engage the centrality of questioning official knowledge. Researchers would be in a position to recognize their own biases and prejudices and, to the extent practicable, communicate those to the audience. They could be clear about their political objectives and offer a project for positive social transformation together with the now ubiquitous critique" (van Heertum, 2005).

5. The issue of self-organization

Self-organization is profoundly embedded in the core of the chaos/complexity epistemic worldview and "can occur dramatically and overwhelmingly, like a flood or a torrent moving between or across borders or boundaries" (Urry, 2005: 246). The central (emergentist) logic of self-organization theory is that system structures often appear (spontaneously) without any explicit pressure or involvement from outside the given system (e.g. the involvement of a "designer" or a "creator").
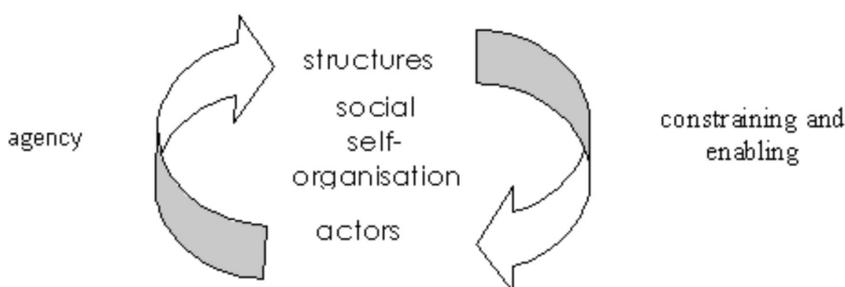
To put it differently, the various organizational constraints are exclusively internal to the system, resulting (bottom-up) from the very interactions among the heterogeneous constituent components and usually independent of the physical nature of those components. This fundamental logic conveys several philosophical-epistemological implications (cf. Fuchs, 2003b: 140):

1. "Self-organizing systems are shaped by a dialectic of determinism and indeterminism, necessity and chance. One can say that it incorporates both a closed causality and an open causality."
2. "Emergence means that many Ones that are opposed to and different from many Others synergetically produce a new Whole or Identical One."[7]
3. "Self-organizing systems are shaped by a dialectic of globality and locality: There are general principles of self-organization that apply to all types of self-organizing systems, but also specific principles for each special type of system."

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[7] Emergence pays attention to multiple levels of analysis (individuals, interactions, and social groups), with a special dynamic focus on the bottom-up and fully spontaneous, unplanned and unpredictable ways in which group phenomena irreducibly and irreversibly result from daily "performative" communication processes among social agents. Even a close and careful look at the constituent properties or elements and their interactions cannot forecast the whole process. Hence, emergence permanently forbids "strong" exhaustive explanations and predictions.

Systemic societal self-organization primarily involves permanent (micro-macro) processes of *both* agency *and* constraining/enabling morphogenesis, by which a system can uniquely maintain/reproduce itself and create its own unity, visions, values, codes and regularities (see Figure 1). No "pure" (strong) position outside the system can be assumed in order to see its "blind spots" (Luhmann) and determine its defining parameters (Cilliers, 2005b: 606).

Figure 1. Systemic societal self-organization *both* enables *and* constrains actions, individuality, creativity and innovation

Source: Fuchs, 2003a

It is almost customary nowadays for the social scientists and philosophers to formulate knowledge claims (or truth claims) in terms of the general notions of social constructedness, contextuality/situatedness, or discursivity. Making predictions has substantially moved "from totem to taboo … For all the proscriptions, predictive activity in sociology is commonplace … We do not highlight our predictions, however. They remain implicit in our work: colleagues can discern them, but they are not made explicit to a wider public" (Aldridge, 1999: 5.6). In fact, social scientists and philosophers no longer take risks for fear of being wrong – or of being falsified and, therefore, weak.

Nevertheless, self-organization entails that it is not enough for social/sociological theory to be "refutable" or "provisional" (Cilliers, 2005a); it should be definitely *weak and imperfect* because of the *co-emergence* of knower and setting, or knowledge and action/experience (see e.g. Maturana and Varela, 1987),[8] as well as because of the very *epistemological circularity* of the theoretical accounts on this co-emergence (Pels, 2003).

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[8] As enactivist scholars B. Davis and D. J. Sumara (1997: 110) have argued, knowing "exists in the interstices of a complex ecology or organismic relationality". In an "enactivist"

We must thus cultivate a self-reflexive ethos of imperfection, against all the purism and asceticism of truth-seeking, which still rages academic (sociological) research (Pels, 2003). The continuous attempt to understand (or to model) human complex systems necessarily involves epistemic modesty, as well as an ethical sense of epistemological weakness that especially focuses on our "natural" incapacity to predict.

Following the Nietzschean *Eternal Return*, the reflexive conception of self-organization requires from us to accept openly (and energize) the responsibility for our claims or models, although we know they are flawed. So, self-organization also involves generosity, justice, honesty, integrity and sincerity.

6. The issue of unpredictability

Modernity, as a social and historical category, has been closely associated to the "received" or "conventional" strong ambition to know, predict and manipulate (engineer) the world *in toto* with total certainty. Sociology's 19th-century founders strongly asserted that the discipline was about making *long-term predictions* and hence applying persuasive, practical and universally-applicable solutions to real-world social problems.

This was how social science originally invented and justified its idiosyncratic epistemic status, in direct contrast to religion or metaphysics, as famously expressed by the classical Comtean formula *savoir pour prévoir et prévoir pour pouvoir*, or by Charles Wright Mills's conclusion (combined with a strong critique of bureaucratic technocracy) that the ultimate "purpose of social science is the prediction and control of human behaviour" (Mills, 1970: 127).

Human life, however, is inherently dynamic: it is inescapably and ceaselessly changing and polymorphous (kaleidoscopic). In other words, it may be simple or chaotic, easy or hard, boring or exciting, happy or miserable, beautiful or evil. To put it very simply, *life is never the same*. Change is actually constitutive of all sorts of human co-existence/co-operation and social living over the ages.

Human behaviour is mostly ambiguous and non-linear; it is characterized by a varied disproportionality between (changes to) the input and the

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or "performativist" conception of social order, social structures, relations, patterns, connections and identities are real/imaginary quantities that exist only partially, because they are continuously "at stake" in attempts to render them a little bigger or a little smaller. We are all in the permanent business of re-negotiating, re-constructing and acting performatively upon them. Therefore, we all contribute to the "reality status" of what is described and explained (see Pels, 2002).

outcome (the so-called *butterfly effect*). In other words, a small cause often has large effects (see e.g. Hayles, 1991: 11). In addition, "similar causes can have different effects and different causes similar effects; small changes of causes can have large effects whereas large changes can also only result in small effects. Hence conceptualizing globalization as an aspect of self-organizing systems enables us to assume that in a globalizing world there are complex, non-linear causal relationships that are stretching across large spatio-temporal distances" (Fuchs, 2003b: 112).

That is why global (or glocal) social networks are chaotic systems: determinism is structurally coupled with the role of agency, surprise, contingency and unintended/unforeseen consequences and side-effects (unpredictability).[9]

- On the one hand, social institutions, networks and structures are inherently fragile, unstable and contingent because choice, imagination and improvisation are *ubiquitous and esoteric* in each and every individual and collective action. There are always new alternative (and unanticipated) roads to fruitful collaboration, innovation and creativity. The future is actually open, subversively enigmatic and potentially full of surprises (for better or for worse...).
- On the other hand, a systematic, well-informed and carefully detailed historiographical approach can easily demonstrate persistent (hidden) patterns, mechanisms and trends underlying the relative "directionality" of social and political change and evolution. Modern notions of "path dependency" now seem very relevant and realistic, so that they get seriously re-energized and re-introduced to the context of analysis. Common global developments are thus far from purely erratic and arbitrary, but still unpredictable in the long run (i.e. beyond the so-called *predictability horizon*).

Self-organized patterns of interconnections, interrelations and interdependencies are continually created and re-created through an "endless

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[9] Chaotic systems are intriguingly rule-based; they are both deterministic and unpredictable (both chaotic and systems) at the same time. Even very simple and explainable systems, whose parameters and rules of interaction are clearly defined, can exhibit chaotic behaviour. Chaotic systems generate behaviour with the appearance of complete randomness by means of a purely deterministic rule. Deterministic chaos shows sensitivity to initial conditions, in that small or trivial differences of a state (at any given moment) lead rapidly to multiple and widely diverging states. It rather seems that there is always a permanent undecidable tension, as well as a paradoxical demiurgic compatibility, between unpredictability (uncertainty) and determinism (certainty), between contingency and directionality. We therefore need to challenge deeply and radically and revise the old conventional ways of perceiving and conceiving our increasingly pluralized "post-human" social and historical universe.

dance of co-emergence" (Waldrop, 1992: 75). Therefore, any social theo-retical attempt to change (or to save) the world is indeed *too weak*: "social development can't be steered because society is a complex, self-organizing system" (Fuchs, 2003b: 164). Nobody can actually (voluntaristically or not) situate her/himself *above* societal dynamics, independent of her/his author-ity, prestige, institutional position or epistemological standpoint. In any case, this should not subtract from the huge importance and significance of (knowledgeable) human agency and intervention. Especially in periods of crisis and acute struggle, human agency and intervention can still make a decisive historical difference for all of us and for the next generations. But the very fact of "unpredictability" implies that we can never know what difference it will make!

Furthermore, the multi-scale nature and complexity of self-organized social networks are crucial features in better understanding (and model-ling) them. Both methodological and epistemological advances in human complex systems (see Tsekeris, 2009) are providing an integrated frame-work, without however achieving true (strong) predictive power of their behaviour. Of course, regularities are not excluded: "laws can be proposed and validated (or negated) via empirical means, but they can be formu-lated *only* in a *probabilistic* manner" (Katerelos, 2007). This particularly denotes that "unpredictability" and "indeterminacy", as significant consti-tutive features of the social world, should always be placed at the centre of the analysis.[10]

After all, what about the very future of human complex systems? A very simple, modest and pragmatic answer is that we just "cannot pre-dict or control this future, these futures. One lesson of Chaos Theory is that no-one else can, either. The will to predict is always doomed and counter-productive. Life, whether social, cultural or digital, is inherently complex" (Hodge and Lally, 2006).[11] This is indeed an *epistemologically weak* answer!

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[10] Within current complexity research, "unpredictability" is frequently used in two differ-ent senses (Katerelos, 2007): (1) On the one hand, it "involves the overwhelming failure of the modern sociological (and social scientific) projects to fully contain social dynam-ics, or to obtain full analytic access to future social and historical developments". (2) On the other hand, it "denotes an essential feature concerning the nature and character of all complex or chaotic systems … In a 'self-organizing' or 'autopoietic' social universe, where (dis)order, (mis)understanding and (dis)unity reflexively come from agonistic competition, irreducible diversity, mutual evolution, emergence, or chaotic noise..., the future just be-comes a mere possibility".

[11] A quite simple mathematical analysis could easily show that, even in simple and ex-plainable systems, which obey Newton's laws of motion, we cannot always and accurately

In the highly contingent, speedy, dynamic and risky universe of self-organized social networks, any strong, authoritarian "top-down" control (or promethean engineering) of information spread, opinion formation, free will and self-expression is completely impossible *and* undesirable. Equally undesirable is a predictable, linear, hierarchical, stable, orderly, homogenous and pure human world (*unpredictability is not a curse anymore*).

This would probably be a very hopeless, colourless, dull and boring world: A completely grey social universe (*against human nature itself!*). In addition, there is indeed a small degree of optimism about the future, by strategically focusing upon *critical possibilities rather than limitations*. As Immanuel Wallerstein perceptively notes, "the future... is open to possibility, and therefore to a better world … Hence we should act in order to realise an alternative, democratic, participatory, humane form of globalization that is based on global alliance technology, global ecological sustainability, global wealth, a global participatory agora, and a global noosphere. New forms of globalization and governance are needed, globalization is in need of global wisdom and global co-operation" (Fuchs, 2003b: 164).

The future dynamic evolution of emerging social networks (online *and* offline) can be coarsely projected up to a certain time horizon (*predictability horizon*), but it cannot be fully predicted with certainty and precision in the long run (see Katerelos and Koulouris, 2004). Namely, predicting the future of human complex systems could be rather considered as an epistemologically weak, irresolvable riddle. But the irreducible social, cultural and historical potential of dynamic social networking, re-creation, co-action, co-operation and self-organization is nevertheless here, for better or for worse!

7. The issue of reflexivity

Methodological reflexivity (also known as "epistemological circularity"), as a systematic means to deeper and better understanding of the complex "knowledge-making enterprise, including a consideration of the subjective, institutional, social, and political processes whereby research is conducted and knowledge is produced" (Alvesson, 2007), has been rendered one of the most attractive sociological buzzwords of our time, especially after the advent of chaos/complexity theory. In particular, the reflexive awareness

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predict what is going to happen next. This is because of a persistent instability, as well as of an undecidable multiplicity of forces that variously affect and act upon an object. For sure, any attempt to predict a simple system's future behaviour over long times will be defeated. Of course, this does not mean that we can say nothing about the dynamic properties and processes of the system.

of the *mutual dependency* of sociological categories (e.g. risk, citizenship, space, time, modernity, morality) and social practice has been increasingly brought right at the forefront of hot epistemological debates.

From the social epistemological standpoint of chaos/complexity theory, the self (including the epistemological/sociological self) is rather reflexively re-created; it is necessarily intertwined with the real world and dialectically re-constituted by the on-going, mutual, synergetic and self-organizing interaction of the ego with emergent structures and the other.[12] It thus appears *neither* as a mere "object" of knowledge, *nor* as an empirical ego that lacks autonomy, agency, imagination, choice, creativity, improvisation and spontaneity. In other words, the subject is not passive, self-assured and narcissistically private any more (see Tsivacou, 2005).

Instead of seeing subjectivity as an isolated, independent and self-contained locus of individual experience (according to the classical Cartesian ego), chaos/complexity theory, in the open spirit of Ludwig Binswanger (1963), fruitfully co-relates it with objectivity and inter-subjectivity, through an (endless) *uncertain circular-dialectical process*, without however reducing ontological questions to epistemological ones (just as Kant did), or "facts" to performative descriptions and interpretations, symbolic categories and conceptual frameworks.

Within the chaos/complexity (reflexive-realist)[13] framework, knowledge cannot and should not be erroneously confounded with the "recording and analysis of the 'pre-notions' (in Durkheim's sense) that social agents engage in the construction of social reality; it must also encompass the social conditions of the production of these pre-constructions and of the social agents who produce them" (Bourdieu, 2003: 282).[14] This is of course in line with Roy Bhaskar's or Pierre Bourdieu's stance of critical/relational realism, but not with Anthony Giddens's ultra-activistic structuration theory,

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[12] In parallel, what should also be reflexively recognized is the importance of the "I-thou" relationship (Buber, 1970), which was the very essence of the great Socratic dialogues. This relationship has been involved with the original introduction of second-person inter-subjective methodologies, such as Bohmian dialogue, leading to innovative forms of *"dialogic consciousness"* (Bohm, 1985).

[13] For the notion of reflexive realism, see Pels, 2000.

[14] Of course, this should carefully refrain from any sort of "last-instance" objectivism and decisively move towards a rather *never-ending reflexive dialectic* between micro and macro, action and structure, transformation and reproduction, individuality and sociality (or individual and collective action), randomness and simplicity, contingency and directionality, emergence and social causation (Sawyer, 2007), as well as towards a generalized critique of naïve/uncritical/unreflexive realism, reification and essentialism, at the level of *both* everyday world-making *and* professional scientific (sociological/organizational) analysis.

or with Berger/Luckmann's subjectivistic accounts of social constructivism, which implicitly reproduce and naively celebrate the old tradition of phenomenological individualism.

But, in the context of chaos/complexity theory, the eye of the "observer" (Luhmann) is always there. The very fact that these "social conditions" (or the "generative mechanisms") are only observable *through their consequences* raises the reflexive problem of their representation. That is, how do we know that invisible conditions, mechanisms, figurations or structures really exist? Who speaks for them (or in their name)? And who has accorded the essential primacy of the invisible (unobservable) over the visible (observable)? Such reflexive-critical questions about the representation of "noumenal" or "transfactual" entities, as well as about the role of their "spokespersons",[15] give us access to a genuine reflexive sociology of intellectuals (see Pels, 1999).[16]

From the reflexive-realist viewpoint of chaos/complexity theory, the radical constructivists should abandon their extreme ontological nihilism and make only *methodological* use of such notions as relativism, constructivism, performativity, and reflexivity. This will eventually show us "how 'reality' – that is, the descriptions, re-descriptions, and constructions of reality, but not reality itself, of course, which exists independently of those descriptions in the same way as the dog barks whether we have a concept of it or not – is 'performatively' constructed as a matter of course by their spokespersons. Such a move from ontological to methodological nominalism implies a consequent switch from a 'deconstructivist' to a genuinely 'constructivist' posture, from construction to something more akin to phenomenological constitution" (Vandenberghe, 1999a: 35, n. 7).

8. The issue of normativity

Hence, most importantly, our knowledge's own (unavoidable) circularity and self-organization should be openly acknowledged and actively celebrated. This explicitly champions a non-hasty and modest *"circular reasoning"* over arrogant and self-sufficient (self-immunizing) rationalist/foundationalist claims for intellectual access to totality. In other words, it explicitly champions the radical (early) ethnomethodological conception of (constitu-

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[15] Spokespersonship involves the ubiquitous, communication-dependent representational work of publicly performing, evoking, or making visible and available that which is absent and therefore falls outside the horizon of immediate control, which is not able to speak for itself (people, things, facts, or relations).

[16] Hence, chaos/complexity theory might potentially provoke an effective reflexive sensitization of the critical realist argumentation.

tive) reflexivity that comprehensively entails "the intimate interdependence between representation and represented object... such that the sense of the former is elaborated by drawing on knowledge of the latter, and knowledge of the latter is elaborated by that which is known about the former" (Woolgar, 1988: 33).

Such a kind of performative "knowledge politics" is *neither* self-refuting *nor* a relativism of the all-cats-are-grey variety (*weak knowledge is not "any" knowledge*), since it non-opportunistically offers itself as a weak and self-organizing criterion of truth, by critically displaying the dialectical "projective relationship between the spokesperson and that which is spoken for" (Pels, 2000: 17). This ultimately waives all authoritarian macho claims for "independent" realities, "transcendental" truths and "obligatory" epistemological foundations (Pels, 1995: 1036), paving however the enthusiastic and promising way to an ethically responsible and radically reflexive mode of critique.[17]

As the radical sceptical ethics of self-organization and circular reflexive reasoning is being brought right at the heart of current epistemological/sociological and interdisciplinary debates, we do maximize our fruitful chances to surprisingly discover a wholly new intellectual and academic life conduct: "Less egotism, both individual and collective, and more awareness of how we all constitute each other: this could be a path toward lowering intellectual acrimony in the future" (Collins, 2002: 70). In such terms, *caring for the other* signifies an essential normative prerequisite for both social and scientific living (Tsivacou, 2005: 520–522), against old modern hardness and classical power talk.

Paul Cilliers perceptively links complexity with the so-called normative dimension: "We only have limited access to a complex world and when we are dealing with the limits of our understanding, we are dealing with ethics" (Cilliers, 2005a: 261). Since innocent knowledge (or pure objectivity) is undoubtedly "chimerical" and the essential interconnectedness (togetherness) of our world cannot be denied or concealed anymore, we are now dramatically condemned to deal with matters of individual and collective responsibility: Making *choices* is completely inescapable.

The issue of normativity is hence intimately associated with "our very understanding of complexity. Ethical considerations are not to be entertained as something supplementing our dealings with social systems. They are always already part of what we do. One could attempt to deny that and

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[17] This also champions a creative on-going interplay between the ontological, the epistemological and the ethical, according to Karl Mannheim's famous "magic triangle" (Pels, 2003).

operate as if one can deal with complexity in an objective way – as if we can calculate everything – and thereby avoid the normative dimension. But this denial of the ethical becomes an avoidance of responsibility and is, of course, ethical in itself, albeit a negative (and much too prevalent) ethics" (Cilliers, 2005a: 264).

The essential and irreducible normative dimension is also involved with the classical issue of autonomy. Autonomy, guaranteed by open, un-interrupted and unbiased dialogue, meaningfully emerges as a necessarily socialized "moral principle in given historical communities" and spontane-ously elevates the self into the being who suffers from – and critically re-sists – systemic and organizational restrictions (Tsivacou, 2005: 519, 521). As Niklas Luhmann (1995) intriguingly observes, the concept of the World (*Welt*) paradoxically represents a demiurgic combination of restriction and freedom, suffering and resistance, determination and indetermination, unit and difference, the past and the future.[18]

Embracing the relational "normative dimension" thus helps us in see-ing ourselves *"with the eyes of the other"* (Heinz von Foerster), as well as in moving beyond the Enlightenment need for grand intellectual heroes, or compassionate social engineers (designing unflawed systems), and the utopian/narcissistic modernist dreams (delusions) of unlimited theoretical wisdom and epistemological perfection – without however devaluing sci-ence or eschewing issues of value, justice, politics and accountability.

It also helps us to expand radically the famous "it could be otherwise" vision (Charles W. Mills) of social thought, as well as to see "beyond the end of our noses" and seriously/responsibly assess the likelihood of (lo-cal) social change and emancipatory social scenarios, under the multiple restraints of the chaos/complexity framework.

9. Final considerations and future orientations

Recent theoretical and methodological advances within chaos/complexity social research in general help us seriously and imaginatively to re-think and re-decide about the persistent, ambiguous, complicated and highly dis-puted issues of predictability/unpredictability, reflexivity, and normativity (ethics). It is likely that many of the arrogant (self-assured) long-term pre-

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[18] In the same paradoxical line, psychic systems refer to both internal conflictual phenom-ena (*auto-reference*) and phenomena of the environment (*hetero-reference*), always using their own communications. So, "*everything seems to be negotiated on the edge between social and individual. Each time that our agents 'move' socially they destabilize their intra-consistency and, each time that they attain some kind of internal equilibrium, social influence comes to disturb them*" (Katerelos and Koulouris, 2004: 5.2).

dictions unreflexively and uncritically overestimate the role and limits of (social) science and technology.[19] The general conclusion that "we cannot make purely objective and final claims about our complex world", clearly entails that "we have to make choices and thus we cannot escape the normative or ethical domain" (Cilliers, 2005a: 259).

Without suffering from an "illusion of control", social scientists (researchers) have always to keep in mind that human societies are mostly fluid and complex/chaotic and, of course, do not work like a Swiss clock (cause and effect are not proportional any more). The essential principle of "sensitivity to initial conditions" makes us better understand the overwhelming existence of critical turning points everywhere in the social structure (e.g. the spread of a small piece of information may cause a stock market or a government to fall). In other words, it makes us better understand what our society really is.

Subsequently, chaos/complexity theory might indeed boost our "sociological imagination" (as defined by Charles W. Mills). Most importantly, it might turn out to be very central to our future knowledge explorations, as well as to the further genuine development of social thought, including the genuine development of social science theory and methodology (see Cilliers, 2005b).

Drawing from Sandra L. Bloom's innovative thoughts (2000), as well as from J. Briggs's and F. D. Peat's original work (1999), social/sociological theory can and should eventually learn many "life lessons" from the very science of chaos/complexity:

- Human behaviour, individual or collective, is not predictable (even if simple and explainable) – at least, not beyond a relatively short "predictability horizon". In fact, we do not actually need predictability, stability and equilibrium.
- There is not such a thing as "objective observation", "pure knowledge", "innocent method", or "access to totality". But we should always look for a small measure of synthesis and objectivity, within a constantly changing and increasingly antagonistic social world.

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[19] These developments tend gradually and irreversibly to "bend, shift, and transform the limits of what we think is possible. It is virtually impossible to predict the full consequences of all of our actions, and we cannot predict how society and the global order might change in response to new technologies … but science should not ignore our moral or ethical responsibility to consider all the risks either" (Virdi, 2008: 41). According to Jean-Pierre Dupuy's perceptive observations, technoscience "cannot isolate itself from social responsibility or should be given a monopoly on decision-maker power" (Virdi, 2008: 41).

- Output (effect) is not proportional to input (cause). Thus, local re-arrangements may bring unforeseen, unintended and unanticipated global transformations and side-effects (for the better or for the worse).
- Chaos is neither avoidable nor destructive; instead, it is can be seen as a unique opportunity/capacity to act and change, as well as something we should responsibly accept, acknowledge, embrace, celebrate and live with.
- We should suspend the "old" or "received" notion that anything can be understood and explained in isolation from anything else. On the contrary, all life is truly and irrevocably interconnected.
- The playful interdependency of all being gives us enormous hope that there is indeed something beyond the fragmented, reductionistic and exploitative view of human nature. In addition, it is chaos itself that guarantees the very possibility of free will and choice.
- Creativity can overcome the odds and bend the rules. It can also help us think better and move forward, decisively freed from the obsessive-compulsive struggle for control and prediction.

In the last instance, these stimulating "life lessons" can triumphantly encourage a genuine reflexive return to the creative transdisciplinary style of thinking, which originally inspired the sociological enterprise. Of course, as Anthony Giddens perceptively points out, "a little bit more utopian thinking might help too – well, why not? Politics in some ways has become deadly dull. We need more positive ideals in the world, but not empty ones – rather, they should be ideals that link to realistic possibilities of change" (Giddens, 2006).

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Rekonstruiranje glavnih epistemoloških tema suvremene društvene misli: prilozi teorije kaosa i kompleksnosti

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Članak nastoji pružiti opširan kritički pregled ključnih tema i dilema u suvremenoj društvenoj misli, kao i u širokom polju teorije i metodologije društvene znanosti. U tom kontekstu, nudi neke teorijske poticaje i vidike za ozbiljno i imaginativno ponovno promišljanje i odlučivanje o trajnim, složenim, dvosmislenim i široko raspravljanim temama predvidljivosti/nepredvidljivosti, refleksivnosti i normativnosti (etike). Tvrdi se da korisni sintetički uvidi utemeljeni na teoriji kaosa i kompleksnosti mogu i da trebali bi imati važnu ulogu u ispravljanju dobro utvrđenih pravaca mišljenja (konkretno, realizma i kritičkog realizma), kao i u primjerenoj raspravi o tim ključnim općim temama.

Ključne riječi: sociologija, epistemologija, znanje, metodologija, realizam, teorija kaosa/kompleksnosti