I don’t believe in the existence of a complex systems theory as such and, so far, I’m still referring to complex systems science (CSS) in order to describe my research endeavours. In my view, the latter is constituted, up until now, by a bundle of loosely connected methods and theories aiming to observe—from contrasted standpoints—these fascinating objects of research called complex adaptive systems. Nearly 40 years after Von Bertalanffy’s *General System Theory* (1968) and Jacques Monod’s *Chance and Necessity* (1971), it is fair to look back and to try to assess how much remains to be said about these complex adaptive systems. After all, Prigogine’s *Order out of Chaos* (1984) already demonstrated that future wasn’t entirely predictable in a history-contingent world. Nearly at the same period, Maturana and Varela’s *Tree of Knowledge* (1987) questioned the closure of biological systems and proposed a challenging theory of autopoietic systems, oddly left aside by CSS’s mainstream research. Later on, Holland’s *Hidden Order* (1996) set out the terminology associated with and the characteristics of complex adaptive systems, still in use nowadays. More recently, Watts’s *Six Degrees* (2004) epitomized current assumptions of network theorists asserting that a system’s structure and organization—most of the time—dictate its functional properties. What remains from these influential contributions are a heterogeneous corpus of partly conflicting theories and a disparate set of tools and methods. Furthermore, too often complex systems science lends itself to criticism when it trades its artificial complex adaptive systems for natural (i.e., actual) ones.
Computer-based simulations, regardless of their expected accuracy, aren’t the reality; there are just metaphoric representations; “the world as it might be, not the world as it is” according to Holland himself.

So, yes, much remains to be said about complex adaptive systems (CAS). Altogether, we need to better our understanding of natural CAS and to improve analytical capacities of artificial CAS. Both aspects need to be dealt with cautiously in order to avoid ill-fated circularities that have sometimes characterized research out of in-vitro simulations or artificial society experiments. It is indeed an understated challenge to design a computer metaphor that describes a given reality independently of the hypothetical processes to be tested. Flawed designs often result in logical tautologies whereby the model always verifies the assumptions. Another challenge consists in the reconciliation between system-wide and individual-centred representations of CAS. This task is anything but trivial as technical limitations and epistemological differences have contributed to the divide. Technically, latest hybrid simulation platforms provide the means to couple agent-based modelling with dynamical systems modelling or network-oriented simulations. But epistemological differences on internationality, for example, need to be dealt with in a same way biology has progressively dealt with the tension between Lamarckism and Darwinism on evolution.

In this context, the present ouvrage comes at its time. The carefully selected chapters cover the latest theoretical developments on natural CAS and innovative ways to improve the analytical capacities of artificial CAS. Traditional concepts of complex systems science are re-visited: what is emergence? Can we explain the emergence of creativity in natural CAS? How does emergent specialization improve artificial CAS’s design? Likewise, essential characteristics of social CAS are scrutinized: How do information flows influence the complexity of social systems? Can we propose a robust ontological foundation for social simulations? Finally, this book invites us into an interdisciplinary journey through biological evolution, neo-classical economics, system thinking and social sciences, using CSS as its Arian’s thread. Intelligent complex adaptive systems (ICAS) will emerge from this interdisciplinary cross-fertilization combined with technological advances. They will provide powerful analytical capacities, supported by a reunified and holistic vision on complex adaptive systems. They will help us to build what I will have to call, finally, a complex systems theory.

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