

A NEW TRANSDISCIPLINARY PARADIGM FOR THE STUDY OF COMPLEX SYSTEMS?

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ABSTRACT: two paradigms for studying the relation between autonomy and cognition are reviewed and contrasted: the "artificial" paradigm, which sees autonomous systems as linear, information-processing organizations, and the "autopoietic" paradigm, which sees them as circular, self-producing organizations. It is argued that these two paradigms are not inconsistent but complementary, and that they can be synthesized in an encompassing paradigm based on the self-organization of complex systems through variation-and-selective retention, leading to the emergence of relatively autonomous subsystems. Some implications of such an encompassing paradigm on the level of science, technology, individual persons and society are outlined, with reference to the papers in this collection. It is argued that the further development of such a transdisciplinary approach will lead to a new "science of complexity".

1. Introduction

In the preface to this book it was argued that some recent trends in different disciplines seem to converge around the concepts of self-organization, autonomy and cognition. Whether these developments really announce the emergence of a new paradigm remains to be proven. Only time can tell. In this position paper, I will assume that they do, and investigate where this new paradigm would be coming from, and where it might be heading to. This will allow me to draw a first map of an as yet uncharted territory.

As my background is in theoretical physics, I will focus primarily on developments in the "hard" sciences and technologies : physics, computer science, chemistry, biology, ... However, I will also discuss some applications of these ideas on the level on persons and society. A more elaborate, personal view on the social implications of the emerging new paradigm can be found in Rosseeel's position paper for this book.

Whereas the paradigm of classical cybernetics (which is related to the paradigms used in other disciplines such as classical physics, computer science, economy, and so on ...) stresses the mechanistic, causal, externally controlled aspects of general systems, there is now a general tendency to acknowledge the indeterministic, self-organizing, internally controlled character of complex systems. This tendency is not really new; it has already had quite some impact on disciplines such as thermodynamics, biology and psychology. Yet the concrete formal or operational expression of these ideas remains vague.

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Mark Steyvers



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