Preface

Harald Atmanspacher and Robert Bishop

Are choice and free will possible in a world governed by deterministic fundamental equations? What sense would determinism make if many events and processes in the world seem to be governed by chance? These and other questions emphasize the fact that chance and choice are two leading actors on stage whenever issues of determinism are under discussion.

The machine sculpture "Klamauk" (English: hubbub) by the Swiss artist Jean Tinguely (1925–1991), featured on the cover, looks like a perfect example of a deterministic process, but it also looks as if thrown together "by chance". This tension between determinism and chance has been of longstanding concern in the sciences and the humanities. And nowhere is this tension stronger than in debates about free will and our place in the world, where determinism seems bound to crowd freedom out of the picture, yet freedom in the absence of some ordered realm of causes seems inconceivable.

The desire to foster an interdisciplinary dialogue on determinism, chance and free will was the initial impetus leading to an international workshop on determinism taking place at Ringberg Castle near Lake Tegernsee, south of Munich, in June 2001. Representatives from mathematics, physics, cognitive and social science, and various branches of philosophy convened to discuss numerous aspects of determinism from their disciplinary perspectives. This volume is based on elaborated and refereed manuscripts of their lectures.

The contributions by Bishop and Nickel form an introduction to the topics discussed in the volume, focusing on aspects of determinism as they arise in mathematics, physics, psychology, and philosophy. These essays discuss characteristics for determinism in these fields as well as bring out the clash between the deterministic perspective of the natural sciences and the phenomenological perspective of lived experience. It is suggested that this clash may be eased through broadening our notions of causation and by realizing that the scientific and every day views are particular perspectives, among many possible ones, from which we may analyze or understand our world.

The first principle subdivision of the volume mainly is devoted to the relation between determinism and chance. Atmanspacher in his contribution

distinguishes between determinism and determinability using a distinction between ontic and epistemic states in physical descriptions. Lombardi, using this same distinction, addresses Putnam's notion of internal realism in the context of physics, arguing that there is no single, pre-given ontology because the questions we ask, both theoretical and experimental, "cut into" reality in a way determining much of the chosen ontology. What is ontic and what is epistemic depends on the questions scientists ask.

Primas and Gustafson discuss results on embedding descriptions of stochastic processes into larger deterministic descriptions. One important feature of these results, according to Gustafson, is that any innovation process, i.e. process losing information as it proceeds forward in time, cannot be time-reversed. Primas refers to embedding theorems as providing a "hidden" determinism in physics and discusses this determinism in relation to the free actions of scientists. Both authors agree that the meaning of the embedding results for the reality of determinism is unclear.

In a related contribution, Misra shows how it is possible to move from a deterministic evolution to an irreversible probabilistic process via a mathematical transformation between the two types of descriptions. This approach shows most clearly that the distinction between determinism and chance for a wide class of systems can be conceived as a matter of description rather than an ontological issue.

Christidis, Kronz and McLaughlin, Dieks, and Berkovitz address chance and determinism from historical and philosophical viewpoints. Christidis interprets some of the fragments of Heraclitus as early precursors of guiding ideas in work by Prigogine and his colleagues. Kronz and McLaughlin discuss Peirce's evolutionary cosmology, where the universe starts out indeterministically and becomes increasingly deterministic by "habituation". Dieks raises questions regarding some implications of physical indeterminism for our ordinary language concepts such as novelty and openness of the future. Berkovitz's contribution examines the roles of determinism and indeterminism as assumptions in causal models using examples from economics.

This first subdivision ends with two papers discussing different aspects of control. Mahler and colleagues show that in the context of quantum mechanics the irreversibility connected with the increase of entropy is associated with a set of robust macro-level (thermodynamic) properties enabling various types of large-scale prediction and control of systems even as prediction and control of the micro-level (statistical) properties are progressively lost. Greenberger and Svozil discuss the consistency requirements for the prediction and control of events and apply them to a quantum mechanical model for time travel.

The second subdivision addresses determinism and free will. Dowe's contribution compares the folk notion of determinism with standard approaches to determinism based on science and discusses causation as a folk notion. Guignon sets out to dissolve the problem of reconciling free will with determinism by questioning the very framework within which the problem is formulated. He explores the realm of human action as a holistic, meaning-filled, embodied lifeworld, where we are always already engaging the world around us in practical ways.

Dorato defends a compatibilist view of free will, focusing on conceptual and pragmatic issues of the debate between compatibilists and incompatibilists. Kane defends an incompatibilist view of free will, invoking a novel indeterministic strategy, and responds to Dorato's discussion of his view in this volume. Martin and Sugarman, working within a broadly compatibilist framework, discuss a developmental account of agency. Richardson and Bishop, in the context of the social sciences, examine and call into question various assumptions shared by both compatibilist and incompatibilist accounts of free will.

Psychology takes center stage in the contributions by Gantt and Slife. Gantt discusses the problems of a reductive biologization in psychology and proposes phenomenological alternatives treating our lived experience as primary for understanding action, meaning, morality, etc. Slife questions the role that atomistic conceptions of time and information have played in psychological theories and proposes holistic alternatives that make better sense of how our view of the past, present and future shape our current actions and vice verse. In the final contribution in this subdivision, Abe and Kobayashi discuss Eastern views of determinism, and compare and reinterpret them from a scientific point of view.

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