



Till Frank

# Determinism and Self-Organization of Human Perception and Performance

Series: Springer Series in Synergetics

- Presents the first self-contained monograph on the subject matter
- Adapted for an interdisciplinary audience with both non-technical and advanced material
- Provides the scientific basis for discussions about determinism versus free will in human actions

This book discusses human perception and performance within the framework of the theory of self-organizing systems. To that end, it presents a variety of phenomena and experimental findings in the research field, and provides an introduction to the theory of self-organization, with a focus on amplitude equations, order parameter and Lotka-Volterra equations. The book demonstrates that relating the experimental findings to the mathematical models provides an explicit account for the causal nature of human perception and performance. In particular, the notion of determinism versus free will is discussed in this context. The book is divided into four main parts, the first of which discusses the relationship between the concept of determinism and the fundamental laws of physics. The second part provides an introduction to using the self-organization approach from physics to understand human perception and performance, a strategy used throughout the remainder of the book to connect experimental findings and mathematical models. In turn, the third part of the book focuses on investigating performance guided by perception: climbing stairs and grasping tools are presented in detail. Perceptually relevant bifurcation parameters in the mathematical models are also identified, e.g. in the context of walk-to-run gait transitions.

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