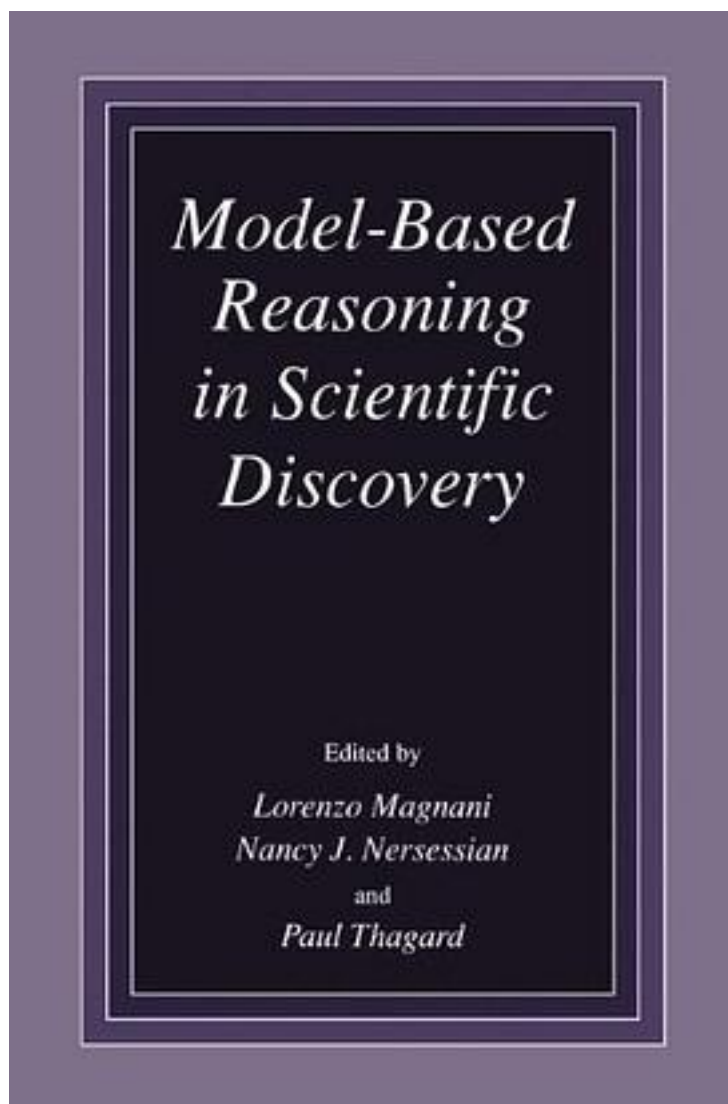# Model-based Reasoning in Scientific Discovery

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The book Model-Based Reasoning in Scientific Discovery, aims to explain how specific modeling practices employed by scientists are productive methods of creative changes in science. The study of diagnostic, visual, spatial, analogical, and temporal reasoning has demonstrated that there are many ways of performing intelligent and creative reasoning which cannot be described by classical logic alone. The study of these high-level methods of reasoning is situated at the crossroads of philosophy, artificial intelligence, cognitive psychology, and logic: at the heart of cognitive science. Model based reasoning promotes conceptual change because it is effective in abstracting, generating, and integrating constraints in ways that produce novel results. There are several key ingredients common to the various forms of model-based reasoning to be considered in this presentation. The models are intended as interpretations of target physical systems, processes, phenomena, or situations. The models are retrieved or constructed on the basis of potentially satisfying salient constraints of the target domain. In the modeling process, various forms of abstraction, such as limiting case, idealization, generalization, and generic modeling are utilized. Evaluation and adaptation take place in the light of structural of structural, causal, and/or functional constraint satisfaction and enhanced understanding of the target problem is obtained through the modeling process. Simulation can be used to produce new states and enable evaluation of behaviors, constraint satisfaction, and other factors. The book also addresses some of the main aspects of the concept of abduction, connecting it to the central epistemological question of hypothesis withdrawal in science and model-based reasoning, where abductive interferences exhibit their most appealing cognitive virtues. The most recent results and achievements in the above areas are illustrated in detail by the various contributors to the work, who are among the most respected researchers in philosophy, artificial intelligence and cognitive science.

作者介绍:

目录:

标签

科学哲学

哲学原著

评论

本书代表了一种非常流行的自然主义的知识论和科学哲学。简而言之，作者把科学活动中的人等同于心理学等关于人的科学的研究对象，从而将心理学的"心灵模型"（mental model）等理论用于解释科学理论中的种种现象，而这些现象早先却被认为是独立于个体的人或偶然的人性的。有别于传统科学哲学强调命题式逻辑的倾向，作者提出图像表象在科学推理中比语言表象更加基本也更加重要，因为它提供的是一种空间并置的表象，而不像语言那样拘限于线性的时间流。这种自然主义研究的启发力自不待说，但它抛离逻辑原则也有一定的问题，其中最严重的就是科学的客观性问题。作者基于心理学的大样本研究想当然地认为心灵模型可以通过叙述顺畅地得以交流，但这种对无可捉摸之模型的诉诸无法面对维特根斯坦对私人语言的诘难——这些模型不也是盒子里的甲虫吗？

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