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Rationality in discovery

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Propositions

1. Problem

Before one can stand on the shoulders of giants, one first has to climb them.

2. Rationality

Assumptions about processes of scientific discovery imply assumptions about psychological processes, and *vice versa*.

3. Neuropharmacology

A part of reasoning in neuropharmacology can be modeled as reasoning about qualitative differential equations, and can be assisted by a computer.

4. Logic

Reasoning in scientific discovery includes logical fallacies, which are necessary to introduce new hypotheses by abduction.

5. Cognition

To understand the rationality of (secondary) cognitive processes of symbolic problem solving in science, one also needs to understand how these processes are controlled by (primary) cognitive processes of probabilistic learning.

6. Computation

One has learned something when one can compute part of the same output with less input.

7. Theory

Rationality in discovery, in theory, includes inferring hypotheses that best explain observations, and inferring predictions that can experimentally test those hypotheses best.

8. Practice

Rationality in discovery, in practice, also includes inferring the best interventions in designing drugs, treatments, and experimental conditions to explore phenomena.

9. Discovery

Interdisciplinary scientists build bridges that other scientists are not eager to cross.

