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The emperor's new mind, by Roger Penrose. Oxford University Press, Oxford, New York, Melbourne, 1989, xiii + 466 pp., \$24.95. ISBN 0-19-851973-7

Penrose doesn't believe that computers constructed according to presently known physical principles can be intelligent, and conjectures that modifying quantum mechanics may be needed to explain intelligence. He also argues against what he calls "strong AI". Neither argument makes any reference to the 40 years of research in artificial intelligence (AI) as treated, for example, in Charniak and McDermott [1]. Nevertheless, artificial intelligence is relevant, and we'll begin with that.

The goal of AI is to understand intelligence well enough to make intelligent computer programs. It studies problems requiring intelligence for their solution and identifies and programs the intellectual mechanisms that are involved. AI has developed much more as a branch of computer science and applied mathematics than as a branch of biology. Mostly it develops, tests and makes theories about computer programs instead of making experiments and theories in psychology or neurophysiology.

The most interesting and fundamental problems of AI concern trying to make programs that can achieve goals in what we call the *commonsense informatic situation*. People confront such situations in daily life and also in practicing science and mathematics. It is distinguished from the informatic situation within an already formalized theory by the following features.

1. It takes into account partial knowledge of both general phenomena and particular situations. The effect of spilling a bowl of hot soup on a table cloth is subject to laws governing absorption as well as to the equations of hydrodynamics. A computer program to predict who will jump out of the way needs facts about human motivation, the human ability to observe and act, as well as information about the physics. None of this information usefully takes the form of differential equations.

2. It isn't known in advance of action what phenomena have to be taken into account. We would consider stupid a person who couldn't modify his travel plan to take into account the need to stay away from a riot in an airport.