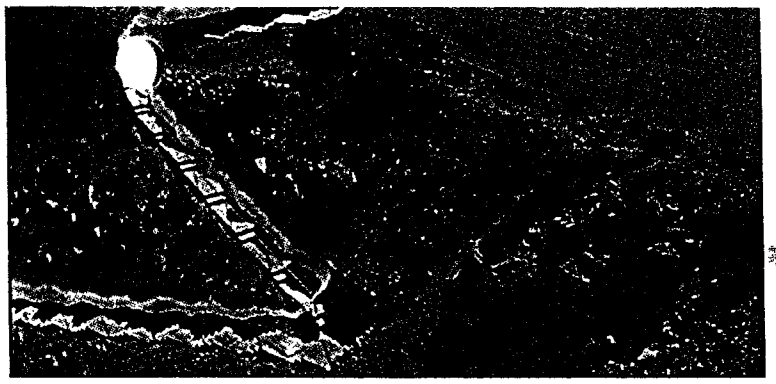


MOONLIT: *The Cerro Tololo Inter-American Observatory in La Serena, Chile.*

LUNCH BREAK: *Gen. Dzhanibekov with wife, daughter at Star City, USSR.*

space places, Mr. Ressmeyer; tell us space stories visua"

That, however, is a observation of one curmudgeonly adult. Leaf through the book with a wide-eyed 6 1/2-year-old, and the conversation quickly pivots on the question: "Wow, what's that?" Which, after all, is what prompted humans to look skyward in the first place.

■ *Peter N. Spotts is the Monitor's national news editor.*

Trying to Make Computers More Like Humans

Simson L. Garfinkel

THE best computer chess machine in the world, Deep Thought, can evaluate a million different chess positions every second. In the middle of a typical game, Deep Thought looks ahead more than five moves for each player; evaluating more than 150 million boards, it takes between two and three minutes to reach its calculated decision.

Richard Reti, one of the great chess masters of this century, was once asked how many moves he looked ahead. "One," said Reti. "The right one."

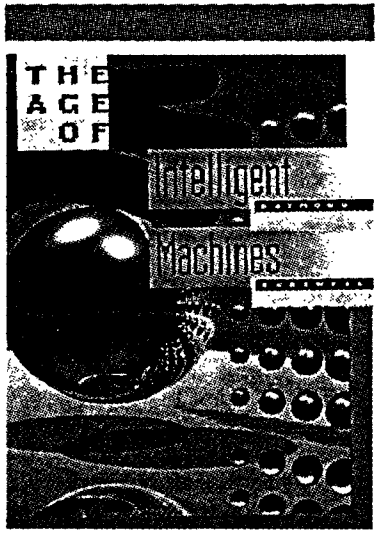
This vignette illustrates the key difference between the way people approach problems themselves and the way they program computers to solve problems. The fact that this story is missing from Raymond Kurzweil's new book on artificial intelligence, "The Age of Intelligent Machines," is symptomatic of the book's key failing.

Computers are fast but dumb. They have a perfect memory, but no innate system for organizing the facts that they remember.

Humans are comparatively slow thinkers, but can make every thought count. And while human memory is far less than perfect, we automatically draw associations and connections between new things as we learn them.

Kurzweil is the founder of Kurzweil Computer Products and Kurzell Applied Intelligence. His book is a tour de force history of artificial intelligence (AI), the branch of computer science that tries to make computers more like humans. The author follows the philosophy of intelligence from ancient Greece, through the Renaissance, to modern times. He follows the history of computers from the mechanical tabulating machines used in the United States' census of 1890, through the electronic computers developed during World War II, to the modern microcomputers of today. He teaches the reader about the Turing Test, a method devised by the British mathematician Alan Turing to determine if a computer is actually "thinking." Kurzweil describes the advances artificial intelligence has made possible and speculates on what the future may bring.

But Kurzweil's book suffers from many of the problems that



THE AGE OF INTELLIGENT MACHINES
By Raymond Kurzweil
Cambridge, Mass.: MIT Press
565 pp., $35

afflict the machines he wishes to demystify. Although the book is orderly, it is not organized. Each invention or development is neatly placed in its own chapter or section, but the reader is left awash trying to figure out how everything fits together.

Today there are computer programs that can play chess, that can respond to commands typed in English, even programs that feign psychoanalysis. But no single program can do all these things. Perhaps more important, these computer programs do not know what they do. They are not self-aware or "intelligent."

Nevertheless, there are still an amazing number of tasks that these so-called intelligent machines can do, from robots that build cars to computers that score musical works.

But for the most part, Kurzweil does not explain how this magic takes place; he simply says it does. When he uses examples, he does not show how they work; he merely asserts they do. Details are missing throughout. The sections describing the history of philosophy and computers contain only enough historical details to whet the reader's appetite.

Kurzweil's pedantic style often lapses into bouts of technojargon. "There is sufficient sequential speed to perform extensive recursive search in the problem space," he writes, discussing an important advantage of computers over human brains (they can do things really fast). Many humans reading the sentence may themselves find need of an "extensive recursive search" to figure out just what this sentence means.

"The Age of Intelligent Machines" does have its moments. After describing a telephone of the future that will use computerized speech recognition, automatic language translation, and speech synthesis to let a person who speaks only English have a conversation with a person who speaks only French, Kurzweil concludes: "Overcoming the language barrier will result in a more tightly integrated world economy and society. We shall be able to talk more easily to more people, but our ability to misunderstand each other will remain undisturbed."

The best part of this book is its last chapter, where Kurzweil speculates on what future artificial intelligence may bring to the world. Also notable are the many essays and articles that other authors have contributed. But the language and presentation make this a difficult book to tackle, especially for readers not versed in computers and AI – presumably Kurzweil's intended audience.

■ *Simson L. Garfinkel is a freelance science writer.*

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