

JOHN E. LAIRD is John L. Tishman Professor of Engineering in the Computer Science Division at the University of Michigan.



Photo by Jessica A. Laird

artificial intelligence/cognitive science

"John Laird's book gives a complete account of the momentous developments that have occurred in the Soar Cognitive Architecture. This book is a must-read for researchers and students who are interested in the grand goals of Cognitive Science and AI."—JOHN R. ANDERSON, Carnegie Mellon University

"John Laird has been at the forefront of research on cognitive architectures since the early 1980s and this book is a culmination of nearly 30 years of work. The book is a substantial achievement and a fine synthesis of the author's work. It provides both a study of how integrated computational mechanisms can generate intelligent behavior and a renewed opportunity for cognitive science to pursue integrated theories. It is essential reading."—ANDREW HOWES, School of Computer Science, University of Birmingham

"A clear and comprehensive account of decades of effort aimed at understanding intelligence and building intelligent systems. The detailed discussion of cognitive architectures, the enumeration of criteria for judging cognitive architectures, and the description of Soar make this a book that belongs in the library of everyone seriously interested in AI and its applications."—PATRICK HENRY WINSTON, Ford Professor of Artificial Intelligence and Computer Science, Massachusetts Institute of Technology

"The Soar enterprise is one of the most interesting big bets in Artificial Intelligence and Cognitive Science. John Laird's impressive book provides an excellent synopsis of the important ideas, results, and new directions in Soar research. Anyone interested in the computational modeling of minds should read this book."—KEN FORBUS, Northwestern University

Jacket art: Block diagram of Soar 9, redrafted by Carl O. Hueter

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THE SOAR COGNITIVE ARCHITECTURE

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In development for 30 years, Soar is a general cognitive architecture that integrates knowledge-intensive reasoning, reactive execution, hierarchical reasoning, planning, and learning from experience, with the goal of creating a general computational system that has the same cognitive abilities as humans. In contrast, most AI systems are designed to solve only one type of problem, such as playing chess, searching the Internet, or scheduling aircraft departures. Soar is both a software system for agent development and a theory of what computational structures are necessary to support human-level agents. Over the years, both software system and theory have evolved. This book offers the definitive presentation of Soar from theoretical and practical perspectives, providing comprehensive descriptions of fundamental aspects and new components.

The current version of Soar features major extensions, adding reinforcement learning, semantic memory, episodic memory, mental imagery, and an appraisal-based model of emotion. This book describes details of Soar's component memories and processes and offers demonstrations of individual components, components working in combination, and real-world applications. Beyond these functional considerations, the book proposes requirements for general cognitive architectures and explicitly evaluates how well Soar meets those requirements.

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