



BACK TO THE FUTURE

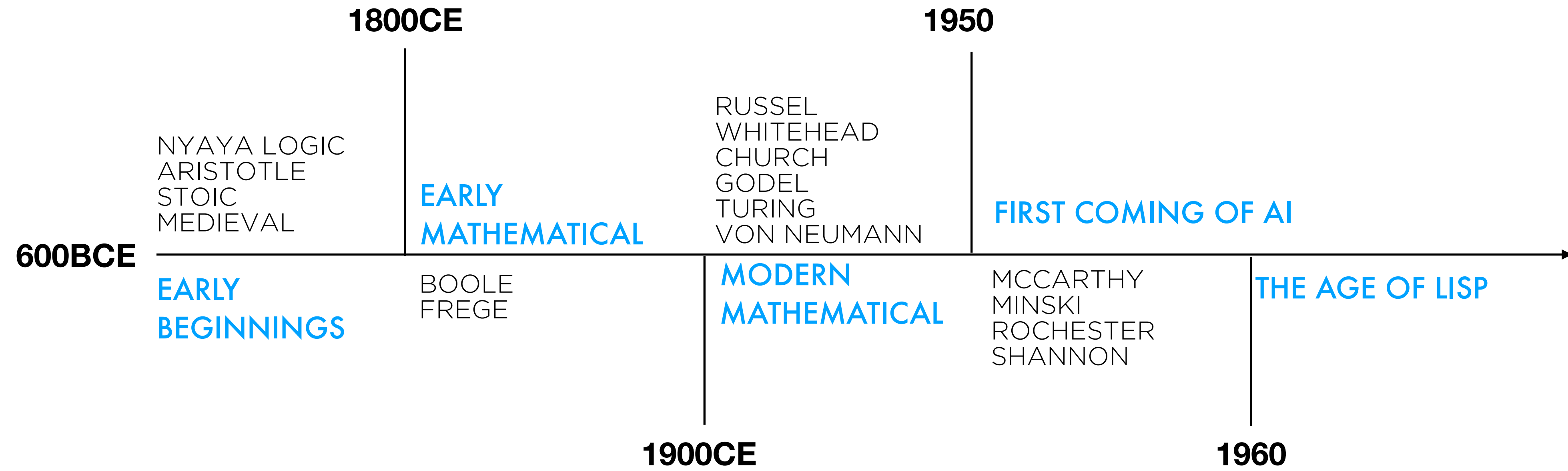
LISP IN THE NEXT AI AGE

ANURAG MENDHEKAR



WHY LISP DOMINATED

THE LOGICAL ROOTS
OF ARTIFICIAL
INTELLIGENCE



ROOTED IN LOGIC

CENTURIES OF WORK IN FORMALIZING THOUGHT

Intelligence has two parts, which we shall call the **epistemological** and the **heuristic**. The epistemological part is the representation of the world in such a form that the solution of problems follows from the facts expressed in the representation. The heuristic part is the mechanism that on the basis of the information solves the problem and decides what to do.

—John McCarthy and Patrick Hayes, 1969

EPISTEMOLOGY

ARBITRARILY COMPLEX
KNOWLEDGE GRAPHS

NIL
CONS
QUOTE

HEURISTICS

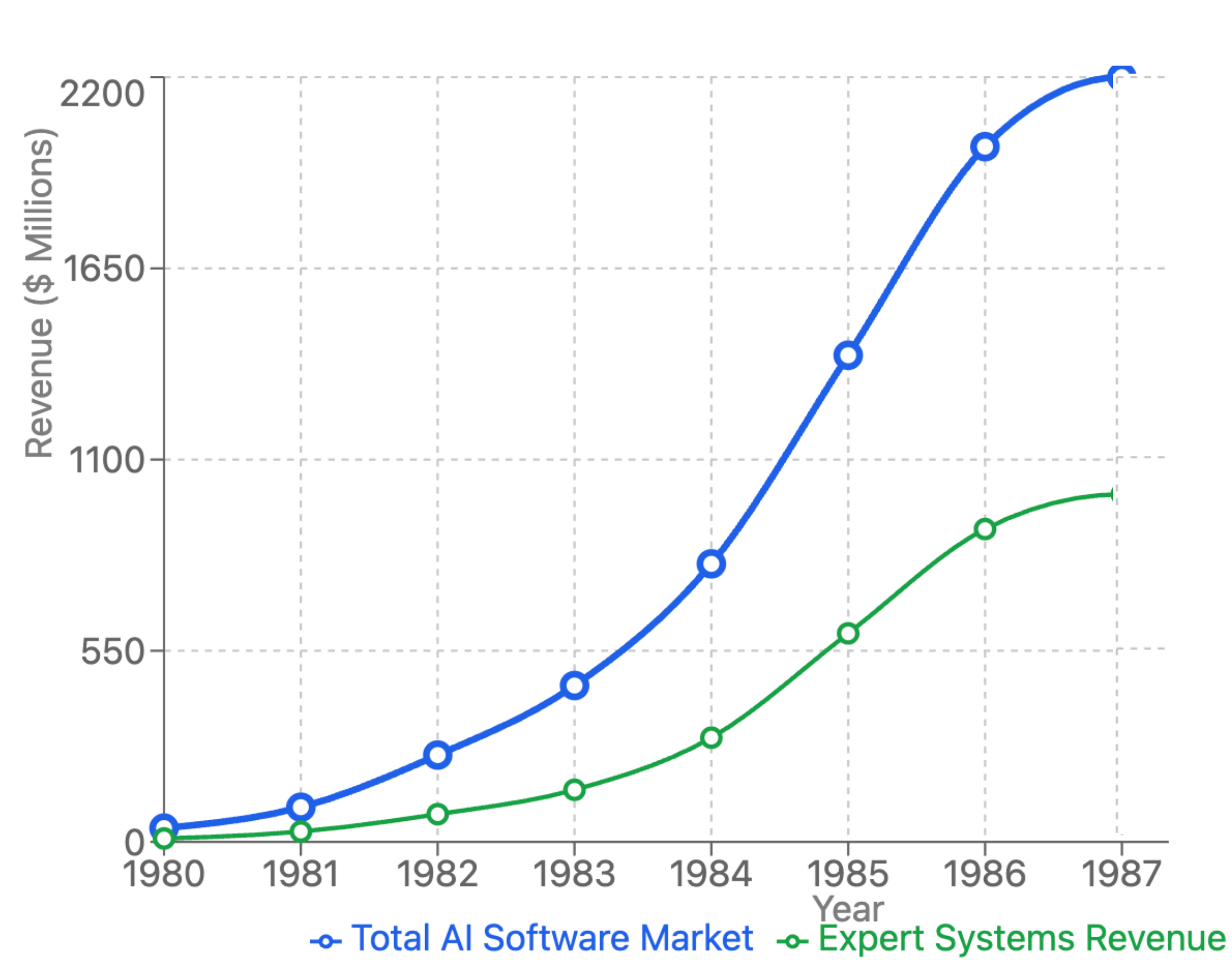
ARBITRARILY COMPLEX
HEURISTICS

CAR CDR LAMBDA COND

RECURSION
DYNAMIC TYPING
REPL

ADD COMPLEXITY INCREMENTALLY

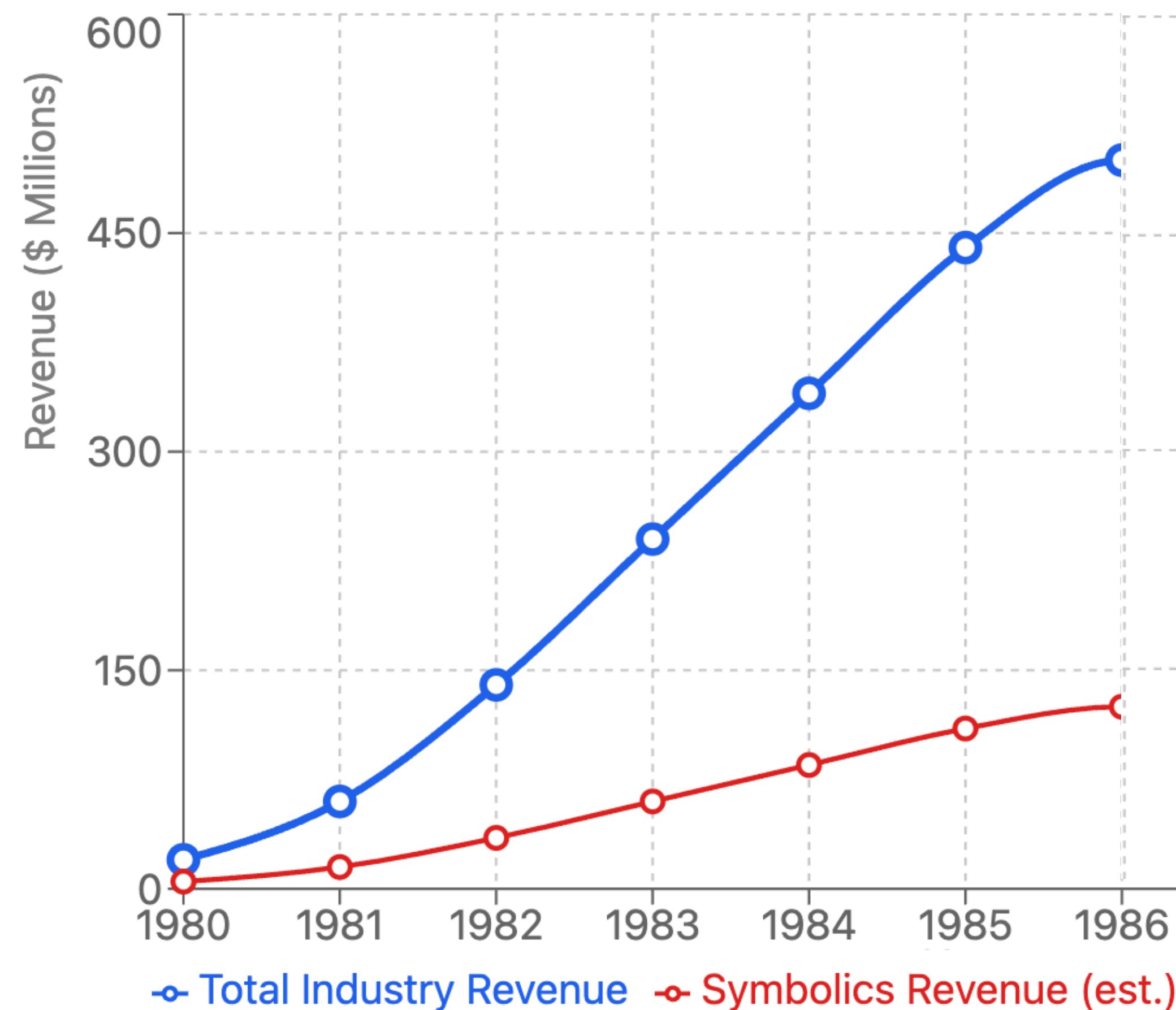
LISP CAPTURES THIS PERFECTLY



Microsoft: \$1.18B
IBM PC: \$9B

LISP WAS WILDLY SUCCESSFUL

AT CAPTURING PROBLEMS THIS WAY



REAL WORLD
APPLICATIONS

DEDICATED HARDWARE

HIGH PERFORMANCE
COMPUTING

LEADING INNOVATION

APPLICATIONS DEMANDED HIGHER PERFORMANCE

EPISTEMOLOGY

HEURISTICS

KNOWLEDGE GRAPHS WERE
HARD TO CAPTURE, GROW
AND MAINTAIN

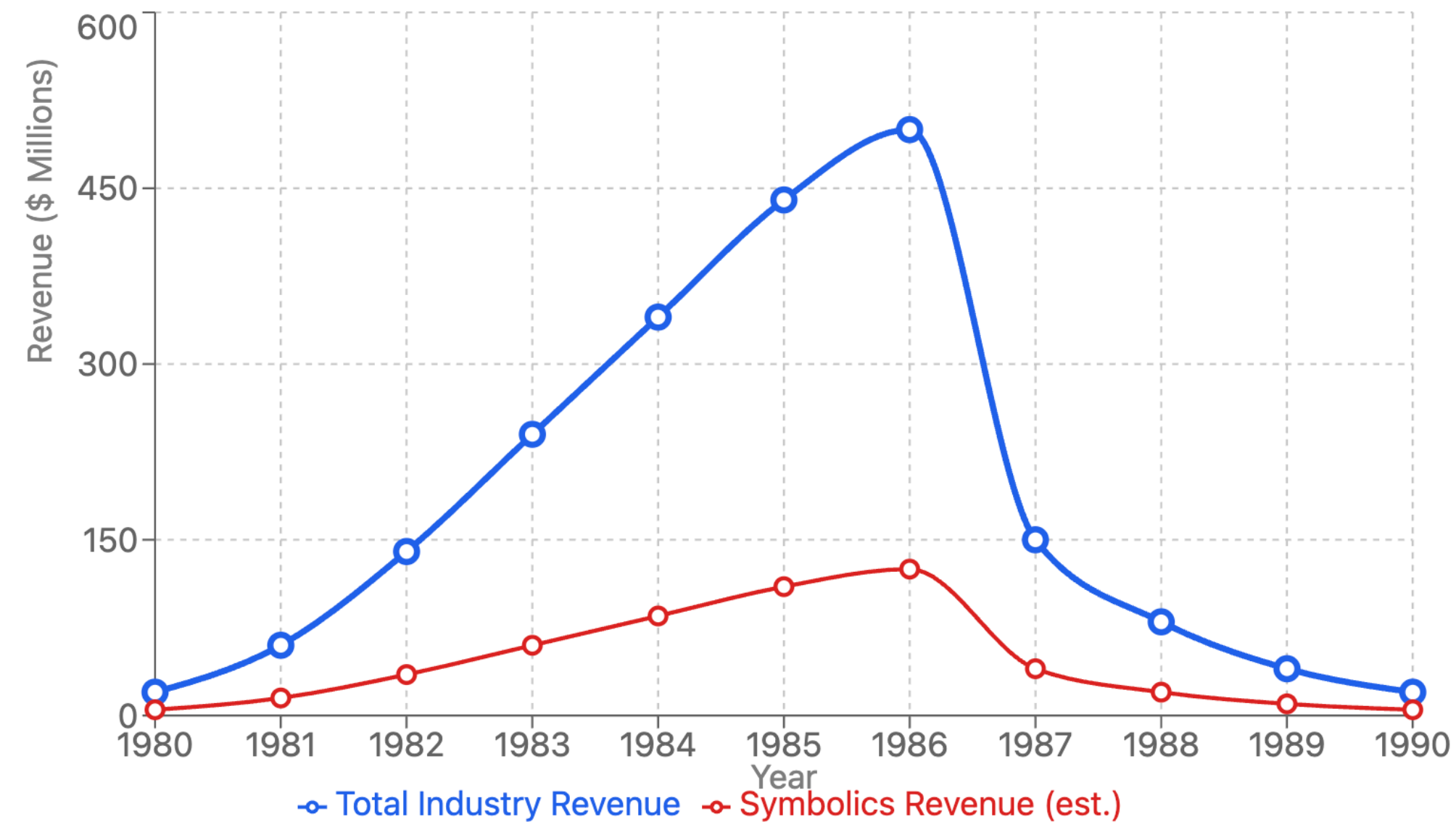
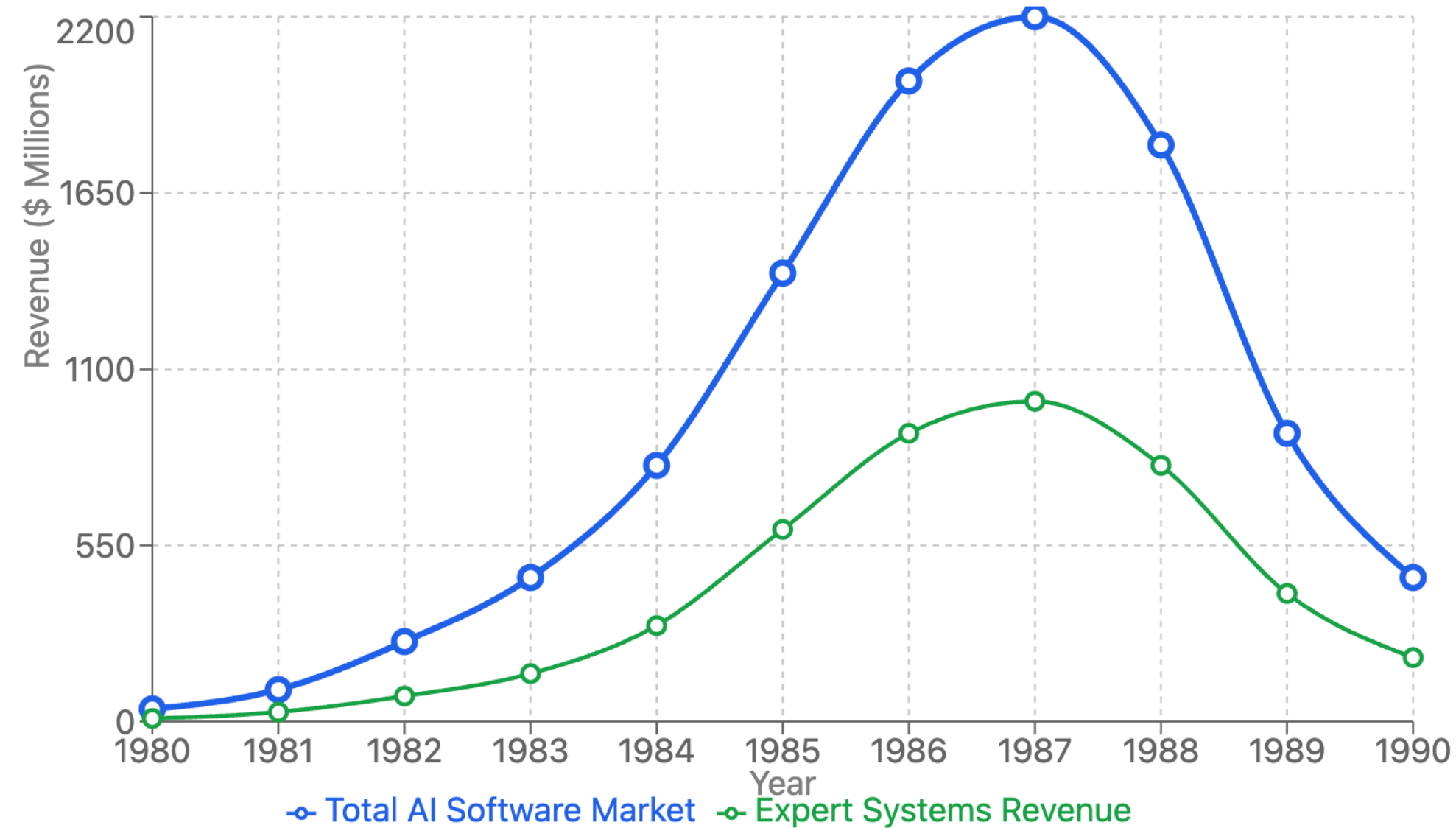
CYC

HARDWARE TO RUN HEURISTICS
WAS TOO EXPENSIVE

LISP MACHINES
CONNECTION MACHINE

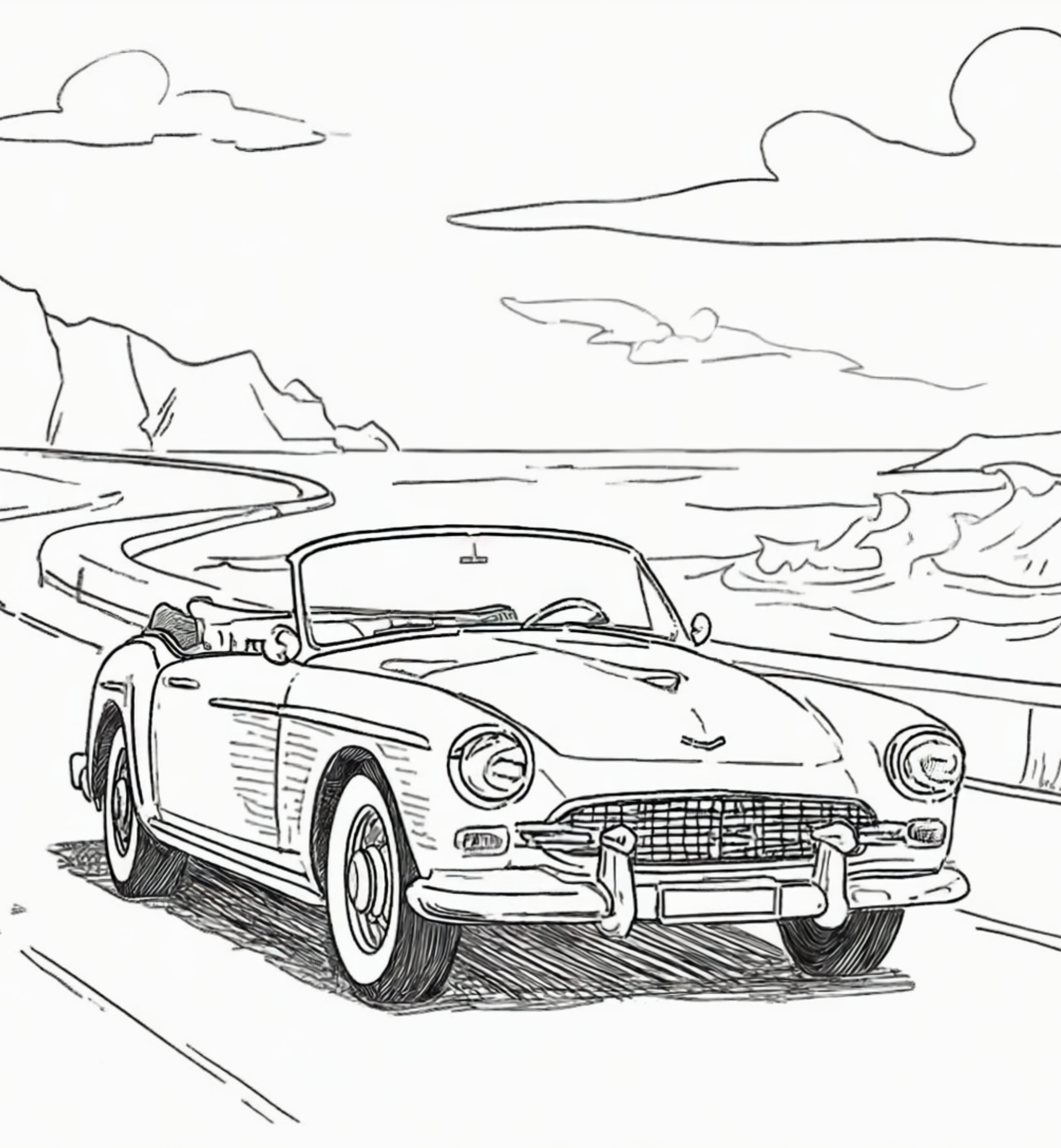
CRACKS APPEAR

UNDERLYING PHILOSOPHY COULD NOT SCALE



IT CAME CRASHING DOWN

THE SECOND AI WINTER BEGINS



A LITTLE DETOUR

THE PHILOSOPHY
RUNS DEEP

EPISTEMOLOGY

HEURISTICS

PROGRAMS ARE THE
KNOWLEDGE
GRAPH

NIL
CONS
QUOTE

FUNCTIONS TO MANIPULATE
PROGRAMS

MACROS
EVAL
COMPILE

LISP INTELLIGENCE

THE SAME PHILOSOPHY

EPISTEMOLOGY

HEURISTICS

THE WHOLE SYSTEM IS
THE KNOWLEDGE GRAPH

NIL
CONS
QUOTE
OBJECTS

EVERYTHING CAN BE
MANIPULATED

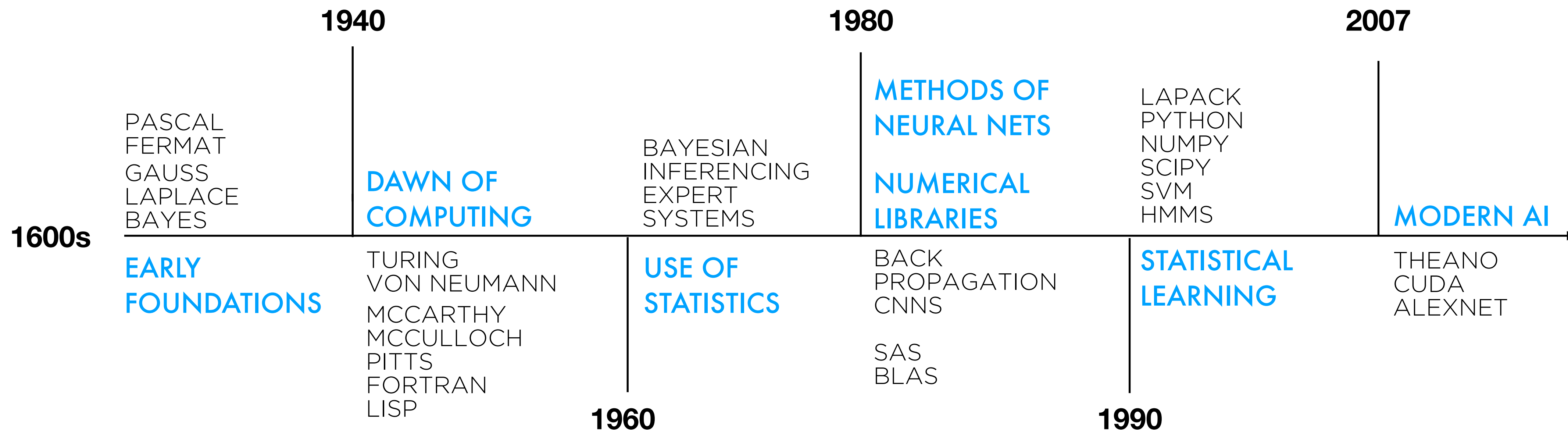
GENERIC FUNCTIONS
FULL SOURCE
FULL INSPECTION
REPL EVERYWHERE

SYMBOLICS GENERA

“M-. ALL THE WAY DOWN ...”



THE STORY OF MODERN AI



THE RISE OF STATISTICAL AI

A DIFFERENT MATHEMATICAL FOUNDATION

EPISTEMOLOGY

KNOWLEDGE IS REPRESENTED
BY PROBABILITY DISTRIBUTIONS

PARAMETERS (F8,16,32)
TENSORS
NEURAL NET DESIGN
GRADIENT DESCENT

HEURISTICS

HEURISTICS ARE BUILT UPON
INFERENCE AND SAMPLING

LINEAR ALGEBRA LIBRARIES (c/++/fortran)
GPU'S (cuda)
PYTHON (bindings)

STATISTICAL INTELLIGENCE

COMPLEX TOOLING, INDEPENDENT OF LANGUAGE

EPISTEMOLOGY

HEURISTICS

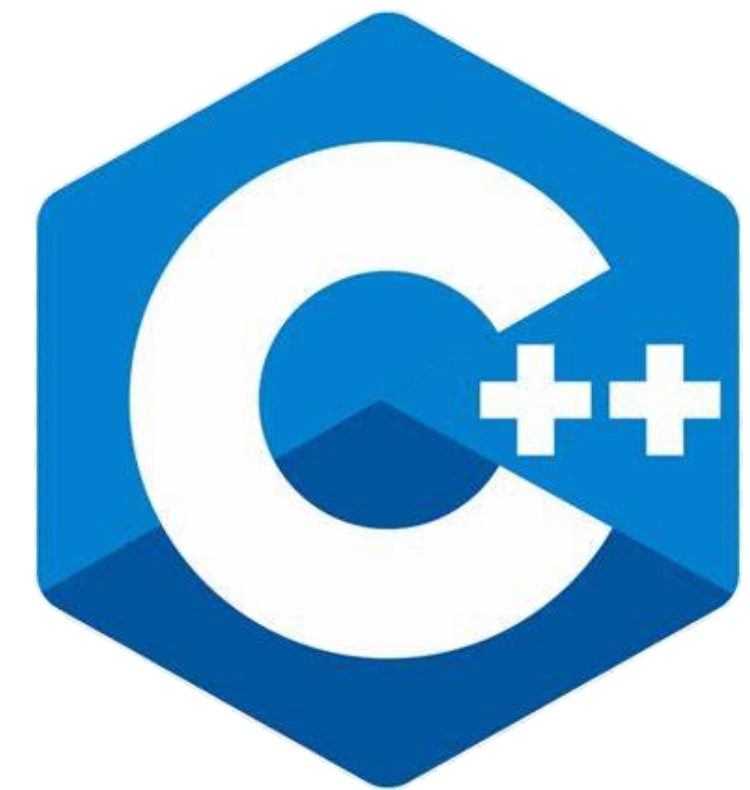
KNOWLEDGE REPRESENTATION
IS A BLACK BOX

"NOT EXPLAINABLE"
"HALLUCINATIONS"

HEURISTICS WORK BY
EXPERIMENTATION

PROMPT ENGINEERING
AGENTIC AI

IT'S A DIFFERENT GAME
THERE'S NO NEED FOR LISP'S EPISTEMOLOGY



LISP IS JUST ANOTHER CANDIDATE

FROM A WIDE RANGE OF CHOICES

All Applications	Number of Repos (k)
Python	7400
C/C++	2500
Common Lisp	4.8
Racket	3.3
Clojure	9.9

AI Applications	Number of Repos (k)
Python	335
C/C++	25
Common Lisp	0.1
Racket	0.05
Clojure	0.1

LISP IS NOWHERE

2-3 ORDERS OF MAGNITUDE BEHIND IN USAGE

EPISTEMOLOGY

HEURISTICS

PROGRAMS \neq KNOWLEDGE
GRAPH

SOME LAME ATTEMPTS

HEURISTICS TOOLS
WERE EMULATED

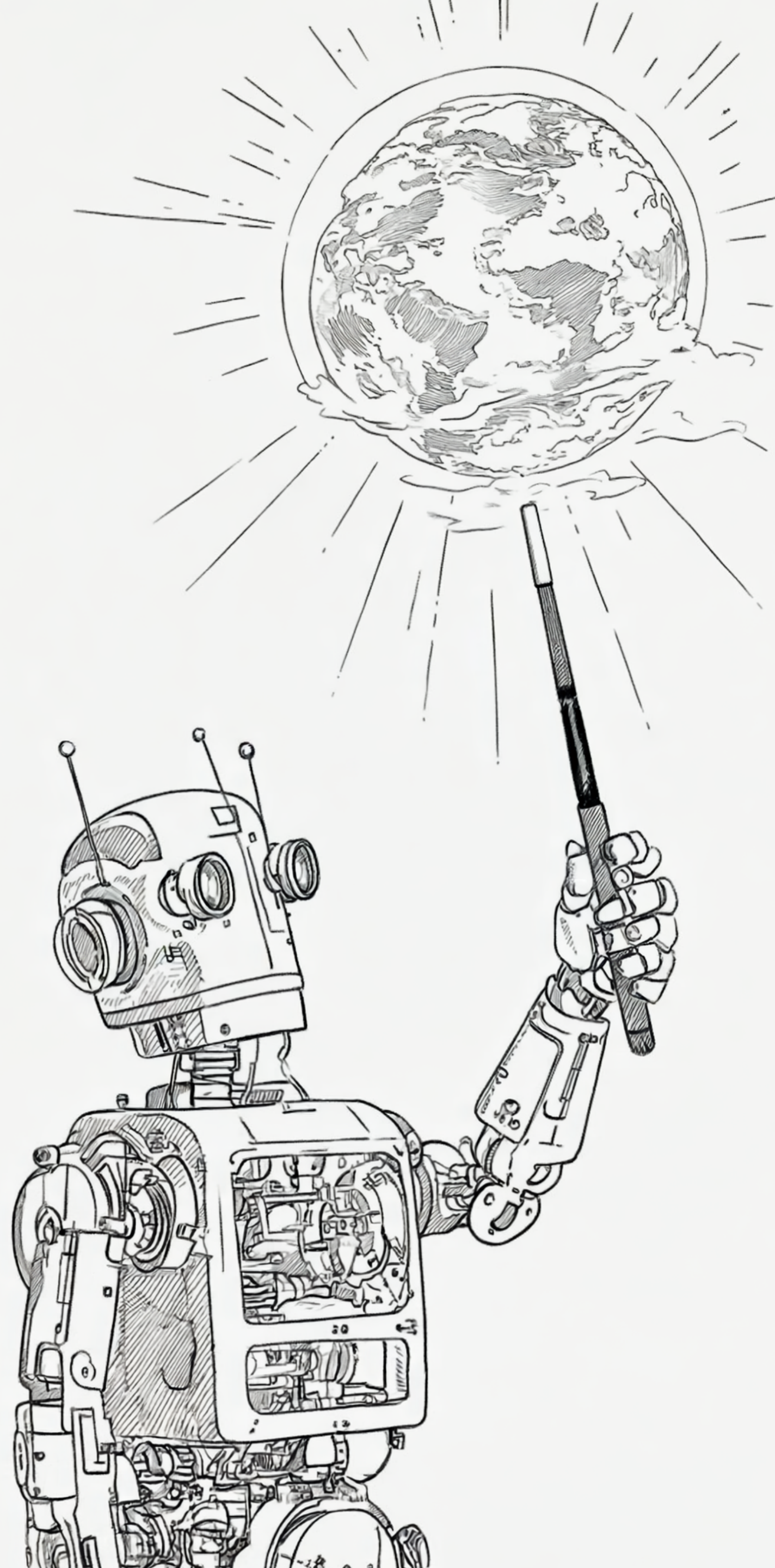
**JAVA, JAVASCRIPT, PYTHON, RUBY,
EVERY FUNCTIONAL LANGUAGE ...**

**RAPID DEVELOPMENT
REPL**

**GARBAGE COLLECTION
FUNCTIONAL PROGRAMMING
RECURSIVE DATA STRUCTURES**

“PYTHON IS AN ACCEPTABLE LISP” — PETER NORVIG

LISP IS EVERYWHERE



LISP 2045

LISP IN THE NEXT AGE
OF AI



THE MESSAGE IS CLEAR
WE DON'T NEED "SKILLED CODERS" ANY MORE

As of 2025, there are at least 12 AI startups valued at over \$1 billion that operate with teams of 50 employees or fewer. These companies have leveraged artificial intelligence to achieve significant growth while maintaining lean operations.

FUTURE “EMPLOYERS”

AI DOES ALL THE CODING
HUMANS TELL IT WHAT TO BUILD

UNDERSTAND, CONCEPTUALIZE, DESIGN, BUILD, MAINTAIN, EVOLVE

WHOLE SYSTEMS

IN VERY SMALL TEAMS + LOTS OF AI

HUMAN + AI
A VERY DIFFERENT WORLD

HUMANITY
UX/UI/HCI
ALGORITHMICS
APPLICATION LOGIC
HIGH LEVEL LIBRARIES
LOW LEVEL LIBRARIES
LANGUAGE RUNTIMES
SYSTEM/OS/NETWORK/CLOUD
HARDWARE



M-. ALL THE WAY DOWN

DEEP SYSTEM VISIONARIES

UNDERSTAND EACH LAYER OF THE SYSTEM

WHY LISP?

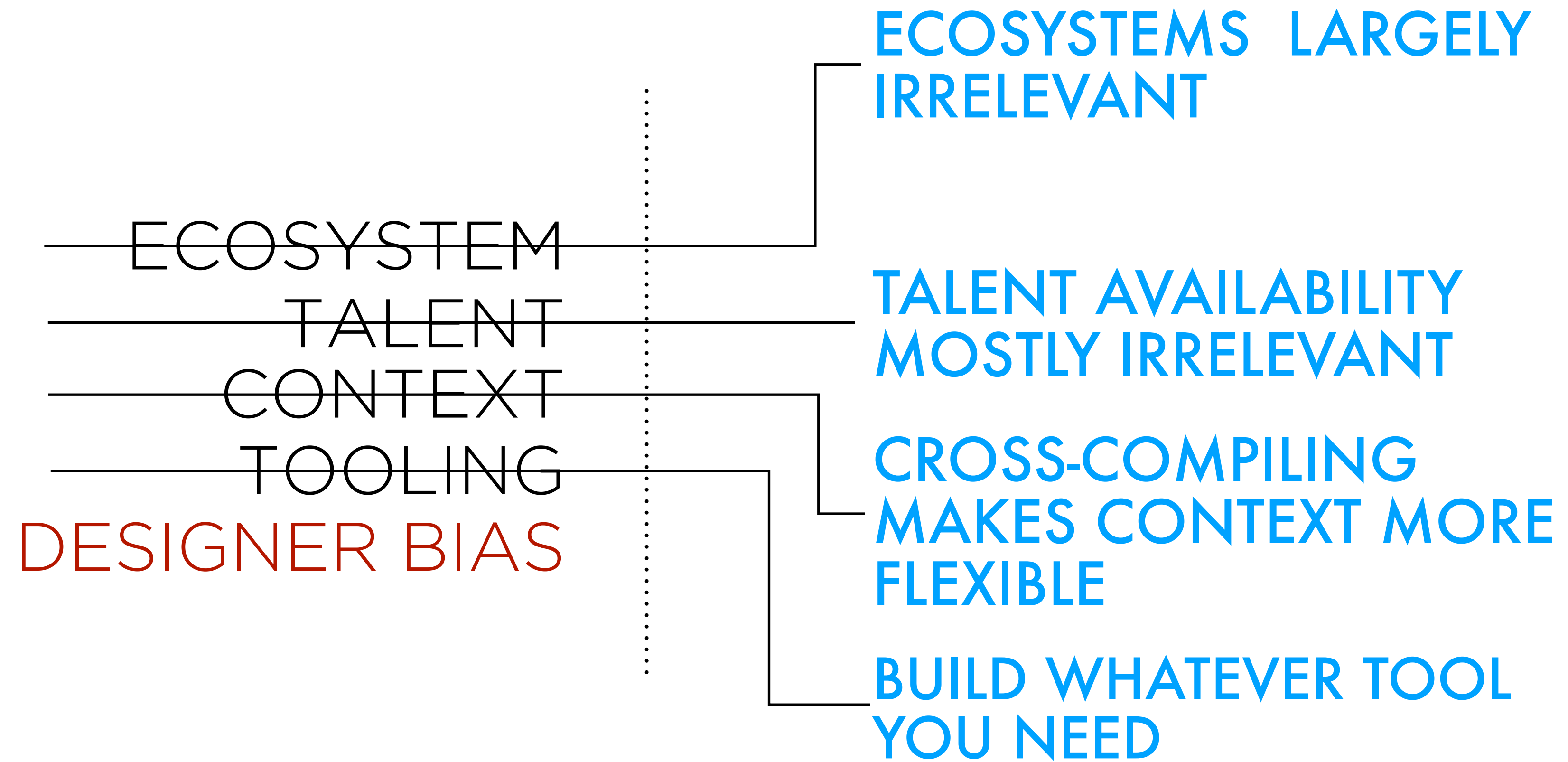
THE ONLY NOTATION MEETS
THE ABSTRACTION
AT EVERY LEVEL

STUDENTS ARE FOCUSED ON PRINCIPLES,
NOT FIGHTING NOTATION AND SEMANTICS

TEACH EVERYTHING IN LISP

TRAIN THEM ON M-. ALL THE WAY DOWN





LANGUAGE CHOICE