# Artificial Intelligence: The History of a Brand

Thomas Haigh

University of Wisconsin—Milwaukee
& Siegen University

Contexts

- Trained in computer science with emphasis on AI, 1991-95

- Became a historian from 1995 onward

- Have written about many aspects of the history of computing, including *A New History of Modern Computing* (MIT, 2021)
  - Big book: about 185,000 words

- Currently writing *AI: A Concise History* for the MIT Press Essential Knowledge Series.
  - Small book, around 40,000 words

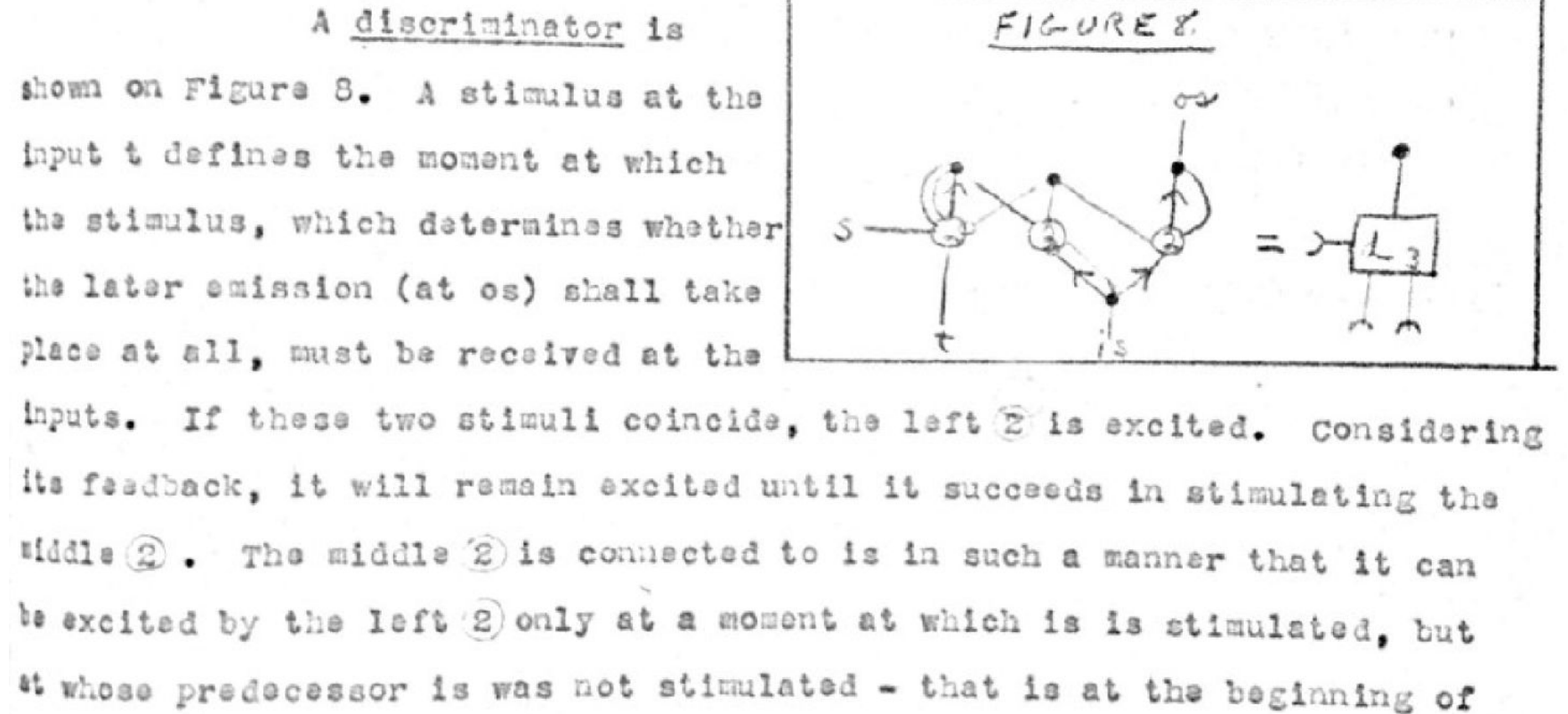- Challenge: how to compress almost 70 years of complex history

A NEW HISTORY OF
Modern Computing
Thomas Haigh and Paul E. Ceruzzi
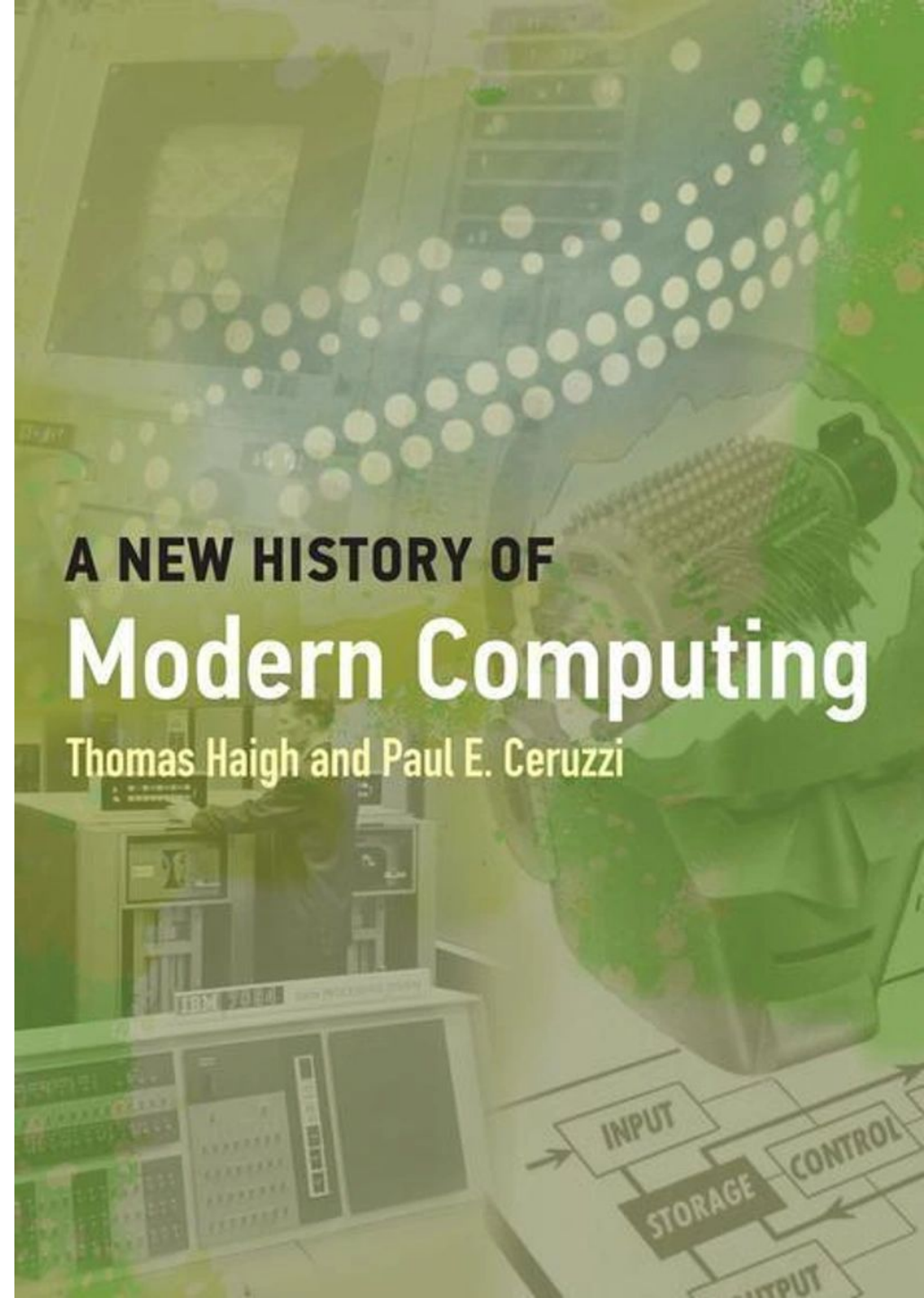
Structure of talk

1. AI: The Birth of a Brand

2. Why Call AI a Brand?

3. Why Wouldn't the Brand Die?

4. Comparisons

1: The Invention of a Brand

Computers vs. Brains

- John von Neuman's *First Draft of a Report on the EDVAC (1945)* explains the architecture of the modern computer with
  - Organs
  - Neurons
  - Stimulation
  - Excitement
- Proto-cybernetic approach

A discriminator is shown on Figure 8. A stimulus at the input t defines the moment at which the stimulus, which determines whether the later emission (at os) shall take place at all, must be received at the inputs. If these two stimuli coincide, the left 2 is excited. Considering its feedback, it will remain excited until it succeeds in stimulating the middle 2. The middle 2 is connected to is in such a manner that it can be excited by the left 2 only at a moment at which is is stimulated, but at whose predecessor is was not stimulated - that is at the beginning of
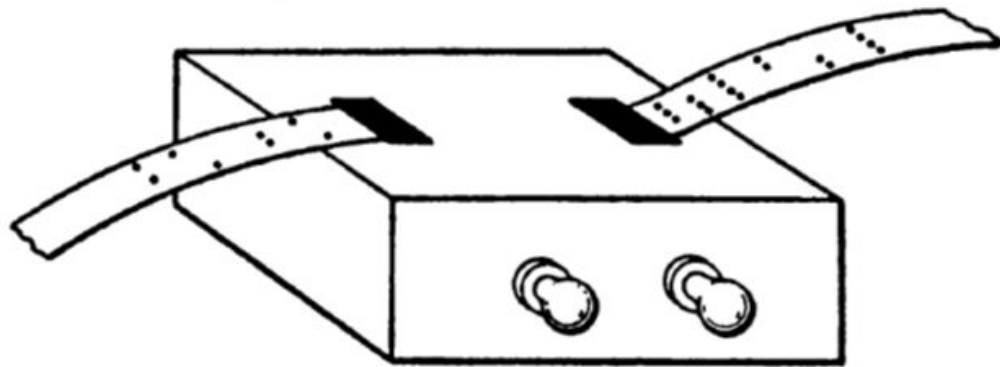
Giant Brains, 1949

- This book predates the AI brand by six years, BUT
- All digital computers are already thinking because switches and neurons do the same things
- Also includes speculation on computers displacing skilled workers with automated
  - machine translation
  - speech recognition
  - psychological therapy.
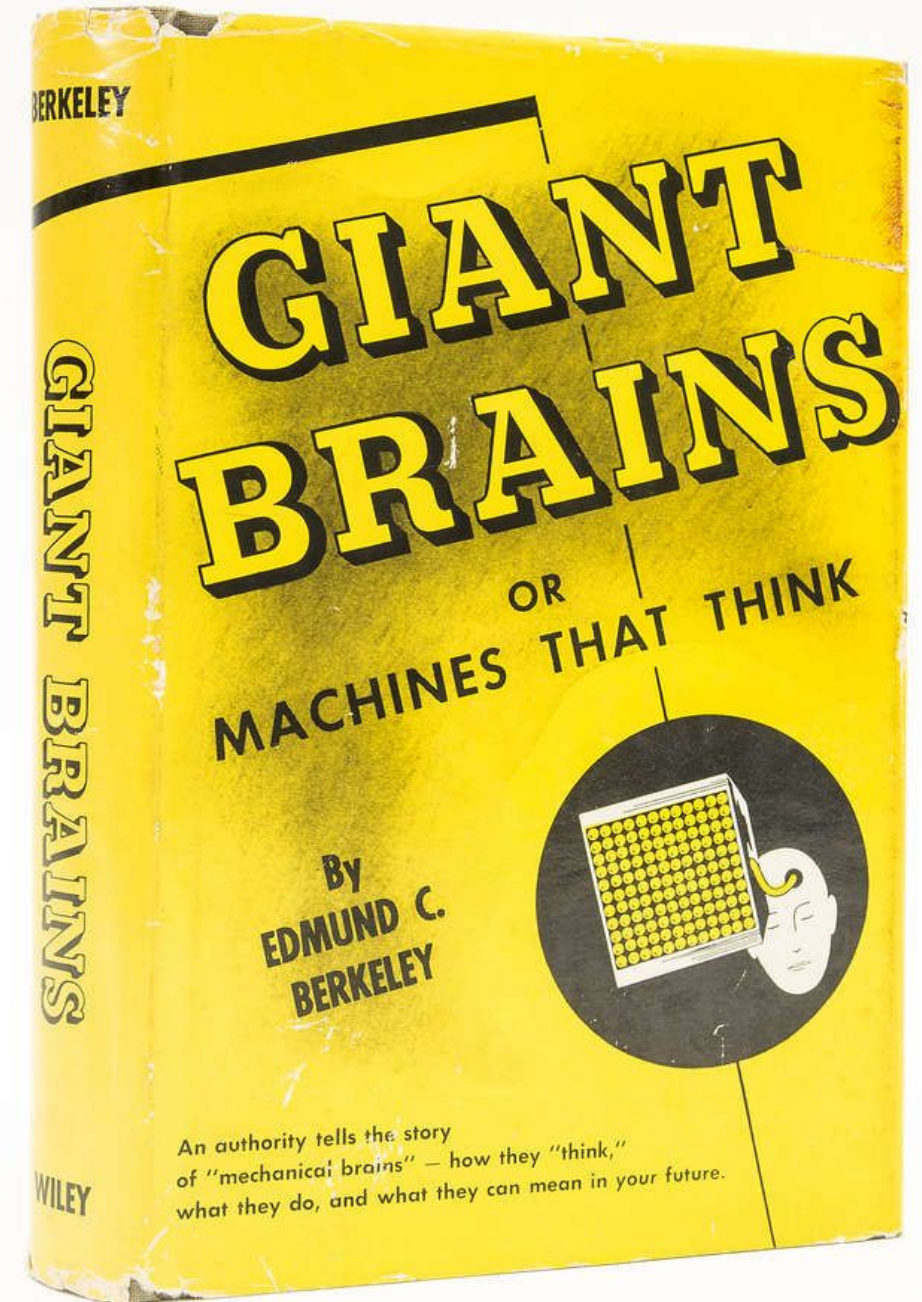
Minimal definition for thinking machines

TWO-HOLE TAPE READER: Simon's left ear that listens to numbers and operations

FOUR-HOLE TAPE READER: Simon's right ear that listens to instructions

LIGHT BULBS: Simon's eyes that wink answers

FIG. 1. Simon, the very simple mechanical brain.

^ "Simon", a build at home project from Giant Brains
☐ GENIAC, an "Electronic Brain" kit sold from 1955

Dartmouth Summer Research Project, 1966

- Proposal funded by the Rockefeller Foundation

- Approx 20 people attended, most for short periods

- Including four men later viewed as the cofounders of AI
  - John McCarthy (right rear)
  - Herbert Simon
  - Allen Newell
  - Marvin Minsky (center rear)

A PROPOSAL FOR THE
DARTMOUTH SUMMER RESEARCH PROJECT
ON ARTIFICIAL INTELLIGENCE

J. McCarthy, Dartmouth College
M. L. Minsky, Harvard University
N. Rochester, I.B.M. Corporation
C.E. Shannon, Bell Telephone Laboratories

August 31, 1955

The following are some aspects of the artificial intelligence problem:

1 Automatic Computers

If a machine can do a job, then an automatic calculator can be programmed to simulate the machine. The speeds and memory capacities of present computers may be insufficient to simulate many of the higher functions of the human brain, but the major obstacle is not lack of machine capacity, but our inability to write programs taking full advantage of what we have.

2. How Can a Computer be Programmed to Use a Language

It may be speculated that a large part of human thought consists of manipulating words according to rules of reasoning and rules of conjecture. From this point of view, forming a generalization consists of admitting a new word and some rules whereby sentences containing it imply and are implied by others. This idea has never been very precisely formulated nor have examples been worked out.

3. Neuron Nets

How can a set of (hypothetical) neurons be arranged so as to form concepts. Considerable theoretical and experimental work has been done on this problem by Uttley, Rashevsky and his group, Farley and Clark, Pitts and McCulloch, Minsky, Rochester and Holland, and others. Partial results have been obtained but the problem needs more theoretical work.

4. Theory of the Size of a Calculation

If we are given a well-defined problem (one for which it is possible to test mechanically whether or not a proposed answer is a valid answer) one way of solving it is to try all possible answers in order. This method is inefficient, and to exclude it one must have some criterion for efficiency of calculation. Some consideration will show that to get a measure of the efficiency of a calculation it is necessary to have on hand a method of measuring the complexity of calculating devices which in turn can be done if one has a theory of the complexity of functions. Some partial results on this problem have been obtained by Shannon, and also by McCarthy.

5. Self-Improvement

Probably a truly intelligent machine will carry out activities which may best be described as self-improvement. Some schemes for doing this have been proposed and are worth further study. It seems likely that this question can be studied abstractly as well.

6. Abstractions

A number of types of "abstraction" can be distinctly defined and several others less distinctly. A direct attempt to classify these and to describe machine methods of forming abstractions from sensory and other data would seem worthwhile.

7. Randomness and Creativity

A fairly attractive and yet clearly incomplete conjecture is that the difference between creative thinking and unimaginative competent thinking lies in the injection of a some randomness. The randomness must be guided by intuition to be efficient. In other words, the educated guess or the hunch include controlled randomness in otherwise orderly thinking.

When does a computer think?

- Proposal suggests that

  The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to and how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves.

- Ambivalent on whether existing computers were thinking or not.

- But Simon described his Logic Theorist in early 1956 as follows: "Over Christmas, Al Newell and I invented a thinking machine."

  - i.e. the computer was **not** thinking until they programmed it to prove theorems

  - Likewise Turing's 1950 suggestion of playing the "imitation game"

The AI agenda of the 1960s to 1990s

- Symbolic approach wins out over neural networks
  - Computers manipulate symbols representing knowledge of the world according to algorithmic rules
  - By early 1980s, all mention of connectionism purged from leading textbooks
- Search as the core technique
- Effort to find general purpose reasoning methods that work across tasks
  - Though specific tasks were selected as test cases
- Assumption that the human brain works the same way
  - Codified in Newell & Simon's "Physical symbol system hypothesis"
- By the 1970s, increasing focus on knowledge representation and its difficulties
  - In part as a response to criticisms of naive focus on reasoning methods by Weisenbaum, Dreyfus, and others

Btw, the "First AI Winter" Never Happened

- Now widely claimed that the 1970s were a period of decline in AI, following the 1973 publication of the Lighthill Report in the UK
  - But membership in ACM's SIGART increased from 1,241 in 1973 to 3,500 in 1978
  - Also important period for publication of textbooks and mainsteaming of AI into computer science curriculm
- See my article in December's *Communications of the ACM*.
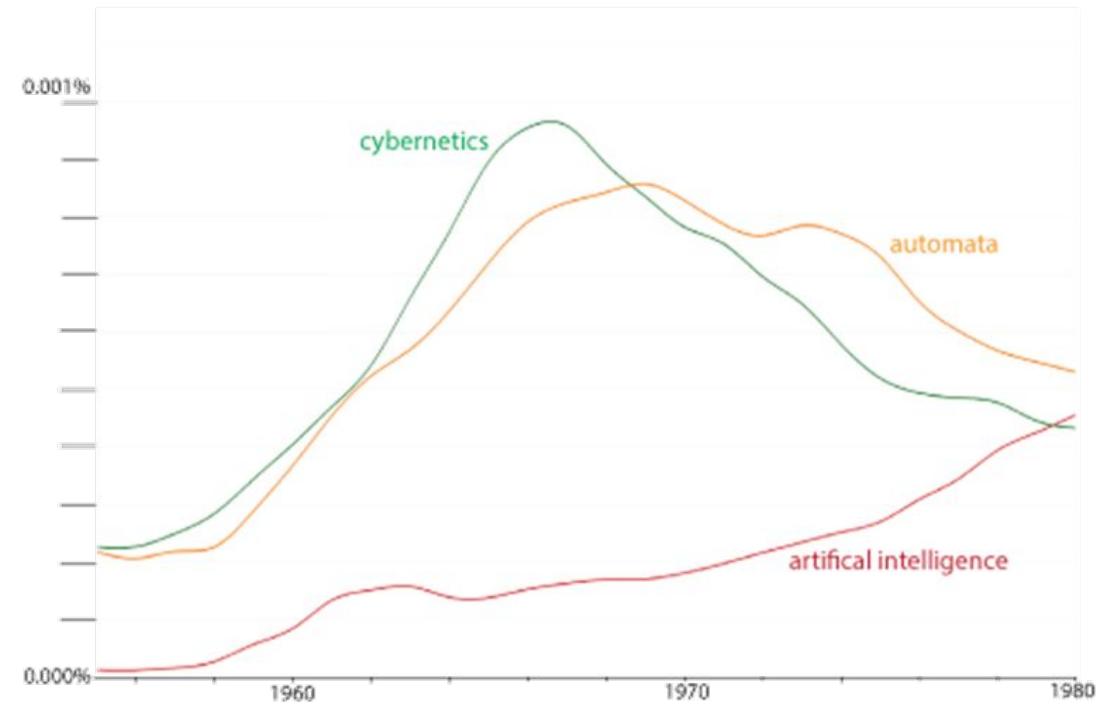
AI was intertwined with Computer Science

- Minsky, McCathy, Newell, Simon are among first 10 ACM Turing Award winners
- Three centers for AI research in the US by 1960s
  - MIT (Minsky, McCarthy)
  - Stanford (McCarthy) & Stanford Research International
  - Carnegie Mellon (Newell & Simon)
- Computer Science programs & depts develop in parallel
  - DOD ARPA is biggest funder of computing projects in 1960s
  - AI labs receive extensive funding, esp. MIT with Project MAC
- MIT, Stanford, CMU still the three highest ranked CS programs today
- (Focus of "Conjoined Twins", my June 2023 CACM contribution)

2: Why Call AI a Brand?

Not Pejorative

- I study the history of capitalism and know brands are important
- Lots of things have brand-like qualities
  - History of Computing
  - Diversity, Equity & Inclusion
  - Ethical Investing
  - Critical AI
- In a sense all disciplines and subfields are brands
  - But *artificial intelligence* is unusually vague about what specific approaches it references
  - Major discontinuities across time

Brands Demarcate Ownership

- Literal meaning to designate ownership of livestock

- Commercial brands are tightly managed and controlled

- McCarthy himself later wrote that "one of the reasons for inventing the term `artificial intelligence' was to escape association with 'cybernetics.' … I wished to avoid having either to accept Norbert… Wiener as a guru or having to argue with him."

(www-formal.stanford.edu/jmc/reviews/bloomfield/bloomfield.html)

AI scope and agenda was set by a small group

- Pamela McCorduck, *Machines Who Think*

  Nine invited papers were given at the 1977 International Joint AI Conference: three by Simon and his former students Ed Feigenbaum and Harry Pople; one by Feigenbaum's own student Doug Lenat; one by Minsky and one by McCarthy. She noted that MIT, Stanford, SRI and Carnegie Mellon dominated, "with the representation from other laboratories being sparser than might have been expected in a field that had grown from the ten Dartmouth pioneers in 1956 to nearly a thousand registrants in 1977."

- Of 7 AI textbooks published 1971-77, all 8 authors had MIT or Stanford degrees

Brands Sell Things

- The AI branding sold
  - Research projects to funding agencies
  - Labs and degree programs to students

- And during the boom of the 1980s and the current moment
  - Startup companies to investors
  - Research groups to companies
  - Funding initiatives to national governments

Brands Compete for Market Share
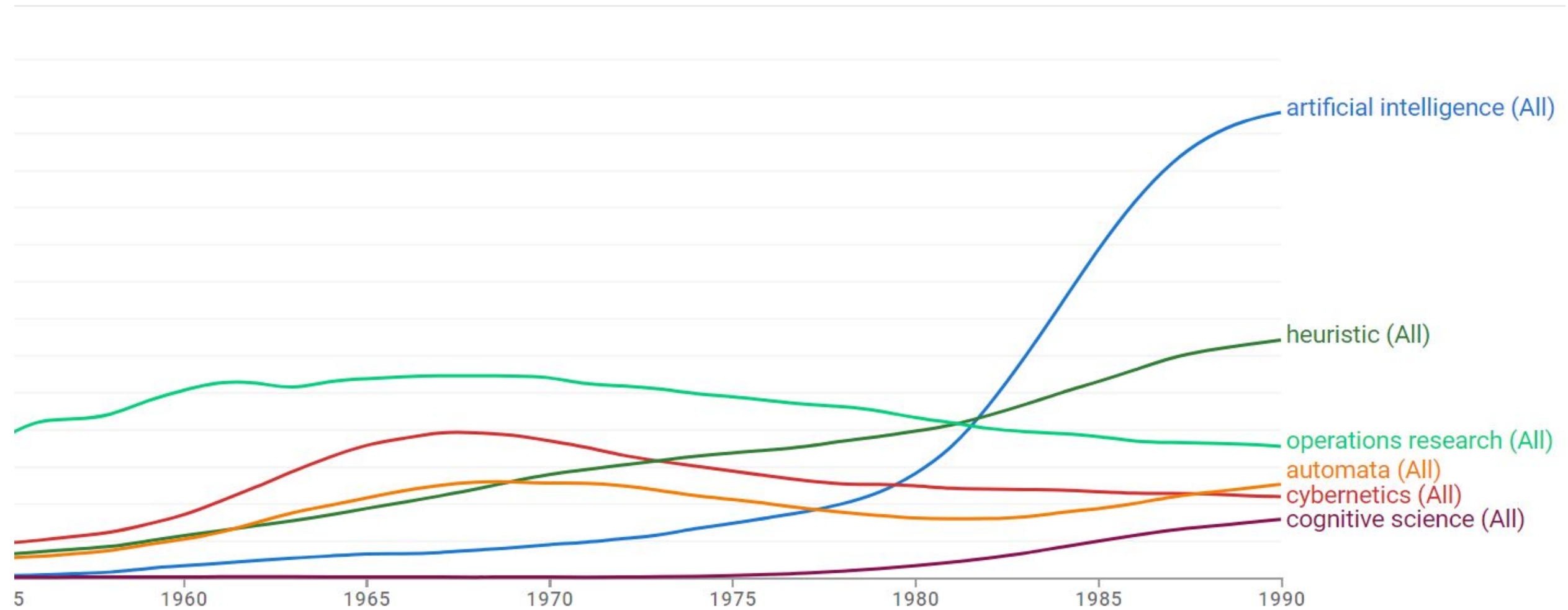
Brands are Aspirational

- And so was the entire project of AI
  - A discipline named after its unobtainable objective

You never actually own a Patek Philippe.

You merely look after it for the next generation. The new men's Neptune. Self-winding, hand crafted in 18 carat solid gold.

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GENEVE

Begin your *own* tradition.

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Brands Impute Qualities

- Rather than having to evaluate the specific object we judge it from the qualities associated with the brand

- AI brand on a system imputed a connection to cognition and a larger mission

Brands Unite Otherwise Distinct Things

STEIGENBERGER

PORSCHE DESIGN

HOTELS

PORSCHE DESIGN

PURE

Similar situation with AI

- Applied to a discontinuous range of activities
  - Justifies even a small project with limited goals as a step towards the grand promise of the AI brand as a whole
- All were originally things humans could do and nobody had yet figured out how to program computers to handle
- But whether specific work was AI branded has more to do with the people, institutions and funding sources than technical content
  - A* search
  - Speech recognition
  - Theorem proving

Brands Outlive Specific Products

- Brands evolve over time, deemphasizing or eliminating the product lines that they were originally applied to.
  - IBM, Nokia, Netflix, HP, etc.
- Similarly the AI brand narrowed to include only symbolic AI from the 1970s to the 1990s
  - Connectionist approaches were branded as pattern recognition, deep learning, machine learning, etc.
  - Within the last decade the situation the AI brand has flipped.

(Brands Can Be Tarnished)

Fashion labels mixing with the wrong crowd

Its association with the UK's 'chav' culture has been a marketing nightmare for Burberry. But how can a fashion brand stop such undesirable elements from buying its clothes? asks Caroline Parry

By Marketing Week | 4 Nov 2004

Share this article

Burberry and the chequered politics of working-class appropriation

FASHION · FEATURE

It's been 20 years since Danniella Westbrook was labelled 'chavtastic' for wearing full-look Burberry, and yet the nova check remains a weathervane for the UK's turbulent relationship with class

Text Daniel Rodgers

26th May 2022

In our new *Class Ceiling series*, we unpack how class actually affects young people today – from our jobs, to the way we have sex, to our general experience of the world.
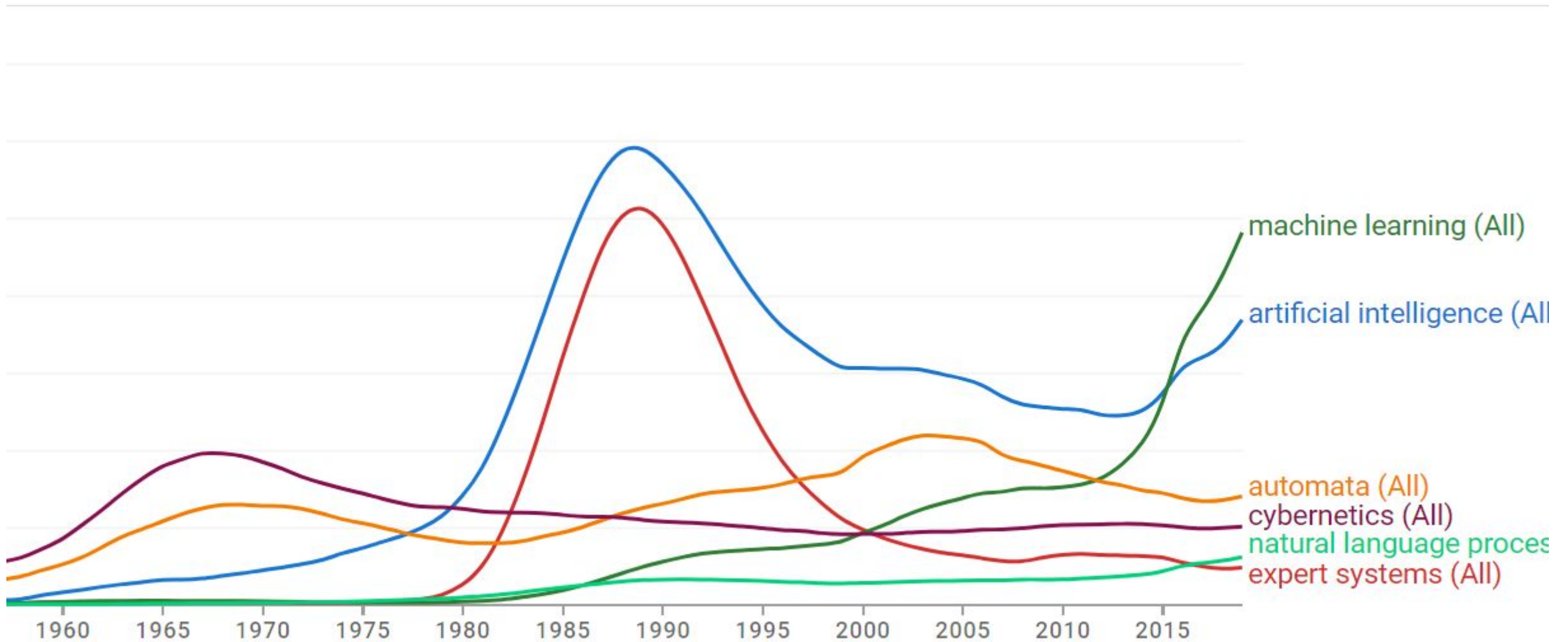
"AI Winter" warned of in 1984

- AAAI Panel on "The Dark Ages of AI": Drew McDermott warned of a feeling of "deep unease" that excessively high expectations for AI "will eventually result in disaster."

  "To sketch a worst case scenario suppose that five years from now the strategic computing initiative collapses miserably as autonomous vehicles fail to roll. The fifth generation turns out not to go anywhere, and the Japanese government immediately gets out of computing. Every startup company fails. Texas Instruments and Schlumberger and all other companies lose interest. And there's a big backlash so that you can't get money for anything connected with AI. Everybody hurriedly changes the names of their research projects to something else."

- All that happened by 1989, BUT…

The 1990s AI Winter is Real, but

machine learning (All)

artificial intelligence (All

automata (All)
cybernetics (All)
natural language proces
expert systems (All)

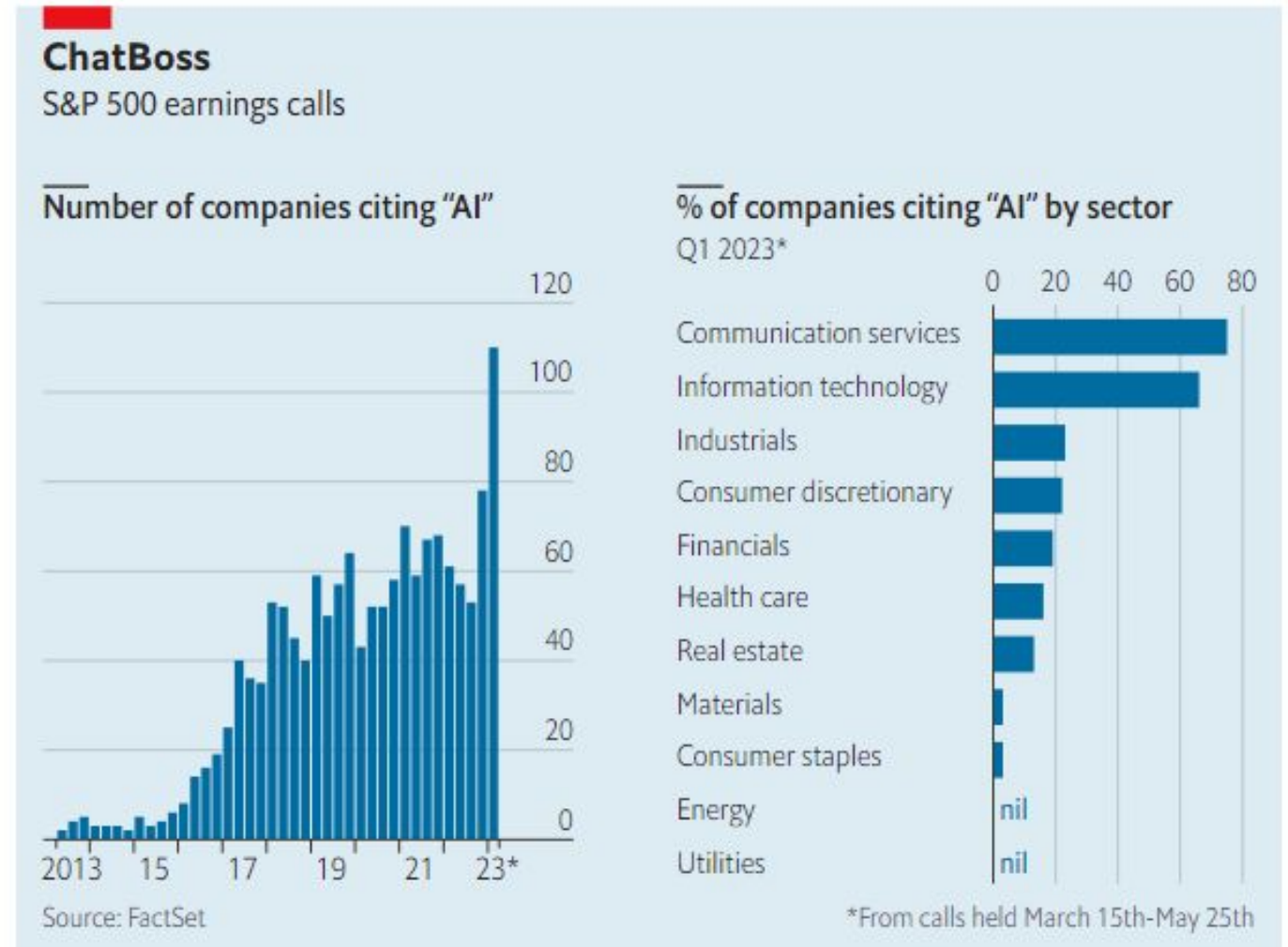1960   1965   1970   1975   1980   1985   1990   1995   2000   2005   2010   2015
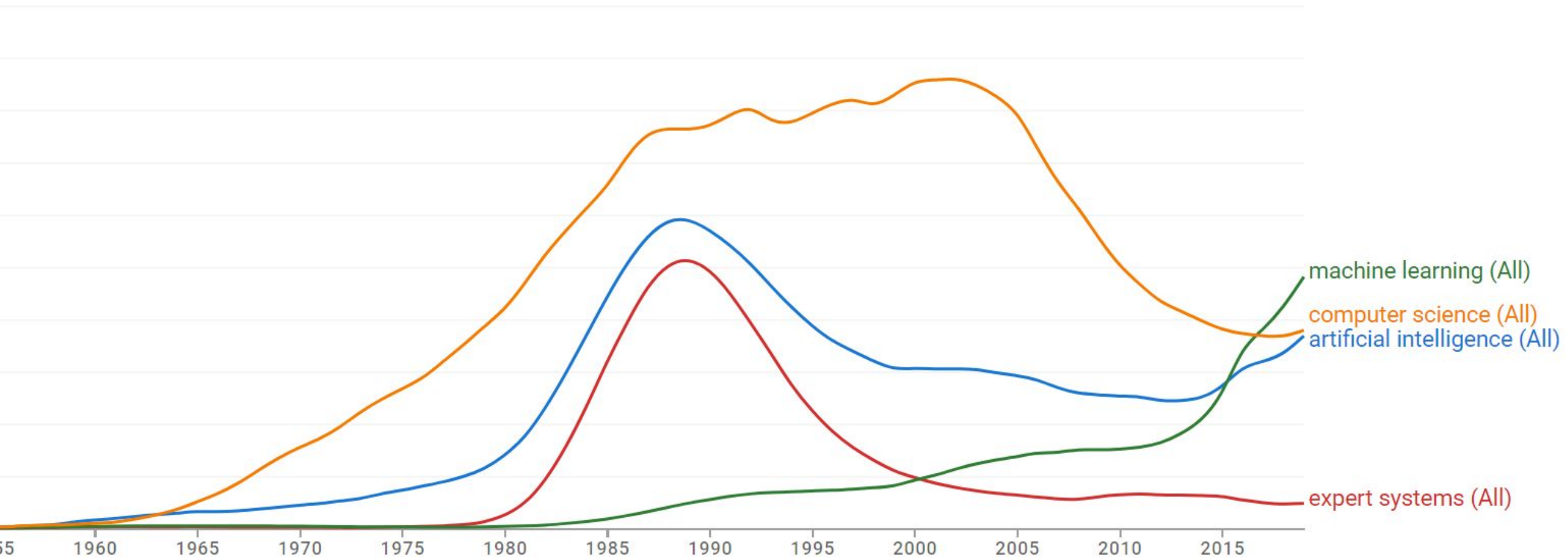
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Today the AI Brand is Selling Better Than Ever

- The Economist suggests that AI hype is the only think keeping US stock rally alive

- Nvidia became 6th company with trillion dollar market cap

- A very old brand taking over from tired new ones like
  - Web 3.0
  - Blockchain
  - Defi
  - Big Data

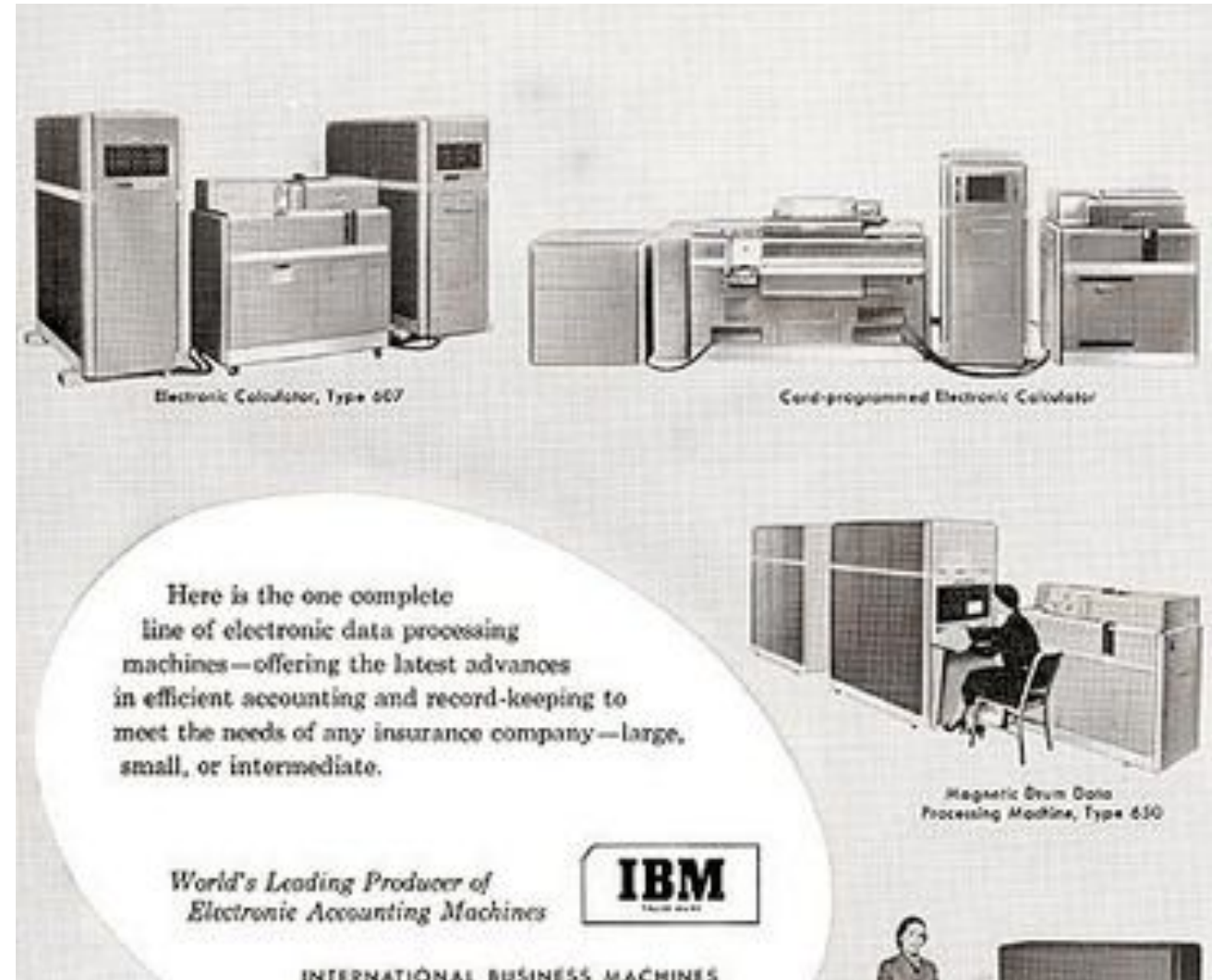# AI & ML have even overtaken "Computer Science"

machine learning (All)

computer science (All)

artificial intelligence (All)

expert systems (All)

3: Why Wouldn't the Brand Die?

Let's Compare vs. Business Computing

Electronic Data Processing

- First used mid-1950s
- Introduced by IBM to unify computing (EDP) with conventional punched card equipment (DP)
- Tom Watson Jr:
  "[T]he very name that we have applied to our jobs—Data Processing," suggested Watson, implied a new focus on the provision "of relevant facts on a timely basis, on a basis equal or better than our business competitors."

Management Information Systems

- Coined in 1959 by American Management Association group
  - "The Continuing Seminar on Management Information Systems"
  - Elites of the "systems", management consulting and computer vending communities
- "Totally Integrated Management Information System"
  - All information, instantly, all managers, whole firm
  - System include models, forecasts, projections
  - Used directly by top executives

MANAGEMENT INFORMATION SYSTEMS

Some dreams have turned to nightmares

RIDLEY RHIND

Mr. Rhind is an associate of McKinsey & Company, Inc. of San Francisco.

It is common knowledge that an executive is dependent on the quality of information he receives—both official and unofficial. Recently many systems men have urged the use of computers in creating management information systems (MIS). In this article Ridley Rhind explores the value of such systems. He begins by citing some limitations of computer-based MIS in providing the information needed by managers for making decisions. Even though the author illustrates that on certain levels of management a computer-based information system can be of great value, he nevertheless contends that many claims for computers are unfounded. In addition, Rhind feels that despite great strides made in perfecting computer information systems, the responsibility for judgment still remains with management.

An executive's dependence on information has long been recognized. Speaking of President Franklin D. Roosevelt as he approached his new office in the 1930's, Arthur Schlesinger has reported that "the first task of an executive, as he [F.D.R.] evidently saw it, was to guarantee himself an effective flow of information and ideas. . . ."¹

Schlesinger goes on to discuss the very great efforts that President Roosevelt made to ensure that he received information—as often from unofficial as from official sources. Although it has not always been so explicitly recognized, the need for information in business is as great as it is in politics, and business executives now universally acknowledge that their sources are very imperfect. But it is only recently that it has become the height of fashion to look to computers to meet executives' information needs.

COMPUTER-BASED MIS

Because the computer seems to promise an improvement in the availability and quality of information—which would meet a universal need—computer-based management information systems (MIS) are much discussed in management journals today, but many of the hopes now pinned to such systems seem to be derived from the acuteness of the need rather than the real likelihood of success.

The concept of a computer-based MIS

¹Quoted in Richard E. Neustadt, *Presidential Power* (New York: John Wiley & Sons, Inc., 1960), p. 149.

JUNE, 1968

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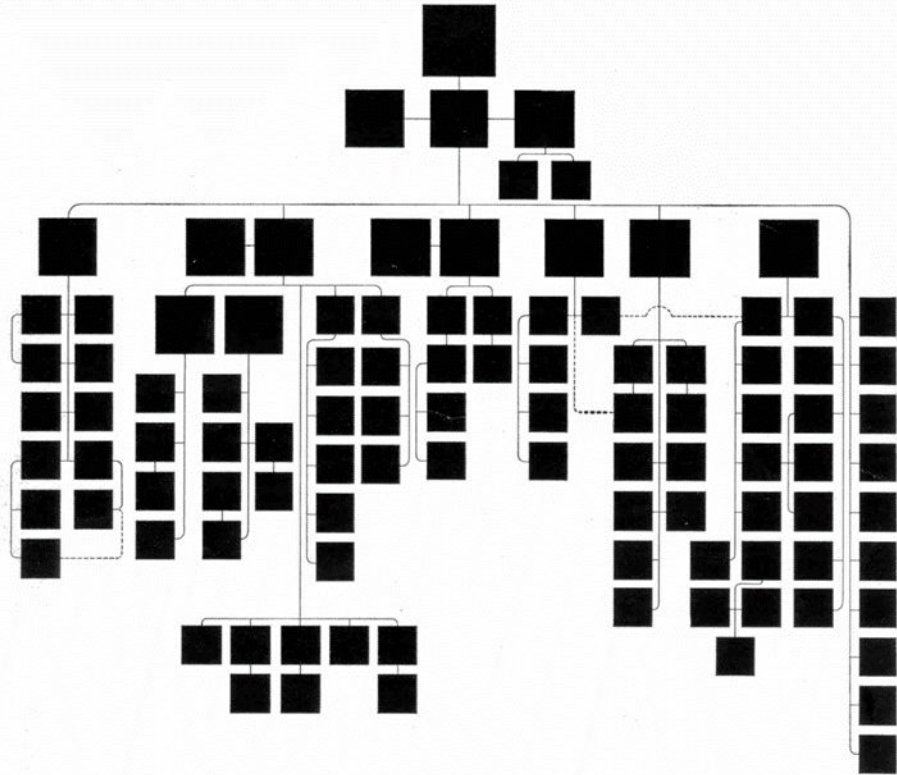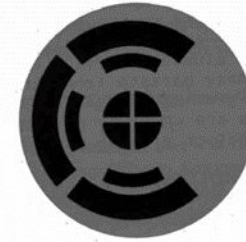
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Your business with a Univac Total Management Information System.

Management is no longer the remote apex of a pyramid but the hub of a wheel. Lines of communication are direct. Every area of activity is monitored on an absolutely current basis. And centralized control of decentralized operations becomes a reality. Painlessly.

There are three distinct Total Management Information Systems graded for businesses of varying size and complexity and known collectively as The Univac Modular 490 Real-Time Systems.
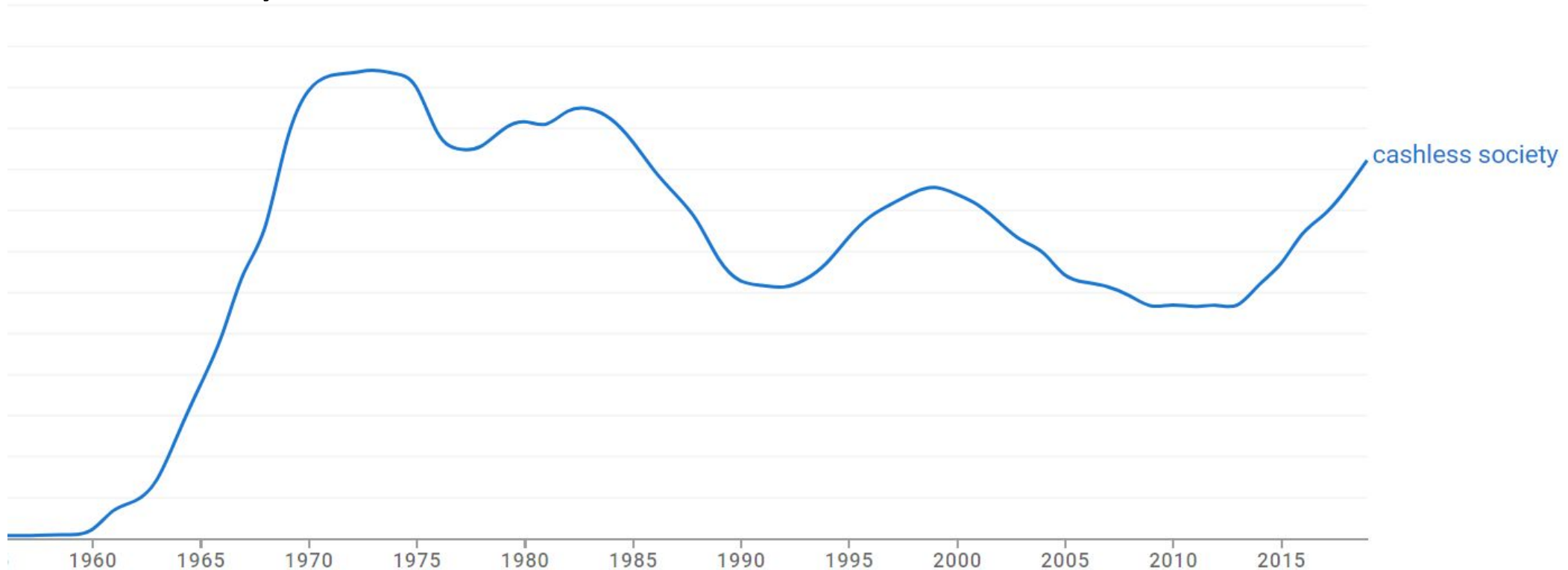
For information about them, get in touch with the **Univac Division of Sperry Rand Corporation.**

Succession of hyped brands here too
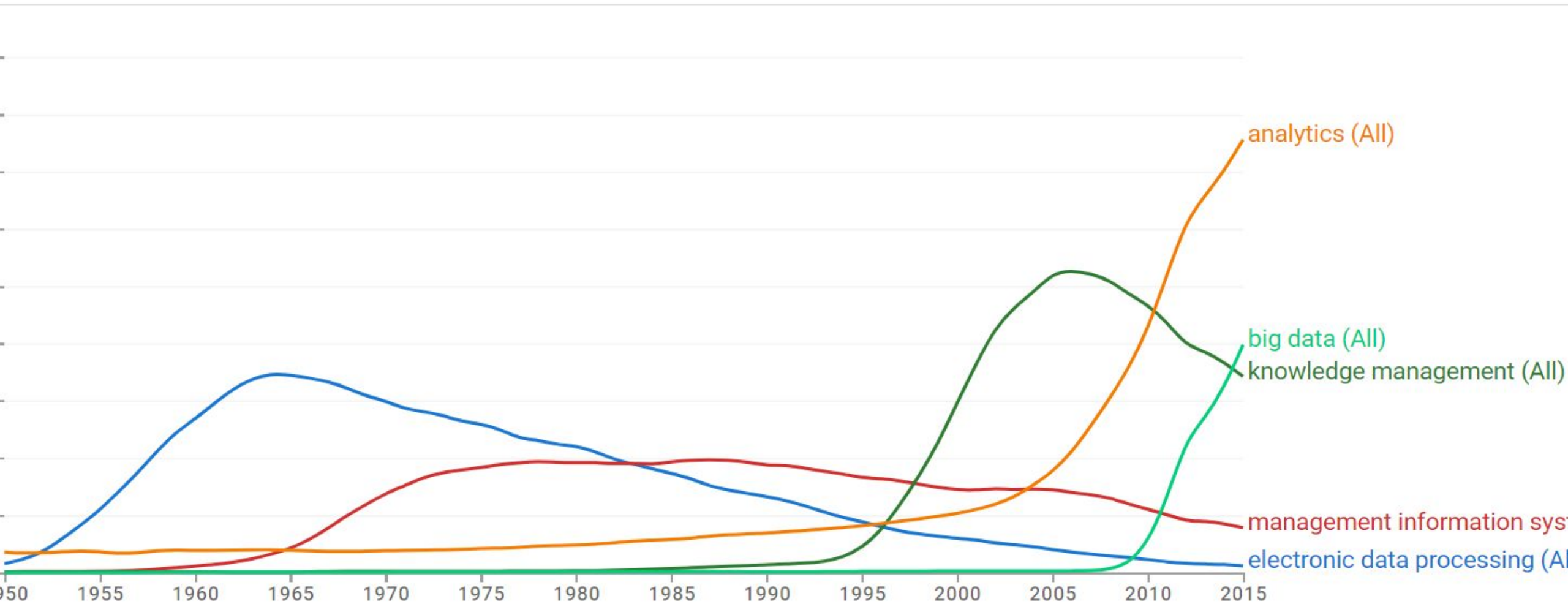
Cashless Society

- Closest to AI trajectory, as hot in 1970s, 1990s and 2010s
- Perhaps because of the vagueness – unlike, say, EFTPOS describes the future by what **won't** be there.

Constant Quest for the New Thing

- Most computing brands have a limited half life
  - Taint of failure
  - Or just become the old new thing
- AI is old and failed to live up to its promises decade after decade
- Herb Simon, 1960: "within the near future-- much less than twenty-five years--we shall have the technical capability of substituting machines for any and all human functions in organizations." The "problem-solving and information handling capabilities of the brain" would be duplicated "within the next decade."
- AI critics were vocal in pointing this failure out from the 1960s onward
- So, why is AI still such a gigantic brand?

Is it the connection to science fiction?

AI Concerns anchored in SF narratives?

- Idea that rational, self aware, superhuman machine intelligence is arriving now

- AI branding taps into this narrative in a way that "knowledge based system" or "large language model" doesn't.
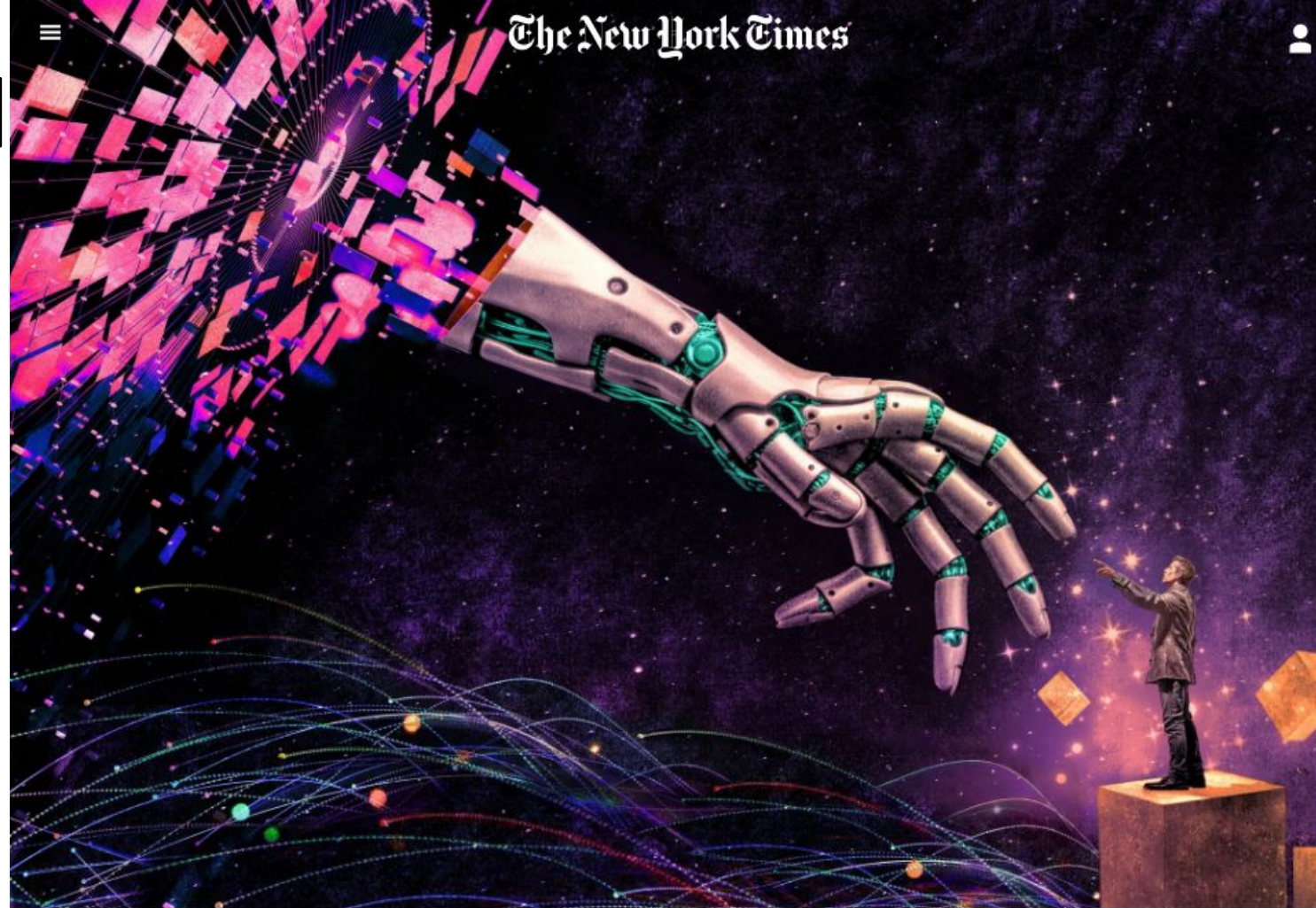
Zach Meyer

Silicon Valley Confronts the Idea That the 'Singularity' Is Here

The frenzy over artificial intelligence may be ushering in the long-awaited moment when technology goes wild. Or maybe it's the hype that is out of control.

4: Continuities and Discontinuities

20TH CENTURY AI	CONTEMPORARY AI
Hugely hyped	Spectacularly hyped
Needs fastest computers	Needs fastest computers
Loose connection of tech to cognition	Loose connection of tech to cognition
Mostly academic	Mostly commercial
Government funded	Investor funded
Symbolic	Connectionist
Heuristic search	Statistical prediction
Humans usually formulate rules	System trains itself from mass of data
Knowledge coded explicitly	Knowledge dispersed over connection weights
Rarely applied outside lab	Widely applied on big tech platforms

Specific Reaction to GPT Chatbots

- The Turing Test has loomed large in popular and philosophical discussion of AI since the 1950s
  - Even though AI researchers have been playing it down since the 1970s
- Defines intelligence on basis of the ability to mimic a human in conversation
  - Which we seem primed to accept as proof
  - Famous case of ELIZA – absurdly simple, but illusion of conversation proved captivating
- CHAT GPT-4 is described as a Large Language Model
  - But clearly is packaged specifically to fool people into believing it has human-like qualities

Published 2021!

ELIZA is the direct ancestor of a phenomenon that makes AI researchers groan whenever it is mentioned: the internet chatbot. These are internet-based programs that attempt to engage users in conversation, often via social media platforms such as Twitter. Most internet chatbots use nothing more than keyword-based canned scripts in the same way that ELIZA did, and as a consequence, the conversations they produce are every bit as superficial and uninteresting. Chatbots of this kind are not AI.

A Brief History of Artificial Intelligence

Michael Wooldridge

What It Is, Where We Are, and Where We Are Going

AI Has Been Many Things Over Time

- We look to ground AI in long histories… today often of statistics.
- But this tends to take one facet of what is, or has been, called AI and essentialize it as standing for the whole.
- In my short book I am focusing on the core AI story
  - The AI brand and how it's evolved over time
  - The specific techniques and technologies that have been branded as AI
  - AI as a subfield of computer science with textbooks, college courses, etc.
- A short history that speaks to many long histories.