

Emergent Metaphors of ‘Virtual’ and ‘Artificial’ in Computer Science in the 1950s.

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“Virtual entities in science: a
virtual workshop”

DFG Research Unit, The
Epistemology of the LHC
March 19, 2021

Non est potestas Super Terram quae Comparetur ei Iob. 41. 24.



The greatest error is to “use words metaphorically; that is, in other senses than that they are ordained for, and thereby deceive others.... such speeches are not to be admitted”

Thomas Hobbes,
Leviathan (1651, 20).

Non est potestas Super Terram quae Comparetur ei Iob. 41. 24.



“Metaphors, and senseless and ambiguous words, are like *ignes fatui*; and reasoning upon them is wandering amongst innumerable absurdities; and their end, contention and sedition, or contempt.”

Thomas Hobbes,
Leviathan (1651, 30).

A N
E S S A Y

CONCERNING

Humane Understanding.

In Four BOOKS.

Quam bellum est velle confiteri potius nescire quod nescias, quam ista effutientem nauseare, atque ipsum sibi displicere! Cic. de Natur. Deor. l. 1.



L O N D O N:

Printed by *Eliz. Holt*, for **Thomas Basset**, at the
George in *Fleetstreet*, near *St. Dunstons*
Church. MDCXC.

“All the artificial and figurative application of words eloquence hath invented, are for nothing else but to insinuate wrong ideas, move the passions, and thereby mislead the judgment, and so indeed are perfect cheats.”

John Locke, *An Essay Concerning Human Understanding* (1689, 677).

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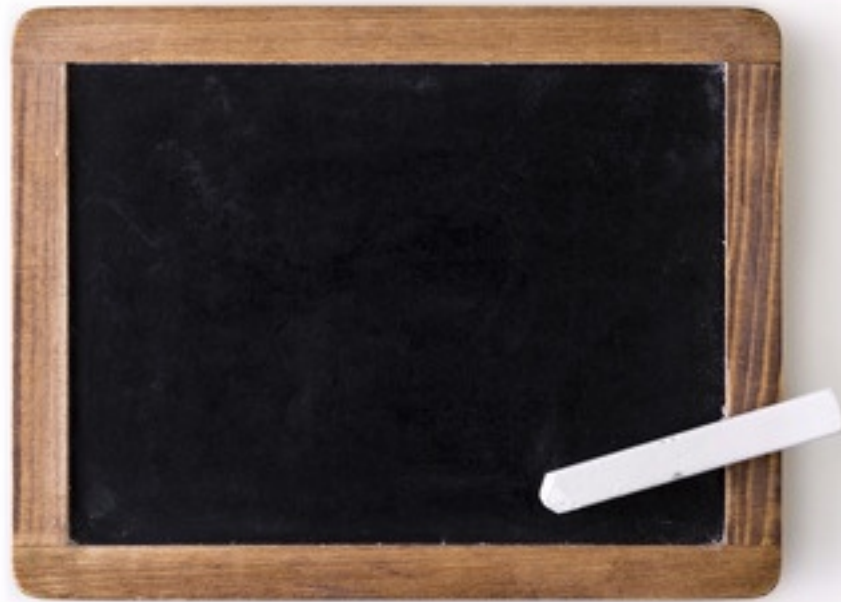


L O N D O N:

Printed by *Eliz. Holt*, for **Thomas Basset**, at the
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“The senses at first let
in particular ideas, and furnish
the yet empty cabinet, and the
mind by degrees growing
familiar with some of them, they
are lodged in the memory, and
names got to them.”

John Locke, An Essay Concerning Human
Understanding (1689, I.ii.15).



"Our skill with metaphor, with thought, is one thing— prodigious and inexplicable; our reflective awareness of that skill is quite another thing—very incomplete, distorted, fallacious, oversimplifying."

I. A. Richards (1936, 116)



“Metaphor has been treated as a sort of happy extra trick with words... a grace or ornament or added power of language, not its constitutive form.”

I. A. Richards (1936, 90)

Orientational = “it boosted my spirits” “I’ve put that behind me”

Ontological = “grasp an idea” “fight the seduction”

Structural = “man is a wolf” “DNA is a ladder”

“Linguistic metaphors realize conceptual metaphors” Lakoff & Johnson (1980)

TIME IS MONEY: “I spent too much time...” “invested” “worth”

“Perhaps every science must start with metaphor and end with algebra” Max Black (1962, 242)

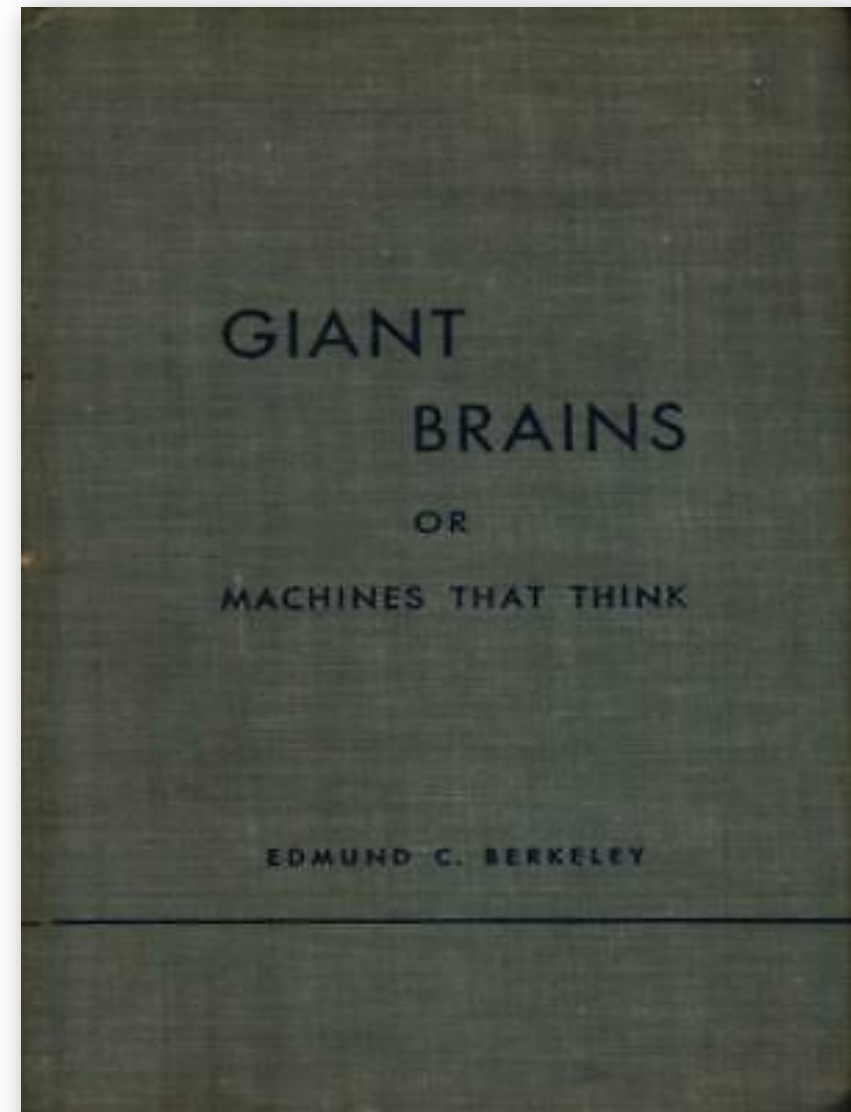
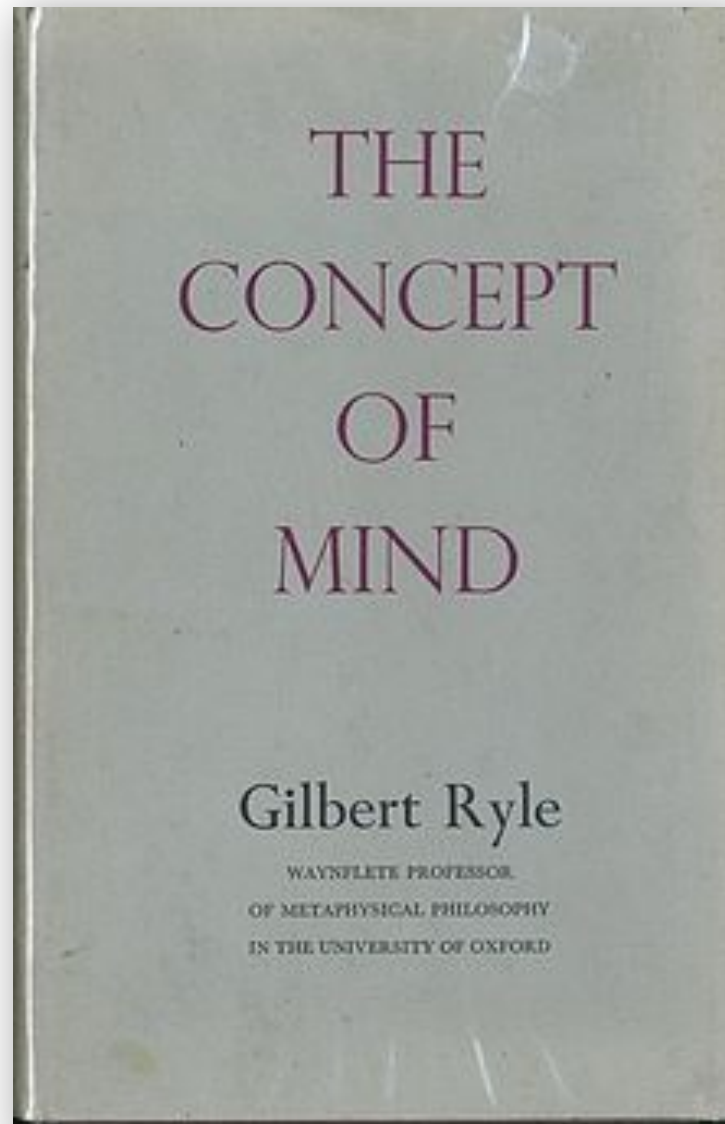
Electricity: “flows through a circuit just like water flows through pipes”
“current” “flow” “resistance” etc.

Light: “travels in waves like water waves (which requires a medium...)”

Spectral lines: “atoms/molecules vibrate at certain frequencies just like tuning forks”

Atomic structure: “electrons orbit the nucleus just like planets orbit the Sun” “plum pudding” “billiard balls” “dice” “soap bubble” “cloud” etc.

1949



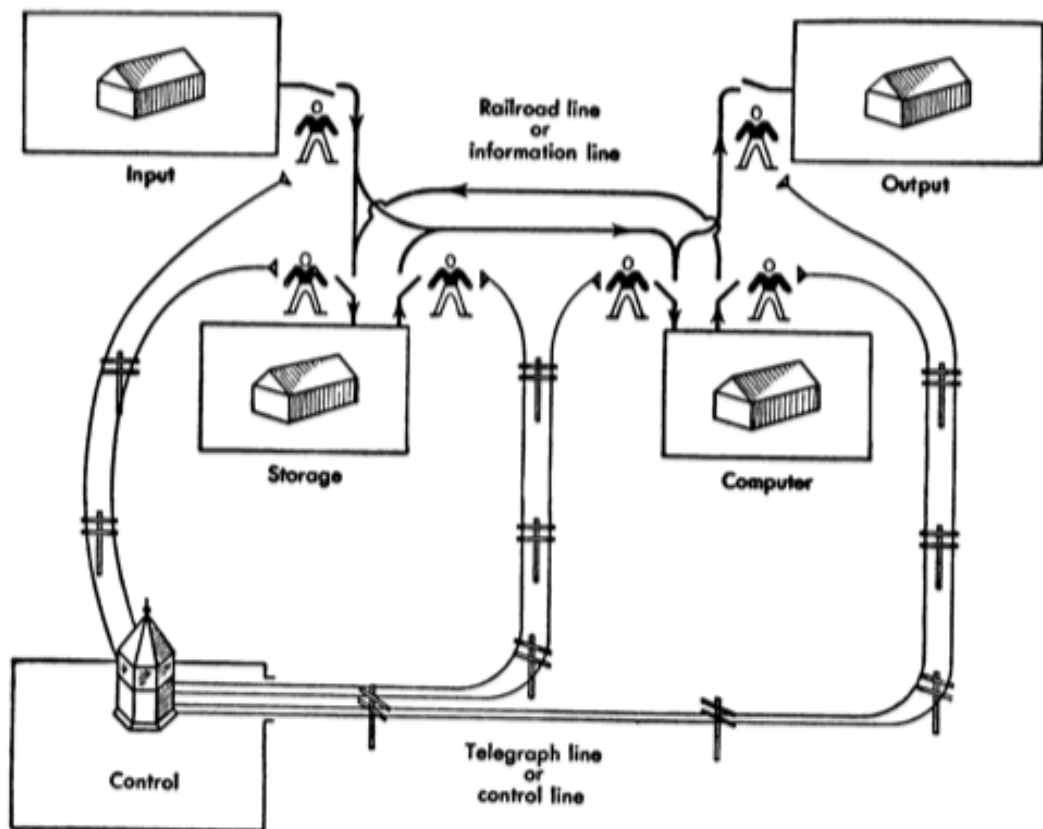


FIG. 2. Scheme of a mechanical brain.

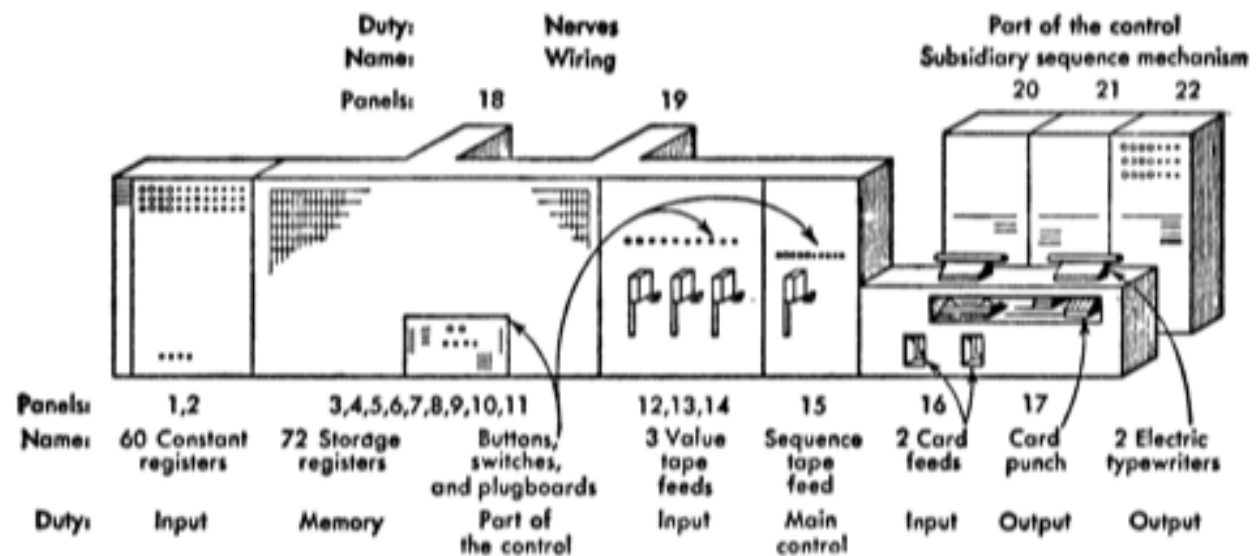


FIG. 1. Scheme of Harvard IBM Automatic Sequence-Controlled Calculator.



If A COMPUTING MACHINE IS A BRAIN ...

then ...

“memory” (Von Neumann 1945)

“neurological networks” > “neuron nets” > “nervous nets” > “neural network”
1954 1956 1956 1963

Neuro = metaphorical morpheme.

“computing machines” > “automatic computers” > “computers”
1937 1956 1963

“machine language” vs. “natural language”

IN THIS BUILDING DURING THE SUMMER OF 1956

JOHN McCARTHY (DARTMOUTH COLLEGE), MARVIN L. MINSKY (MIT)
NATHANIEL ROCHESTER (IBM), AND CLAUDE SHANNON (BELL LABORATORIES)
CONDUCTED

THE DARTMOUTH SUMMER RESEARCH PROJECT ON ARTIFICIAL INTELLIGENCE

FIRST USE OF THE TERM "ARTIFICIAL INTELLIGENCE"

FOUNDING OF ARTIFICIAL INTELLIGENCE AS A RESEARCH DISCIPLINE

"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."

IN COMMEMORATION OF THE PROJECT'S 50th ANNIVERSARY
JULY 13, 2006

A COMPUTING MACHINE EXHIBITS INTELLIGENCE

“machine intelligence” “human intelligence” “artificial intelligence”

MACHINES ARE PEOPLE that can:

Copy, execute (x3), form (x8), formulate (x7), make (x4), do (x8), work (x3), try (x2),
manipulate, operate (x3), acquire, respond, improve (x4), self-improve (x2), find, solve (x7),
guess (x3), simulate (x8), predict (x3), transmit, learn (x4), develop, be imaginative (x3),
acquire, exhibit (x4), be trained (x2), abstract (verb), perform, assemble, explore, get
confused, behave (x3).

MACHINES ARE PEOPLE that have (or could have):

Behavior (8), memory (2), capacity (3), a laborious manner, internal habits, language, a
sophisticated manner, symptoms, character(istically), speed (2), tend(ency), higher
function, originality (8), common sense, intuition (2), strategy.

“Information Processing Language” (Simon and Newell; 1956) suggested as alternate
metaphor

VIRTUAL COMPONENTS

“Virtual memory” (1959)

“Virtual terminal; virtual disk” (1961)

“Virtual machine” (1965)

“Terms like ‘virtual terminal’ and ‘virtual disk’ soon evolved as operating system designers adopted the strategy of **simulating** machine components and **hiding** the real machine’s complexity behind a simple interface.” (Peter Denning)

Simulate comes from Latin stem *similis* (*similar*). The virtual memory/machine/disk is a *simile* of the real thing (i.e. a metaphor for the real hardware)

(proto-)“virtual reality” (1957)

“...you shouldn’t think of a computer screen as a way to display information, but rather as a window into a virtual world that could eventually look real, sound real, move real, interact real, and feel real.”

Ivan Sutherland, 1965

“A virtual machine is taken to be an ***efficient, isolated duplicate*** of the real machine”

Popek and Goldberg, 1974

KNOWLEDGE IS AN OBJECT

KNOWLEDGE IS AN OBJECT that can be:

Carried out (x3), obtained (x3), acquired, circulated, (in)complete (x2), attractive, clear (x6), connected, valuable, accumulated, worthwhile, looked for, shown, seen (from a “point of view”), “cast some light on”, “appear” (x3), given, provided, stored (x2), used (widely), extended, approached, made to appear, near, seen, handled, injected, supported (x4), set up, constructed (x3), built (x3), linked, seen, had on hand (or the other hand) (x2), worked on/out (x10), orderly.

KNOWLEDGE IS AN OBJECT that has:

Size (of a calculation), worth, upper and lower bounds, scope, basis (x3), structure (x2), matter, sets (of rules, of experiments) (x7), higher and lower levels/functions (x2), stages, flow, high order.

KNOWLEDGE IS A BUILDING

KNOWLEDGE IS A BUILDING allows for knowledge to be described as:
having a “basis” (x3), as needing financial “support” (x4), as having “stages” (x3), “levels” (4)
and “structure”. It can be “built,” and “constructed,” and distinctions can be made between
“higher” and “lower” levels of knowledge

KNOWLEDGE IS ...

a “territory” “environment” “tree” “hill” something that can be “framed”

“For visual scene analysis, the different frames of a system describe the scene from different viewpoints, and the transformations between one frame and another represent the effects of moving from place to place”

(Minsky, 1974, 2)

The entailments here suggest morphemic variations of the word including “framework,” found in the text as “frame-systems,” “inter-frame structures,” “niche-frame,” “space-frame,” “conventional frame,” “frame-oriented scenario,” “super-frame,” and terms that cross with other metaphors previously mentioned such as chess (“fork frame”) and A MACHINE IS A BRAIN (“a great collection of frame systems is stored in permanent memory” (Minsky, 1974, 8)).

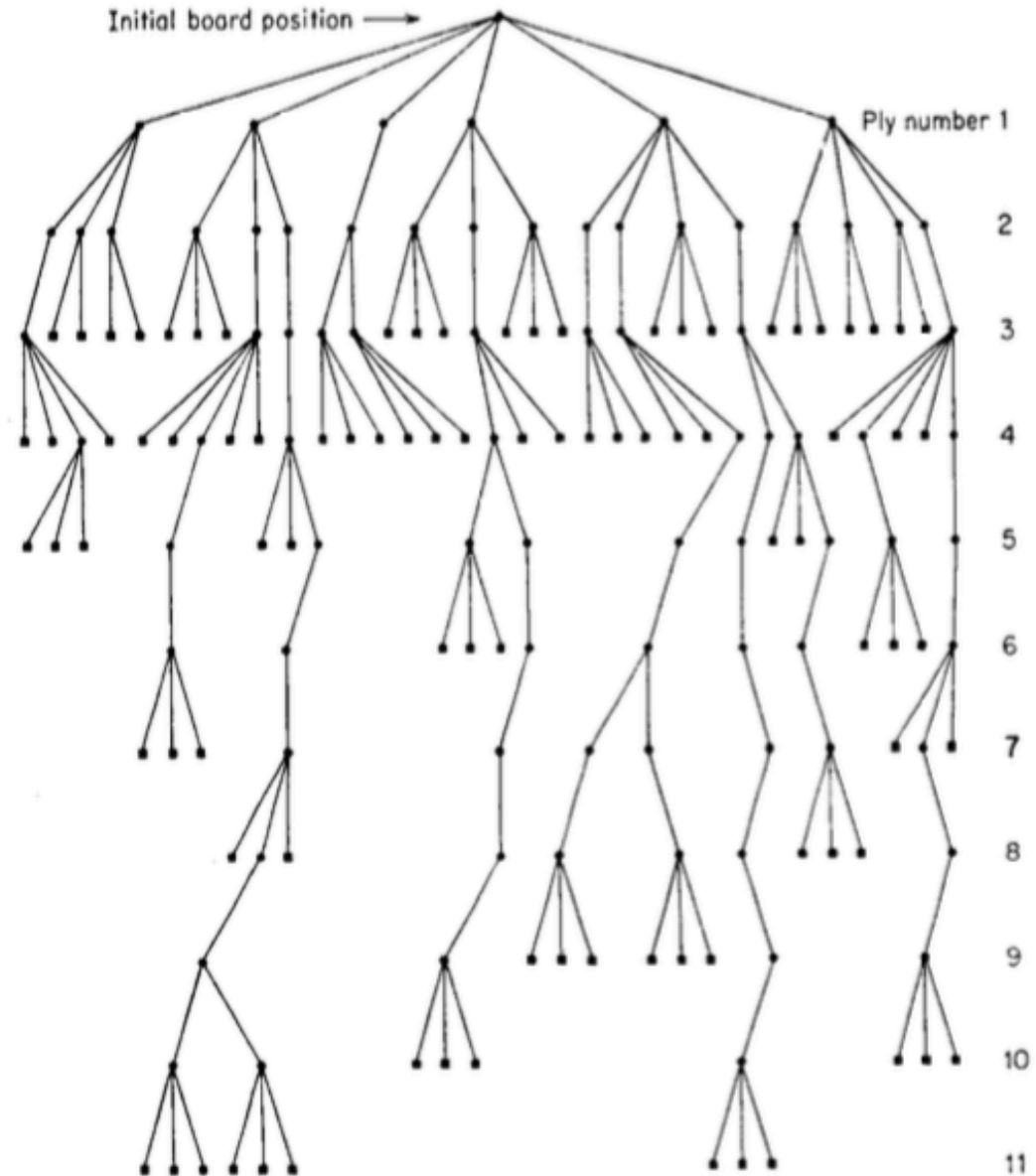


Figure 1. A "tree" of moves which might be investigated during the look-ahead procedure. The actual branchings are much more numerous than those shown, and the "tree" is apt to extend to as many as 20 levels.

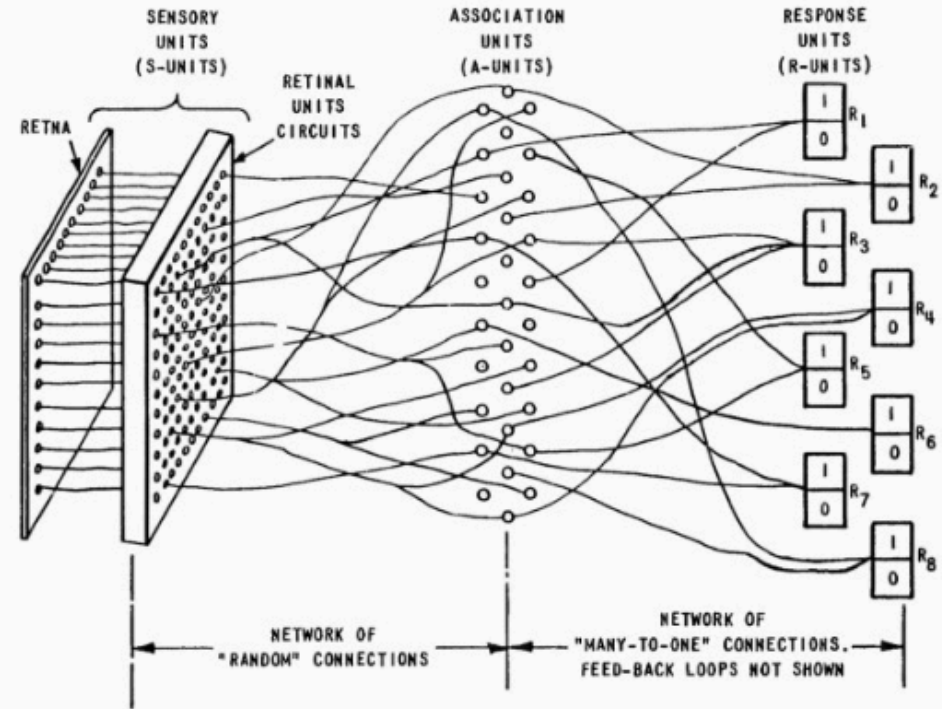
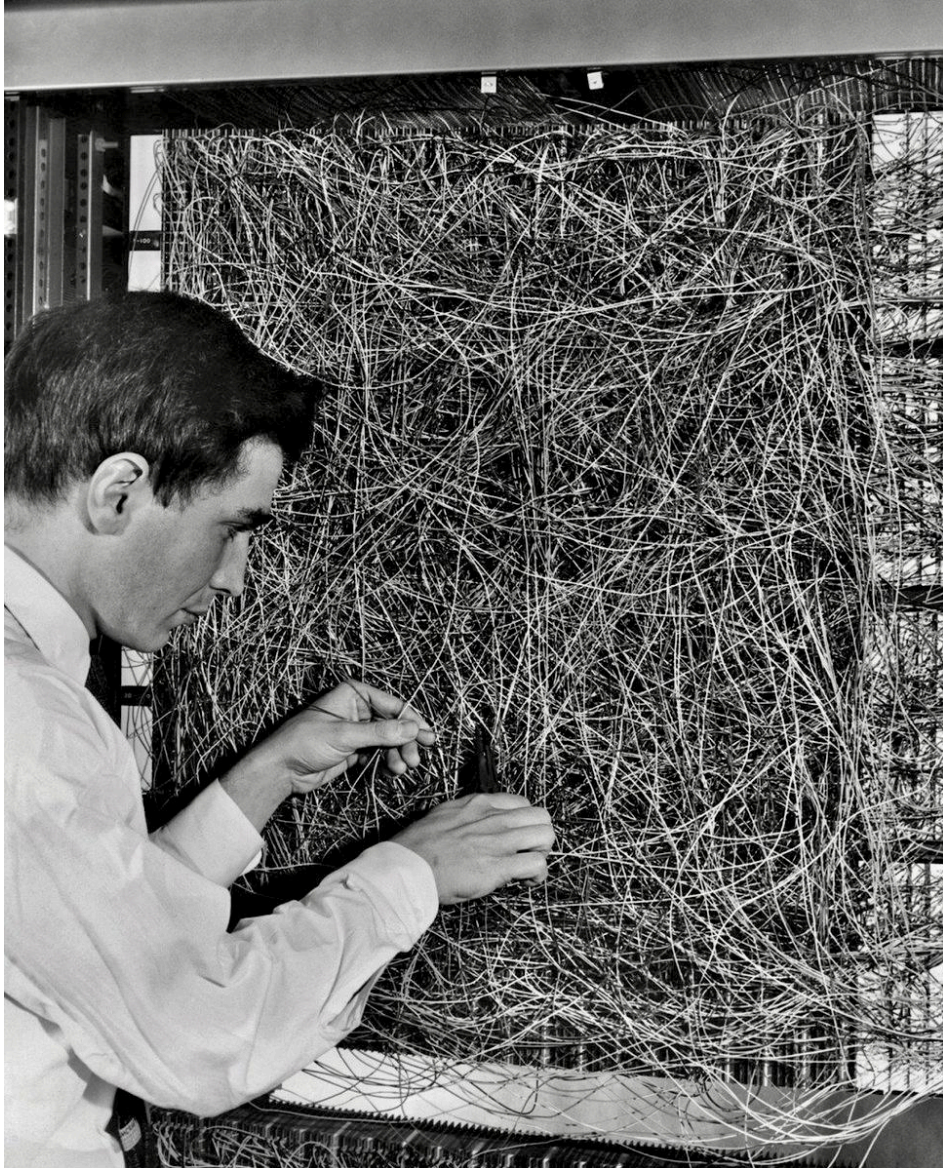


Figure 1 ORGANIZATION OF THE MARK I PERCEPTRON

Diagram of the organisation of the Mark 1 Perceptron. Source with feedback loop not shown. Source: Frank Rosenblatt, Mark I Perceptron Operators' Manual. Buffalo, NY: Cornell Aeronautical Laboratory, 1960.

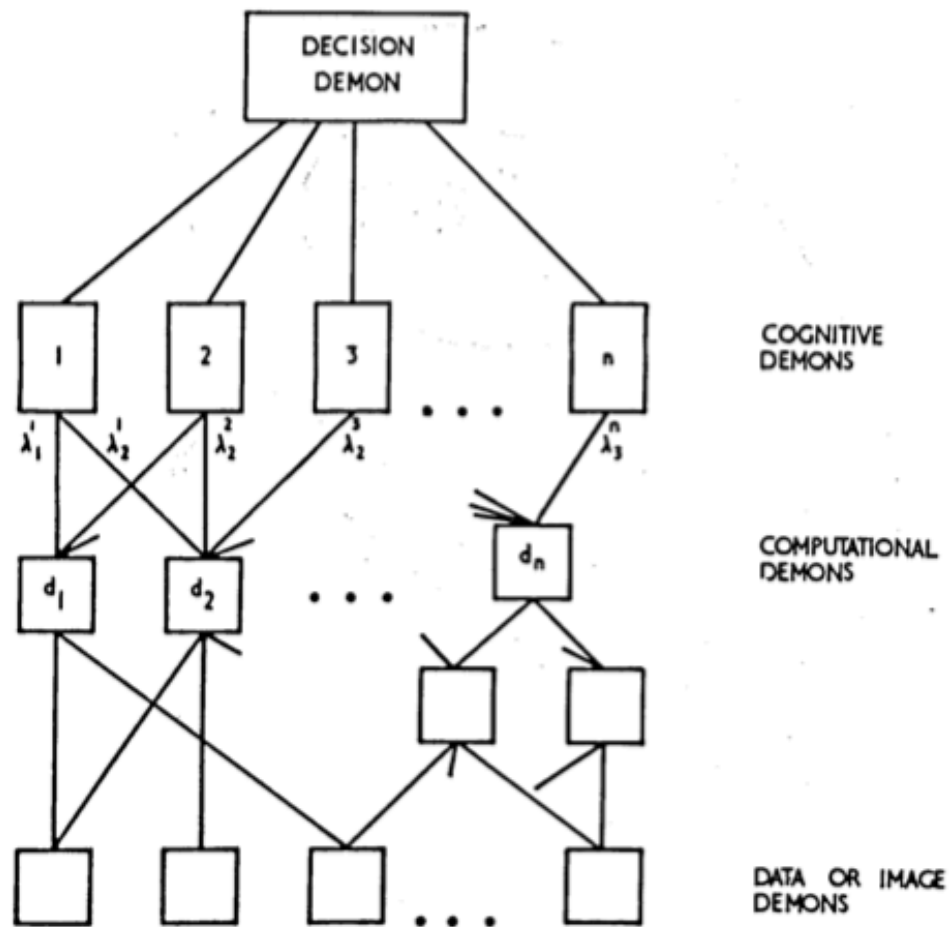


Fig. 3. Amended Pandemonium

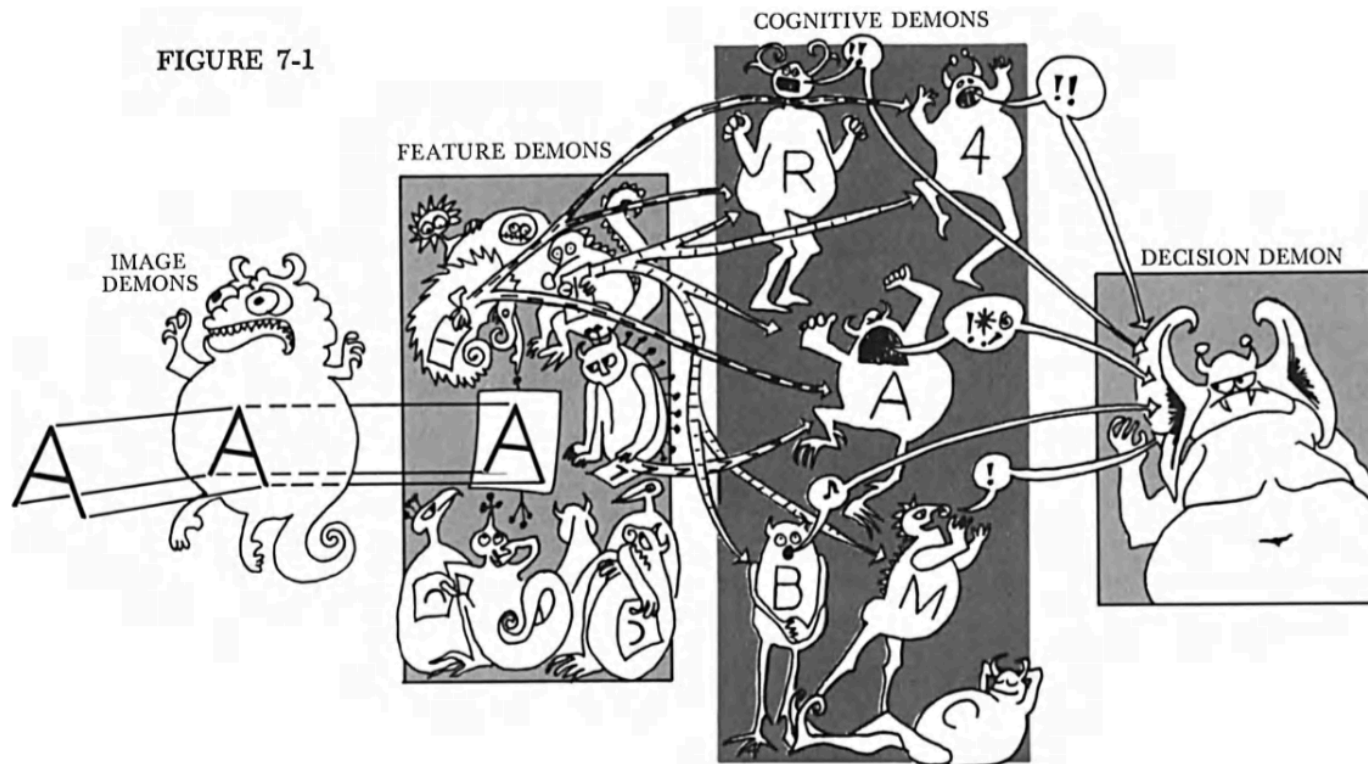


FIGURE 7-1

METAPHOR MARKERS

Explicit introduction: “we can proceed using a framework...” “it might be a good model to use...”

Similes: “like” “as”

Hedging: “imagine...” “a good comparison might be...”

Quotation marks: “artificial intelligence” “neurons”

Modifiers: “artificial intelligence” “machine language”

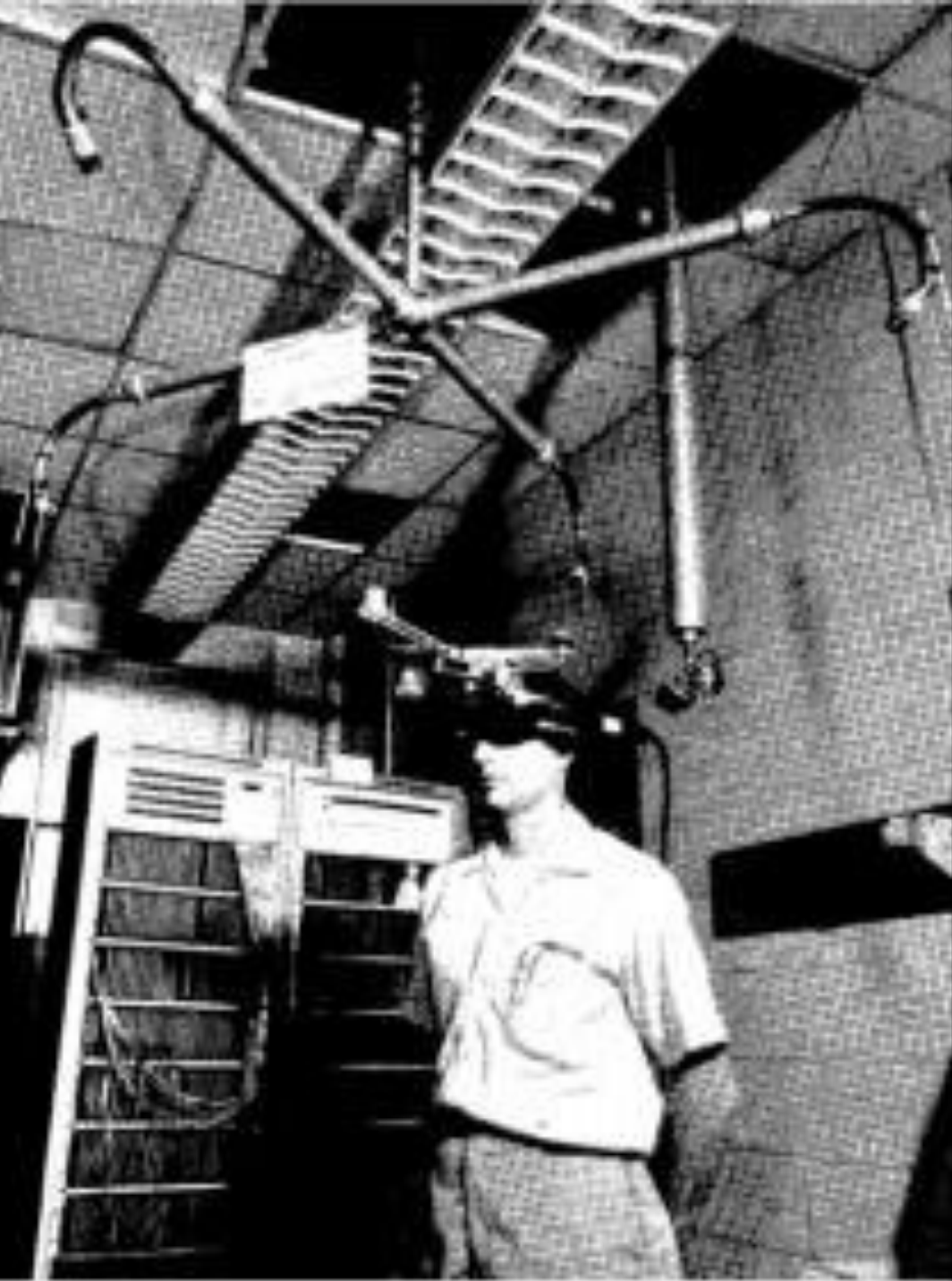
Metaphors often proceed in the literature from a ‘marked’ instance’ to unmarked:

Novel > Conventional > Dead > Historical (Career model of metaphor; Dedre & Gentner)

senSofama







Mar 27, 2018, 08:15am EDT

Virtual Intelligence Vs. Artificial Intelligence: What's The Difference?



Terence Mills Forbes Councils Member

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Erin E. Makarius and Barbara Z. Larson

Published Online: 1 May 2017 | <https://doi.org/10.546>

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Virtual-Intelligence Applications in Petroleum Engineering: Part 1—Artificial Neural Networks **\$**

[Shahab Mohaghegh](#)

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