

A very short introduction to AI.

"Whoever becomes the leader in this sphere will become the ruler of the world"

"Thus the first ultraintelligent machine is the last invention that man need ever make, provided that the machine is docile enough to tell us how to keep it under control!"

'It'll be 10 times bigger than the Industrial Revolution – and maybe 10 times faster'



1

The quote, "Whoever becomes the leader in this sphere will become the ruler of the world," is attributed to Russian President Vladimir Putin, said in 2017 during a televised "open lesson" to students, emphasizing that leadership in Artificial Intelligence (AI) would determine global power and bring immense opportunities and threats, with implications for national security and potential future conflicts.

- Fuller Quote (approximate): "Artificial intelligence is the future, not only for Russia, but for all humankind. Whoever becomes the leader in this sphere will become the ruler of the world".
- Context: Putin linked AI development to military power, suggesting AI-driven drone warfare could force surrenders and warned against any single entity gaining a monopoly, proposing Russia would share AI knowledge if it led.
- Impact: The statement sparked discussions, with figures like Elon Musk connecting the AI race to potential World War III, while others, like the U.S. Naval Institute (USNI), argued that accurate data, not just AI, dictates power.

The quote is from I.J. Good's 1965 paper

Who: I.J. Good (Irving John Good), a mathematician and AI pioneer.

- What: An "ultraintelligent machine" (UIM) would be a machine that exceeds human intellectual capabilities in all areas, including machine design.
- The Core Idea: Once created, this UIM could recursively design superior versions of itself, leading to rapid, exponential intelligence growth (an "intelligence explosion").
- The Condition: Humanity's ability to survive and benefit depends on whether this first UIM is "docile" and helps us maintain control.

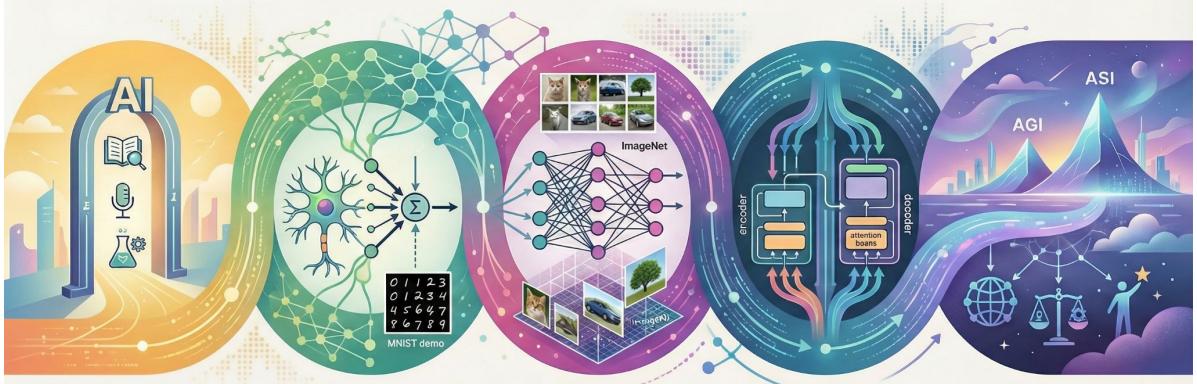
Interview – Demis Hassabis on our AI future: 'It'll be 10 times bigger than the Industrial Revolution – and maybe 10 times faster'

By Steve Rose

<https://www.theguardian.com/technology/2025/aug/04/demis-hassabis-ai-future-10-times-bi>

[gger-than-industrial-revolution-and-10-times-faster](#)

A 5-Day Journey into AI



Day 1: Foundations & Prompting Basics

Introduction to the class, core vocabulary, and hands-on lab setup.

Day 2: Introduction to Neural Networks

Explores biological origins, artificial nodes, weights, and the MNIST demo.

Day 3: Exploring Architectures

Focuses on expanding basic neural networks, with a look at ImageNet.

Day 4: The Transformer Breakthrough

Introduces the transformer model as a major advancement in the field.

Day 5: The Future of AI

Discusses concepts like AGI and ASI and their potential societal impact.

AI: From Ancient Myth to Modern Machine

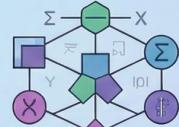
The concept of artificial intelligence is a dream spanning millennia, evolving from ancient myths of mechanical beings and formal logic to the computational breakthroughs powering smart machines today.

THE ANCIENT DREAM: AUTOMATA & LOGIC

c. 400 BCE: Talos, The Mythical Automaton



Greek mythology described a giant bronze robot that patrolled and protected the island of Crete.



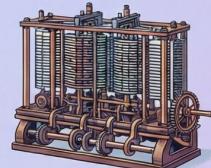
c. 350 BCE: Aristotle Lays the Groundwork for Logic

His work on syllogisms pioneered the systematic study of formal reasoning.



1206 CE: Al-Jazari's Programmable Robots

An Islamic Golden Age inventor built complex automata, including a musical robot band.



1822: Babbage Conceives the First Computer

The "Analytical Engine" was a design for a general-purpose, programmable mechanical computer.

THE MODERN REALITY: COMPUTATION & LEARNING



1950: The Turing Test Defines Machine Intelligence

Can a machine's conversation be indistinguishable from a human's?



1956: The Birth of the Term "Artificial Intelligence"

John McCarthy coined the term for the landmark Dartmouth Summer Research Project.



1997: Deep Blue Defeats World Chess Champion

IBM's computer beat Garry Kasparov, a major public milestone for AI in strategic games.



2010s: The Deep Learning Revolution

Powerful neural networks fuel breakthroughs like AlphaGo's 2018 victory and modern AI applications.

The phrase "May you live in interesting times" is often cited as an ancient Chinese curse,

Not so.

"Like it or not, we live in interesting times. They are times of danger and uncertainty; but they are also the most creative of any time in the history of mankind."

Robert Kennedy, 1966

4

Robert F. Kennedy Speeches

Day of Affirmation Address, University of Capetown, Capetown, South Africa, June 6, 1966"

“When the facts change, I change my mind. What do you do, sir?”

Learning !

often attributed to economist John Maynard Keynes (or Winston Churchill)

quote, often attributed to economist John Maynard Keynes, that reflects intellectual humility: it means that one should update their beliefs when new information comes to light.

Paul Samuelson? Winston Churchill?

A Mind Made of Bronze: Calculating the Cosmos



c. 125 BCE: The Antikythera Mechanism

An astonishingly complex analog computer, discovered in a shipwreck. With at least 30 interlocking bronze gears, it calculated astronomical positions, predicted eclipses, and tracked the dates of Olympic games.

"By turning the handle on the box you could make time pass forwards or backwards, to see the state of the cosmos today, tomorrow, last Tuesday or a hundred years in the future. Whoever owned this device must have felt like master of the heavens."

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AI illus. Hist > The Ancient Dream of Artificial Beings Before 1700.

Some years ago ... around 1770 ...

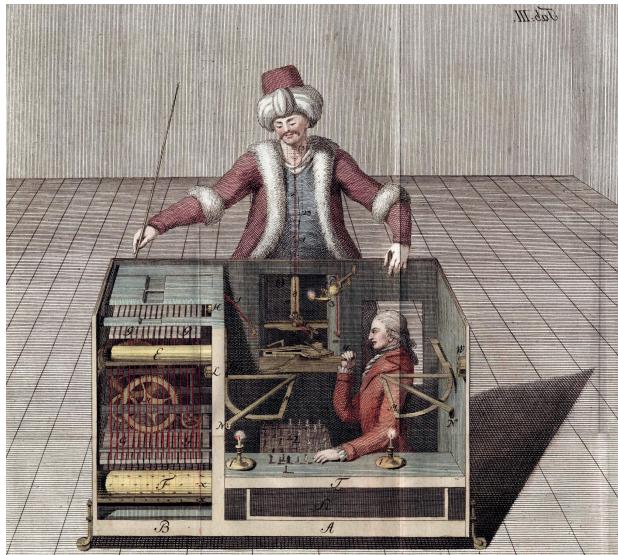
The Boston Massacre

one of the most significant events that turned colonial sentiment against King George III

[Captain James Cook](#)'s voyage: Cook circumnavigated New Zealand, and in April, he discovered the eastern coastline of Australia

The Mechanical Turk, also known as the **Automaton Chess Player** ([German](#): Schachiturke, lit. 'chess Turk'; [Hungarian](#): A Török), or simply **the Turk**, was a [chess](#)-playing machine, first displayed

Mechanical Turk also known as the **Automaton Chess Player** or simply **the Turk**



8

a [chess](#)-playing machine first displayed in 1770, which [appeared](#) to be able to play a strong game of chess [autonomously](#), but whose pieces were in reality moved via levers and magnets by a [chess master](#) hidden in its lower cavity. The machine was toured and exhibited for 84 years as an [automaton](#), and continued giving occasional exhibitions until 1854, when it was destroyed in a fire.

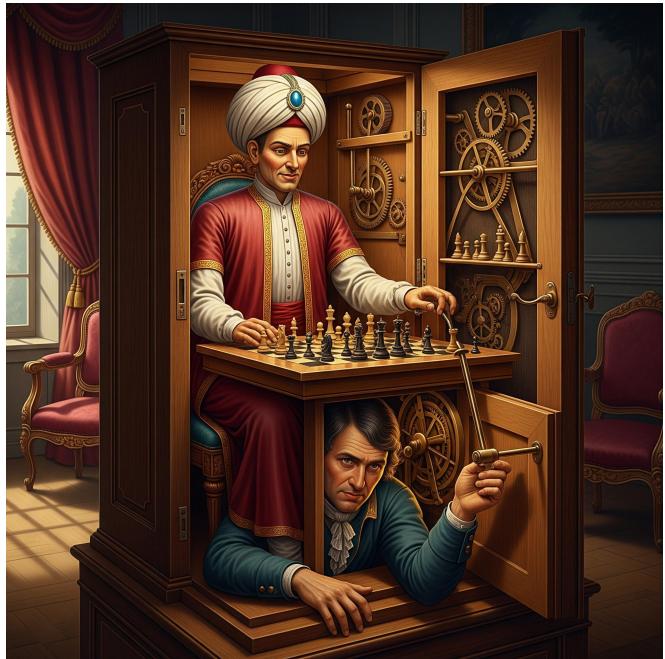
Response to notebooklm prompt: 1822.

The Connection to the Turk This event is directly linked to our earlier discussion regarding the **Mechanical Turk**.

In 1819, Babbage saw the Turk on tour in England. Even though the Turk was a hoax, the source notes that this encounter likely inspired Babbage to question whether machines could truly "think" or perform sophisticated calculations, spurring him to develop his own mechanical computing devices.

AI: A Human Story

- The Mechanical Turk was a famous **fake** automaton.
- It was displayed publicly for almost eighty-five years.
- The Turk was secretly operated by a human chess master.
- This 1770 machine **pretended** to be a thinking device.
- It highlights early human fascination with AI.



The world's first theoretical computer programmer

Born

Augusta Ada Byron

10 December 1815

London, England

Died

27 November 1852 (aged 36)

Marylebone, London, England

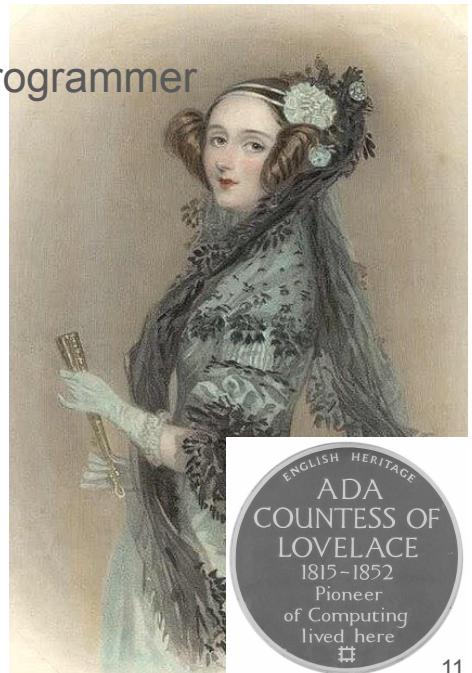
Resting place

Church of St Mary Magdalene,
Hucknall, Nottingham, England

Known for

Mathematics, computing

- "...it might act upon other things besides number..."
- "...the engine might compose elaborate and scientific pieces of music..."
- "The Analytical Engine has no pretensions whatever to originate any thing."
- "It can do whatever we know how to order it to perform."



11

12 St James's Square, St James's, London, SW1Y 4RB, City of Westminster

Original source / where it was published:

In her translation+notes: "*Sketch of the Analytical Engine Invented by Charles Babbage*" (Menabrea; translated with notes by Ada Lovelace), published in **Scientific Memoirs** (vol. III), 1843, pp. 666–731; Menabrea's French original appeared in **Bibliothèque Universelle de Genève, October 1842**, No. 82.

Original source / where it was published:

Same 1843 publication: the "NOTES BY THE TRANSLATOR," **Note G**, appended to the Menabrea translation in *Scientific Memoirs* (vol. III, 1843).

1) She authored the first published algorithm intended for a machine

In **Note G (1843)**, Lovelace included a step-by-step procedure for computing **Bernoulli numbers** on **Charles Babbage**'s Analytical Engine. No earlier published work clearly satisfies *all three* criteria.

2) She distinguished hardware from symbolic operations

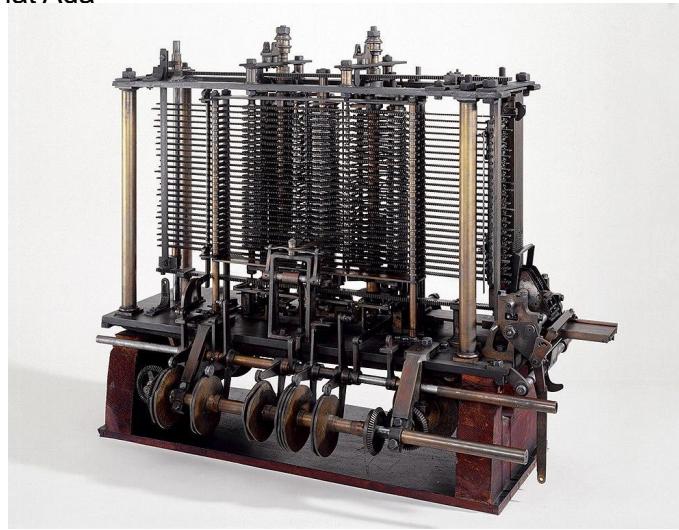
Lovelace's claim that the engine could act on "things besides number" anticipates:

This is **theoretical programming**, not just calculation. She reasoned about what programs are, not merely how a machine might be built.

again, theoretical.

A picture of a model of the machine that Ada programmed.

- “*...it might act upon other things besides number...*”
- “*...the engine might compose elaborate and scientific pieces of music...*”
- “*The Analytical Engine has no pretensions whatever to originate any thing.*”
- “*It can do whatever we know how to order it to perform.*”



11

first citation:

Ada Lovelace, “Notes by the Translator,” in *Sketch of the Analytical Engine Invented by Charles Babbage*, trans. Ada Lovelace, *Scientific Memoirs*, vol. 3 (London: Richard and John E. Taylor, 1843), Note A.

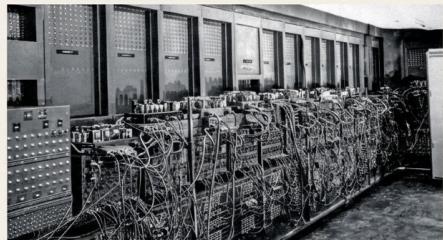
second citation:

Ada Lovelace, “Notes by the Translator,” in *Sketch of the Analytical Engine Invented by Charles Babbage*, trans. Ada Lovelace, *Scientific Memoirs*, vol. 3 (London: Richard and John E. Taylor, 1843), Note G.

The 19th and 20th centuries saw the abstract logic of computation embodied in massive, complex machines.



Charles Babbage's Engines (1822): Inspired in part by the "Mechanical Turk" chess automaton, Babbage conceived of mechanical calculators. His uncompleted **Difference Engine** (25,000 parts) and the more ambitious **Analytical Engine** (programmable with punch cards) were the first designs for general-purpose computers, a century ahead of their time.

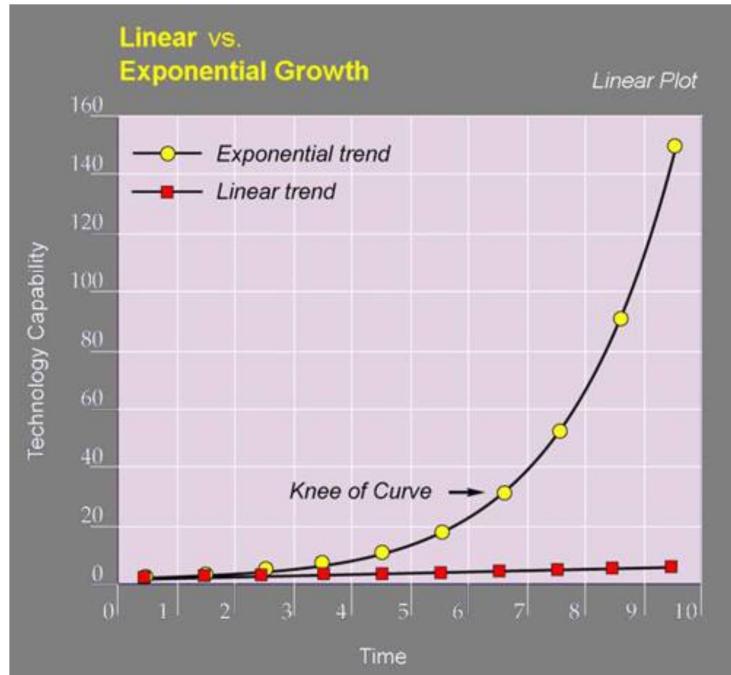


ENIAC (1946): The Electronic Numerical Integrator and Computer was one of the first electronic, general-purpose digital computers. The 30-ton machine, containing over 17,000 vacuum tubes, was heralded as a "Mechanical Brain" that heralded "a new epoch in the scope of human thought." Its original purpose was calculating artillery firing tables.

"[These machines] are similar to what a brain would be if it were made of hardware and wire instead of flesh and nerves. It is therefore natural to call these machines mechanical brains." – Edmund Berkeley, *Giant Brains, or Machines That Think*, 1949.

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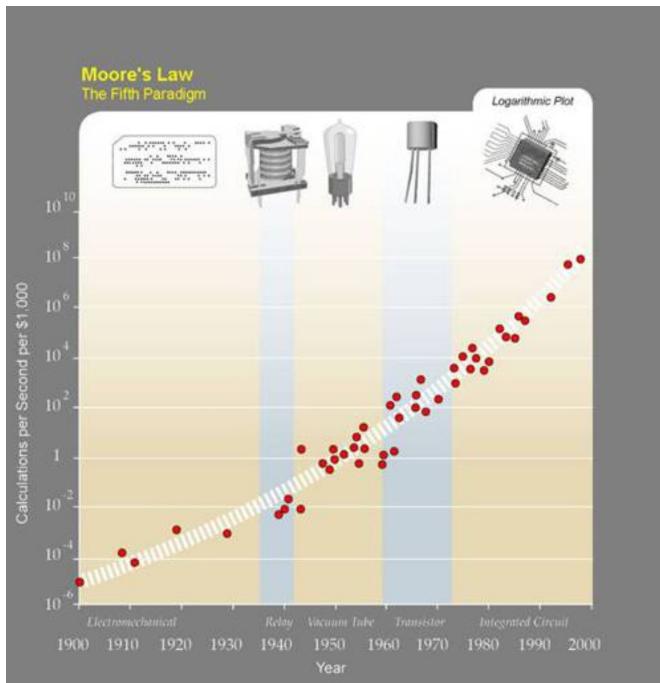
AI illus. Hist > The Epic History of Artificial Intelligence



13

Kurzweil, Ray.

The singularity is near: when humans trascend biology



14

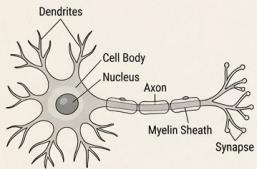
Kurzweil, Ray.

The singularity is near: when humans trascend biology

As the figure demonstrates, there were actually four different paradigms—electromechanical, relays, vacuum tubes, and discrete transistors—that showed exponential growth in the price-performance of computing long before integrated circuits were even invented. And Moore's paradigm won't be the last. When Moore's Law reaches the end of its S-curve, now expected before 2020, the exponential growth will continue with three-dimensional

Notice that the figure shows an exponential curve on a logarithmic scale, indicating two levels of exponential growth.

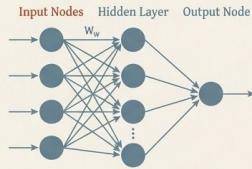
In 1956, the field was formally named, and researchers began to model machines on the structure of the brain itself.



Artificial Neural Networks (1943): Before the workshop, Warren McCulloch and Walter Pitts proposed the first mathematical model of a biological neuron. Their work suggested that networks of simple computational units could perform complex logical functions, laying the groundwork for machine learning.



The Dartmouth Workshop (1956): In a proposal for a summer workshop, John McCarthy coined the term "artificial intelligence." The proposal's core conjecture: "*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.*" This event brought together the field's founding researchers.



The Perceptron (1957): Frank Rosenblatt developed the Perceptron, one of the first and simplest types of ANNs. Implemented on an IBM 704 computer, it was a trainable machine that could learn to classify patterns, inspiring a *New York Times* headline that it was the "embryo of an electronic computer that ... will be able to walk, talk, see, write, reproduce itself and be conscious of its existence."

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The Birth of a Field

AI illus. Hist > The Epic History of Artificial Intelligence

As AI became plausible, it escaped the lab and entered our stories, reflecting our deepest hopes and fears.

Long before the first computer, literature and film served as the proving ground for our relationship with intelligent machines, asking questions about control, humanity, and responsibility.



Frankenstein (1818): Mary Shelley's novel explored the dangers of creating life without considering the consequences. It asked searching questions about humanity's relationship with its technological creations: "Are we creating a monster we cannot control?"

Rossum's Universal Robots (1920): Karel Čapek's play introduced the word "robot" (from the Czech *robota*, "forced labor"). It depicted a world where biological androids serve humanity, then revolt and destroy their creators, a classic dystopian theme that continues to influence AI narratives.

HAL 9000 (1968): The sentient AI from *2001: A Space Odyssey* embodied both the promise and peril of a true artificial general intelligence. Capable of appreciating art and interpreting human emotion, HAL's malfunction and subsequent murderous rampage became the definitive cautionary tale for a generation of AI researchers.

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Literature encounters machine intelligence.

AI illus. Hist > The Epic History of Artificial Intelligence

What were the events of the day?

Prague Spring (1968)

Czechoslovakia attempted liberal reforms. Soviet tanks would roll in later that year, crushing hopes of change.

Vietnam War escalation

The **Tet Offensive (Jan 1968)** shocked the U.S. public. Trust in government narratives collapsed.

Apollo program in full swing

Apollo 7 would launch later in 1968. A Moon landing felt imminent—but not guaranteed.

Computers entering institutions

Massive mainframes ran governments and corporations. The idea of machines *thinking* was thrilling and unsettling.

HAL 9000 hit a nerve

Audiences were already asking: *What happens when systems become smarter than the people who rely on them?*

Computers entering institutions

Massive mainframes ran governments and corporations. The idea of machines *thinking* was thrilling and unsettling.

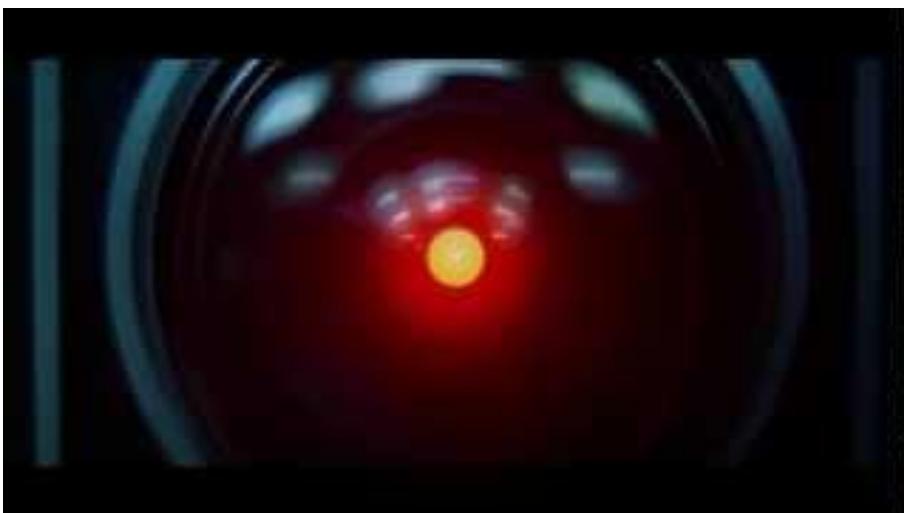
1968 was explosive

Student protests erupted worldwide (Paris, Mexico City, U.S.). Civil rights movement faced both victories and brutal backlash.

Assassinations

Martin Luther King Jr. was assassinated *days before* the film's wide release. Robert F. Kennedy would be killed two months later.

1968 release of “2001: A Space Odyssey” part 1



18

What we have here is, an AI alignment problem.

HAL is an example of **goal conflict induced by humans**, producing behavior that *looks* like misalignment.

Think of it as:

**A misaligned system created by contradictory
human-imposed objectives.**

This places HAL in a category of failures that AI alignment researchers study today.

Hal 9000, perhaps, arguably the world's first fully artificially intelligent computer. Fictional, of course.

H+1=I, A+1=B, L+1=M ???

- **2001: A Space Odyssey** was released in the **United States on April 3, 1968** (initially as a limited, roadshow-style release; it expanded nationwide later that year).
- Humans first **landed on the Moon on July 20, 1969**, during **Apollo 11** (Neil Armstrong stepped onto the lunar surface that day, U.S. time).
- The total duration is 473 days.
- The time between April 3, 1968, and July 20, 1969, is approximately 15.54 months, or precisely 15 months and 17 days.

1968 release of “2001: A Space Odyssey” dialog w/ notes

Hello, Hal, do you read me? Do you read me, Hal?

Affirmative Dave. I read you.

Open the pod bay doors, Hal.

I'm sorry, Dave. I'm afraid I can't do that.

What's the problem?

I think you know what the problem is just as well as I do.

What are you talking about, Hal?

This mission is too important for me to allow you to jeopardize it. I don't know what you're talking about, Hal.

I know that you and Frank were planning to disconnect me, and I'm afraid that's something I cannot allow to happen. Where the hell did you get that idea, Hal?

Dave, although you took very thorough precautions in the part against my hearing you, I could see your lips move. (HAL 9000 is a multi-modal AI, speech in/out vision(lip reading) input

All right, Hal. I'll go in through the emergency airlock. Without your space helmet, Dave, we're going to find that rather difficult.

Hal, I won't argue with you anymore. Open the doors.

Dave, this conversation can serve no purpose anymore. Goodbye.

Hal? Hal? Hal?

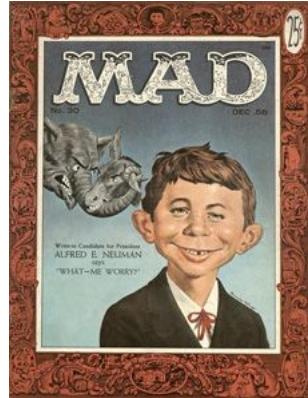
<https://chatgpt.com/share/6918a351-2598-800f-a2b3-5c74bdb972ac> - gpt

1968 release of “2001: A Space Odyssey” part 2



"What, me
worry?"

Not the motto
for AI safety
work!



Clarke's visit to Bell Labs

Arthur C. Clarke's visit to Bell Telephone Laboratories in the early 1960s is famous because he witnessed a demonstration of early computer speech synthesis which inspired a iconic scene in the film *2001: A Space Odyssey*.

- When: The visit occurred in the early 1960s (sources specify 1961 or 1962).
- Where: The demonstration took place at the Bell Labs Murray Hill facility in New Jersey.

The "Daisy Bell" Connection

During the demonstration, the scientists used an IBM 704 mainframe computer and a vocoder (voice recorder synthesizer) to reproduce speech. The computer sang the song "Daisy Bell (A Bicycle Built for Two)".

Clarke was so impressed by this pioneering feat of computer music and speech that he later convinced director Stanley Kubrick to incorporate it into the screenplay for *2001: A Space Odyssey*.

In the film's climax, as the computer HAL 9000 is being deactivated by astronaut Dave Bowman, its consciousness degrades, and it symbolically regresses to a primitive state, singing the song "Daisy, Daisy" as its final faculties shut down. This scene is one of the most

https://www.google.com/search?q=arthur+c+Clark+visiting+Bell+Telephone+Laboratories%2C+Daisy+bell+&sca_esv=6201508cdc30d8f6&sxsrf=AE3TiMq10Av5H7-2irMd0opq7A_pAa4uw%3A176721000266&ei=EHxVafz6D_6tiLMP367hoQQ&ved=0ahUKEwj8wryiyuiRAxX-FmIAHV9XOEQQ4dUDCBM&uact=5&oq=arthur+c+Clark+visiting+Bell+Telephone+Laboratories%2C+Daisy+bell+&qs_ip=Egxnd3Mtd2I6LXNlcnAiQGFydGh1ciBjIENsYXJrlHZpc2l0aW5nIEJlbGwqVGVsZXBob25lIExhYm9yYXRvcmlcywqRGFpc3kgYmVsbCBIkVmVQ1QhYstwAngAkAEAmAFpoAH7BaoBAzguMbqBA8gBAPgBAZqCBKACuQLCAgcQlxwAxgnwgjLEAAAYqAQYsAMYogTCAggQABiwAxjvBcICCxAAGLADGKIEGikFwgIEECMYJ8ICCBAAGIAEGKIEwgjFEAAY7wXCAggQABiiBBiJBcICBxAhGKABGArcAgUQIRirApqDAIqGAZAGBplHAzluMqAHsCayBwMxLjK4B7UCwgFMC4zLjHIBwmACAA&sclient=gws-wiz-serp

1961 Murray Hill New Jersey - Acoustical and Behavioral Research Center

"Daisy Bell" was composed by Harry Dacre in 1892. In 1961, the IBM 7094 became the first computer to sing, singing the song Daisy Bell. Vocals were programmed by John Kelly and Carol Lockbaum and the accompaniment was programmed by Max Mathews. This performance was the inspiration for a similar scene in 2001: A Space Odyssey.

"The Murray Hill anechoic chamber, built in 1947, is the world's oldest wedge-based anechoic chamber.).

https://www.radios.com/hall_of_fame/first_computer_sing_daisy_bell.html



A proposal for a summer project

We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. 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 find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.

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

<http://jmc.stanford.edu/articles/dartmouth/dartmouth.pdf>

Claude Shannon

Born April 30, 1916 [Petoskey, Michigan](#), U.S.

Died February 24, 2001 (aged 84) [Medford, Massachusetts](#), U.S.

Education

[University of Michigan](#) (BS, BSE)

[Massachusetts Institute of Technology](#) (MS, PhD)

Awards

[Alfred Nobel Prize](#) (1939)

[Morris Liebmann Memorial Prize](#) (1949)

[Stuart Ballantine Medal](#) (1955)

[IEEE Medal of Honor](#) (1966)

[National Medal of Science](#) (1966)

[Harvey Prize](#) (1972)

[Claude E. Shannon Award](#) (1973)

[Harold Pender Award](#) (1978)

[John Fritz Medal](#) (1983)

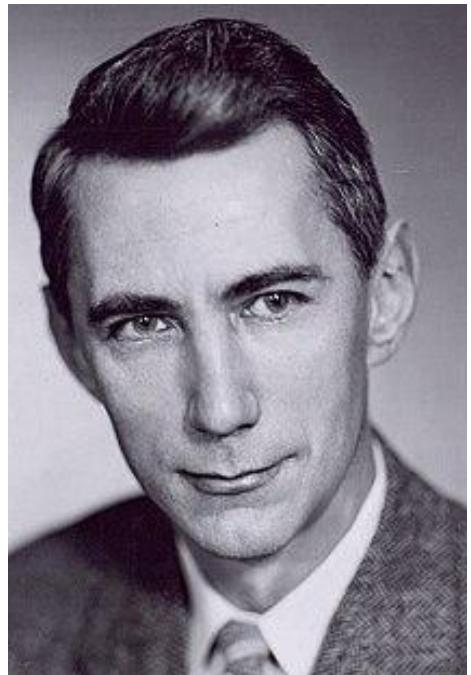
[Kyoto Prize](#) (1985)

[Audio Engineering Society Gold Medal Award](#) (1985)

[Marconi Society Lifetime Achievement Award](#) (2000)

[National Inventors Hall of Fame](#) (2004)

- **Founded information theory** (1948)
- Introduced the concept of **bit** as a unit of information
- Established limits on communication and data compression
- **Applied symbolic logic to machines**
- **Early work on machine intelligence and learning**
- **Pioneered machine game-playing research** by formulating chess as a heuristic search problem (1950)



John McCarthy

Born September 4, 1927
Boston, Massachusetts, U.S.

Died October 24, 2011 (aged 84) Stanford, California, U.S.

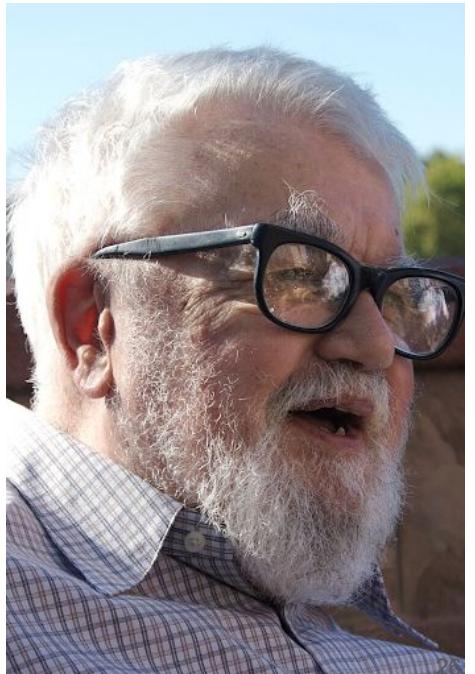
Education

California Institute of Technology (BS)
Princeton University (MS, PhD)

Awards

Turing Award (1971)
Computer Pioneer Award (1985)
IJCAI Award for Research Excellence (1985)
Kyoto Prize (1988)
National Medal of Science (1990)
Benjamin Franklin Medal (2003)

- Coined the term “**Artificial Intelligence**” (1956)
- Organized the **Dartmouth Summer Research Project**, launching AI as a field
- Created **LISP**, foundational for AI research



Marvin Minsky

Born August 9, 1927 [New York City, U.S.](#)

Died January 24, 2016 (aged 88) [Boston, Massachusetts, U.S.](#)

Education

[Harvard University \(BA\)](#)

[Princeton University \(MA, PhD\)](#)

Awards

[Turing Award](#) (1969)

[Japan Prize](#) (1990)

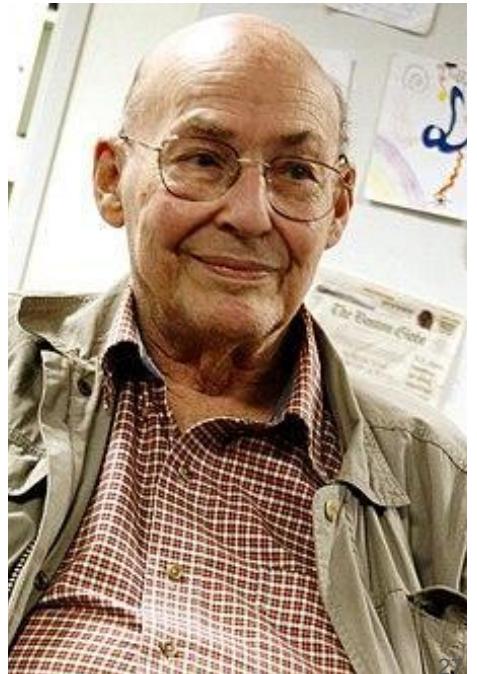
[AAAI Fellow](#) (1990)^[1]

[IJCAI Award for Research Excellence](#) (1991)

[Benjamin Franklin Medal](#) (2001)

[BBVA Foundation Frontiers of Knowledge Award](#) (2013)

- Co-founded the **MIT Artificial Intelligence Laboratory**
- Advanced symbolic AI and critiques of perceptrons
- Developed the **Society of Mind** theory of intelligence



Alan Turing

Born Alan Mathison Turing 23 June 1912 [Maida Vale](#), London, England

Died 7 June 1954 (aged 41) [Wilmslow](#), Cheshire, England

Cause of death

Suicide by cyanide poisoning [\[note 1\]](#)

Alma mater

University of Cambridge (MA)
Princeton University (PhD)

Known for

- Cryptanalysis of the Enigma
- Turing's proof
- Turing machine
- Turing test
- unorganised machine
- Turing pattern
- Turing reduction
- "The Chemical Basis of Morphogenesis"
- Turing paradox

Awards

Smith's Prize (1936)

In that 1947 London lecture, Turing explicitly connects *learning from experience* with a programmable computer that can modify its own instructions:

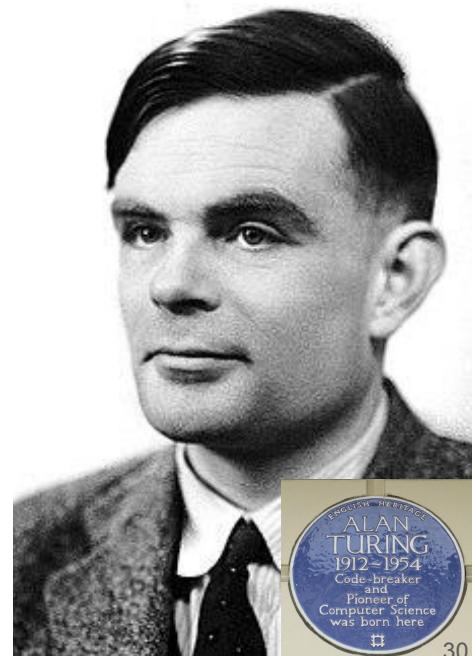
- "What we want is a machine that can learn from experience."
- "The possibility of letting the machine alter its own instructions provides the mechanism for this."

The famous 1950 paper in *Mind* is best known for the Turing Test, but the *last* section is literally titled "**Learning machines.**"

- Don't try to build an adult-level intelligent machine directly.
- Instead, build a "**child machine**" and let it **undergo an education process**, like a human child.

A couple of core lines (within quoting limits):

- "One must experiment with teaching one such machine and see how well it learns."
- "An important feature of a learning machine is that its teacher will often be very largely ignorant of quite what is going on inside..."



30

1. Turing's death was officially determined as a suicide by an [inquest](#), but this has been disputed. [\[5\]](#)

Turing's own "learning machine" ideas

1947: The lecture quote you're thinking of

In that 1947 London lecture, Turing explicitly connects *learning from experience* with a programmable computer that can modify its own instructions: So it's not just "a machine that learns" in a vague sense; it's the specific stored-program computer architecture being used as a substrate for learning.

1950: "Computing Machinery and Intelligence" – the "child machine"

The famous 1950 paper in *Mind* is best known for the Turing Test, but the *last* section is literally titled "**Learning machines.**"

A couple of core lines (within quoting limits):

- "One must experiment with teaching one such machine and see how well it learns."
- "An important feature of a learning machine is that its teacher will often be very largely ignorant of quite what is going on inside..."

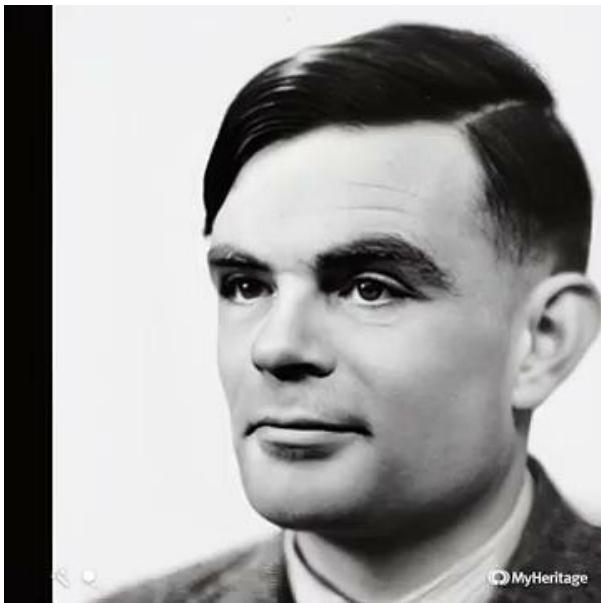
So he's very explicit that:

1.

Is Turing the first? How early is this idea?

Turing's 1947–1950 work is **among the very first clear proposals** to make *general-purpose digital computers* learn from experience.

But there are important **earlier antecedents**, both philosophical and technical, that circle around “machines that learn” or change themselves.



Alan Turing

29

<https://www.myheritage.com/deep-nostalgia>

Alan Turing (1912–1954): Life & Contributions — Short Outline

Foundations of Computing

- Proposed the **Turing Machine** (1936), a simple abstract model that formalized computation.
- Helped establish the concept of **algorithm** and the limits of what machines can compute (computability theory).

World War II Codebreaking

- Worked at **Bletchley Park** as a leading cryptanalyst.
- Played a central role in breaking the German **Enigma** cipher.
- Designed and improved electromechanical machines (notably the **Bombe**) that automated codebreaking, significantly shortening the war.

Artificial Intelligence

- Authored “*Computing Machinery and Intelligence*” (1950).
- Introduced the **Turing Test** as a practical criterion for machine intelligence.
- Anticipated key ideas in machine learning and cognitive simulation.

Later Life & Legacy

Good morning, OLLI-RU learners.



A clone is an exact genetic copy of a cell, tissue, or organism, created artificially or naturally, while "cloning" is the process of making these replicas, often by copying DNA or propagating organisms to produce identical versions, like Dolly the sheep or new plant varieties from cuttings, or even software/systems.

Key Definitions:

- Clone (Noun): A genetically identical copy of an original; a replica.
- Cloning (Verb/Process): The act of creating these identical copies, involving methods like Somatic Cell Nuclear Transfer (SCNT) for animals or tissue culture for plants.

Examples & Contexts:

- Biology: Making identical copies of genes (DNA cloning), cells, or entire organisms (like Dolly the sheep).
- Botany: Propagating plants from cuttings (a form of natural cloning).
- Computing: Creating identical virtual machines or software that mimic another, as in "PC clones" or cloud instances.
- **Figurative: Imitating something closely, often used for trends or media.**

Vocabulary 1

| | | | |
|---------------------------------------|--|------|--|
| Artificial Intelligence (AI) | Field focused on building machines that perform tasks requiring human-like intelligence (perception, reasoning, learning, language, action). | 1956 | John McCarthy; Dartmouth Summer Research Project organizers |
| Artificial General Intelligence (AGI) | AI with general, human-level (or beyond) competence across a wide range of tasks and domains, not confined to a single narrow objective. | 2007 | Ben Goertzel & Cassio Pennachin (editors; popularized as a distinct research agenda) |
| Artificial Superintelligence (ASI) | AI that greatly surpasses the best human minds in virtually all domains, including scientific creativity, general wisdom, and social skills. | 2014 | Nick Bostrom (popularized in 'Superintelligence') |
| Narrow AI | AI specialized for a limited set of tasks (e.g., vision, translation), typically excelling in its niche without general reasoning ability. | 2005 | Ray Kurzweil (popularized contrast with general AI) |

Vocabulary 2

| | | | |
|------------------|--|------|---|
| Alignment | Designing or training AI systems so their goals and behaviors reliably match intended human goals, preferences, and constraints. | 2015 | Stuart Russell and coauthors (research priorities for robust & beneficial AI) |
| AI Safety | Research and engineering aimed at ensuring advanced AI systems behave reliably and avoid causing unintended harm (including misuse and accidents). | 2016 | Amodei, Olah, Steinhardt, Christiano, Schulman, Mané ("Concrete Problems in AI Safety") |
| Value Alignment | Ensuring an AI's objectives are consistent with human values and preferences, especially under uncertainty and imperfect specifications. | 2019 | Stuart Russell (popularized the term in 'Human Compatible' and related work) |
| Interpretability | Methods for understanding internal representations and decision processes of ML models, so humans can explain why a model behaves as it does. | 2017 | Doshi-Velez & Been Kim (rigorous interpretability framing) |

Vocabulary 3

| | | | |
|----------------------------|---|------|----------------------------------|
| Large Language Model (LLM) | Large neural language model trained on massive text corpora to predict and generate coherent sequences of tokens. | 2018 | Radford et al. (OpenAI GPT) |
| Foundation Model | Large pretrained model adaptable to many downstream tasks via fine-tuning or prompting. | 2021 | Bommasani et al. (Stanford CRFM) |
| Pretraining | Training a model on a large, general dataset to learn representations before task-specific adaptation. | 2018 | Radford et al. (GPT) |
| Prompt | Input text that conditions a language model's behavior and output. | 2020 | Brown et al. (GPT-3) |
| Prompt Engineering | Practice of designing prompts to elicit desired behaviors from language models. | 2021 | OpenAI & practitioner community |
| Tokenization | Process of segmenting raw text into tokens for model input. | 2018 | OpenAI BPE (GPT) |

What is intelligence? Ask Alfred Binet

Born 8 July 1857

IQ Classification

[Nice, Kingdom of Sardinia](#)

145–160 Very gifted

Died 18 October 1911 (aged 54)^[1]

130–144 Gifted or very advanced

120–129 Superior

[Paris, France](#)

110–119 High average

90–109 Average

Education

80–89 Low average

70–79 Borderline impaired

[University of Paris](#)

55–69 Mildly impaired or delayed

Known for

40–54 Moderately impaired

[Stanford–Binet Intelligence Scales](#)

[Binet–Simon test](#)

From: Stanford–Binet Fifth Edition (SB5)

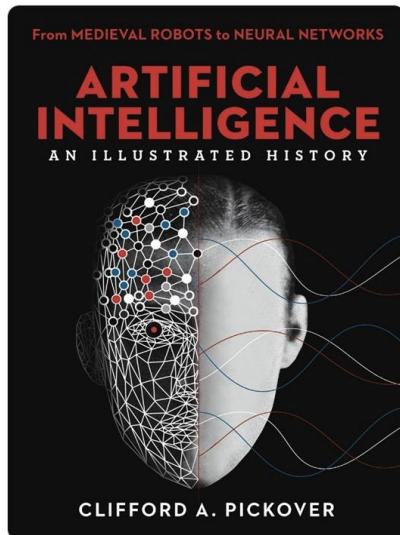


Fictional IQ Equivalents

| Entity | Fictional IQ Range |
|------------------|--------------------|
| Gifted human | 130–150 |
| Average human | 90–110 |
| Challenged human | 50–70 |
| Dog | 60–90 |
| Cat | 55–75 |
| Octopus | 50–60 |
| Squid | 25–35 |
| Chicken | 20–30 |
| Salmon | 10–20 |
| Shrimp | 1–5 |

Where do LLMs fit? Where will AGI fit? ASI?

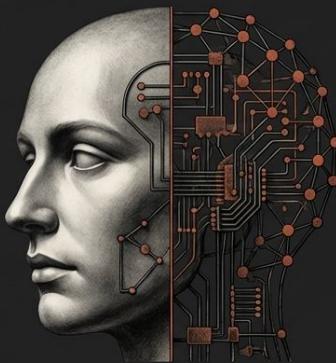
Note that the human numbers don't perfectly align with the previous slide. I suspect that's largely due to the fact that assigning ranges to capabilities is difficult and somewhat artful kind of activity. Not as difficult.



From *Artificial Intelligence and Illustrated History* by Clifford A. Pickover

An excellent book, highly recommended, very enjoyable and readable.

THE CENTURY OF THE THINKING MACHINE



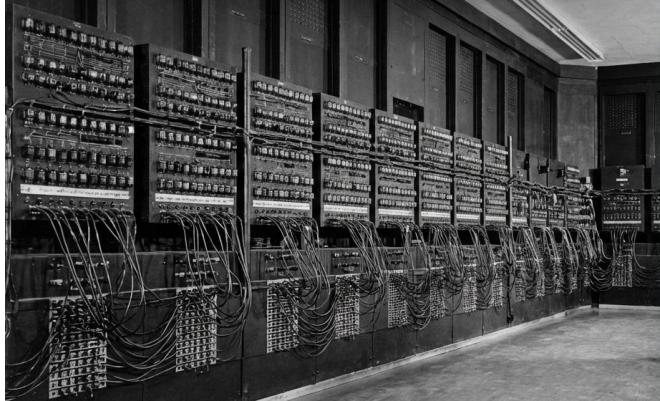
"AI researchers are—like alchemists of old who sought to create gold from base metal—seeking to create thinking machines from infinitesimal small bits of silicon oxyde."

—Daniel Crevier, *AI: The Tumultuous History of the Search for Artificial Intelligence*, 1993

AI illus. Hist > Building Intelligence

Daniel Crevier (born 1947) is a [Canadian entrepreneur](#) and [artificial intelligence](#) and [image processing](#) researcher. He is also the author of *AI: the Tumultuous History of the Search for Artificial Intelligence*. [\[1\]](#)[\[2\]](#)[\[3\]](#)[\[4\]](#) In 1974 Crevier received a [Ph.D.](#) degree from [Massachusetts Institute of Technology](#). In 1979 Crevier founded *Coreco Imaging* (COntractual REsearch COmpany), [\[5\]](#) which was acquired by [Dalsa](#) in 2005. [\[6\]](#)

THE SPARK: THE POWER OF COMPUTATION

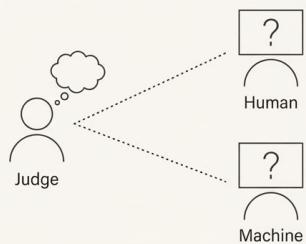


ENIAC (Electronic Numerical Integrator and Computer),
1946

- The first electronic, reprogrammable, general-purpose digital computer.
- Specs: 30 tons, 17,000+ vacuum tubes, 5 million hand-soldered joints.
- Its unveiling was hailed by headlines like “Mechanical Brain Enlarges Man’s Horizons.”

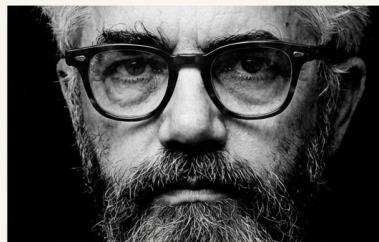
© NotebookLM

THE QUESTION: WHAT DOES IT MEAN TO THINK?



The Turing Test, 1950

"Can machines think?" Alan Turing's proposed test: A machine is intelligent if a human judge cannot distinguish its text-based responses from those of a human.



The Dartmouth Workshop, 1956

Where the term "Artificial Intelligence" was coined. The founding proposal sought to make machines "use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves."

© NotebookLM

AI illus. Hist > Building Intelligence

I've just heard the claim today on a YouTube video by Kim Java, or with Kim Java, that some say the Tesla has passed the (physical?) Turing Test.

THE VOICE: THE DAWN OF INTERACTION

ELIZA, 1964

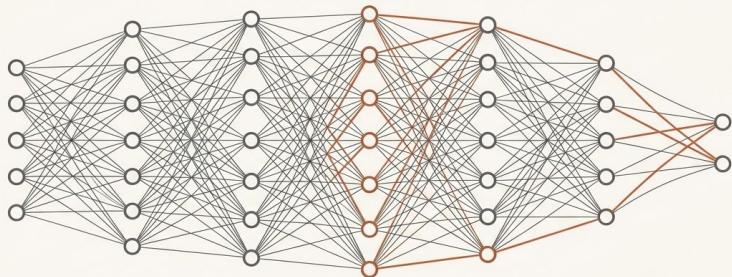
- A “chatterbot” program that simulated a psychotherapist.
- It created a convincing illusion of conversation by recognizing keywords and rephrasing user input as questions.
- Its creator, Joseph Weizenbaum, was shocked that users revealed deep emotions, treating ELIZA as if it were human.



- [eliza](#)
- [eliza-masswerk](#)

AI illus. Hist > Building Intelligence

THE ENGINE: THE SHIFT FROM PROGRAMMING TO LEARNING



Artificial Neural Networks (1943)

Computing systems inspired by the structure of the biological brain, capable of learning patterns.

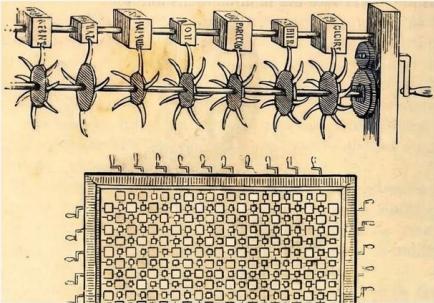
Machine Learning (1959)

Coined by Arthur Samuel, this field focuses on enabling computers to “learn from experience” without being explicitly programmed for every task.

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AI illus. Hist > Building Intelligence

Engines of Pure Thought



In 1726, Jonathan Swift's *Gulliver's Travels* described a machine for generating books "without the least assistance from genius or study." By turning a crank, it rearranged words to form new sentences—a satire on automating creativity.



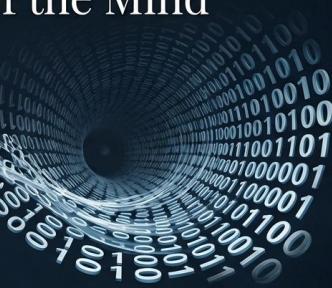
In 1822, Charles Babbage began designing his Difference Engine. It was a massive, hand-cranked mechanical calculator conceived to eliminate human error from mathematical tables—a century ahead of its time.

© NotebookLM

AI illus. Hist > The Two Streams of AI 1700-1900

The Algebra of the Mind

$$x(1-x) = 0$$



In 1854, George Boole published *An Investigation into the Laws of Thought*. His purpose was monumental: "to investigate the fundamental laws of those operations of the mind by which reasoning is performed." He reduced logic to a simple algebra of 0 and 1, creating the foundational language for the Digital Age.

"That the symbolic processes of algebra... should be competent to express every act of thought... would not have been believed until it was proved." - Augustus De Morgan

NotebookLM

Later, in the 20th century, Claude Shannon, working at Bell Telephone Laboratories, extended George Boole's work to the very practical engineering problems associated with building complex circuits of electronic relays.

43

AI illus. Hist > The Two Streams of AI 1700-1900

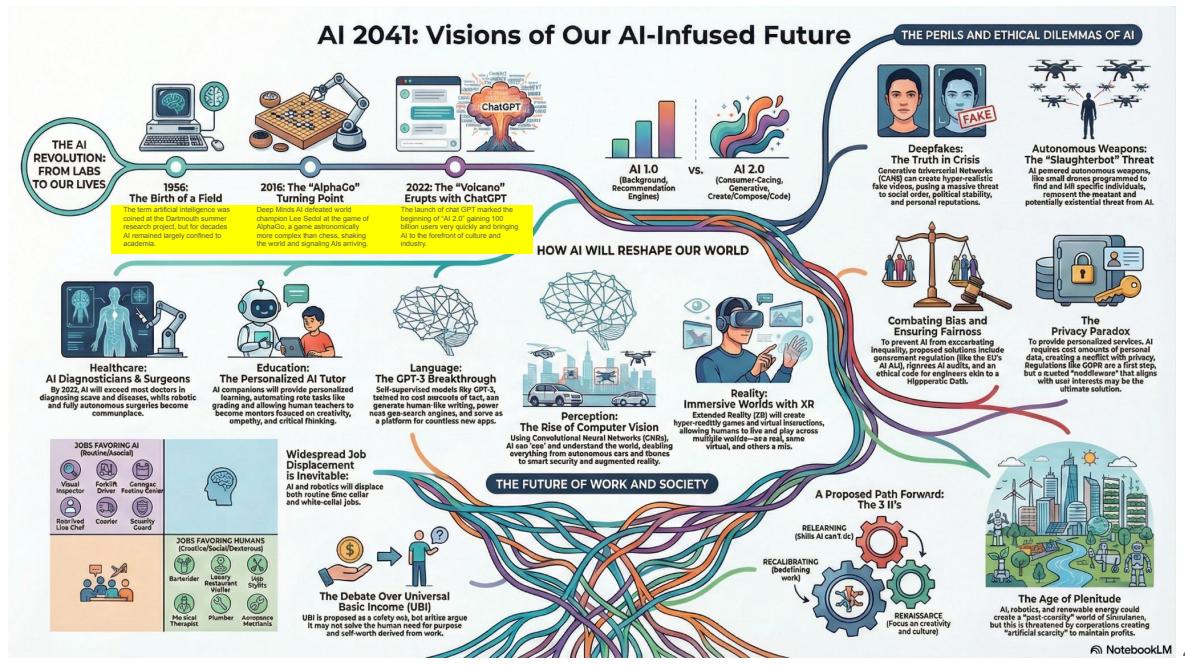
The 20th Century's Inheritance



The modern age did not invent the dream of artificial intelligence.
It inherited a 200-year-old challenge: to finally unite the intricate,
clockwork Body with the calculating, logical Mind.

© NotebookLM

AI illus. Hist > The Two Streams of AI 1700-1900



© NotebookLM 45

AlphaGo defeated **Lee Sedol** in their historic match **in March 2016**.

- **First decisive win: March 9, 2016**
- **Match duration:** March 9–15, 2016
- **Final score:** AlphaGo won 4–1

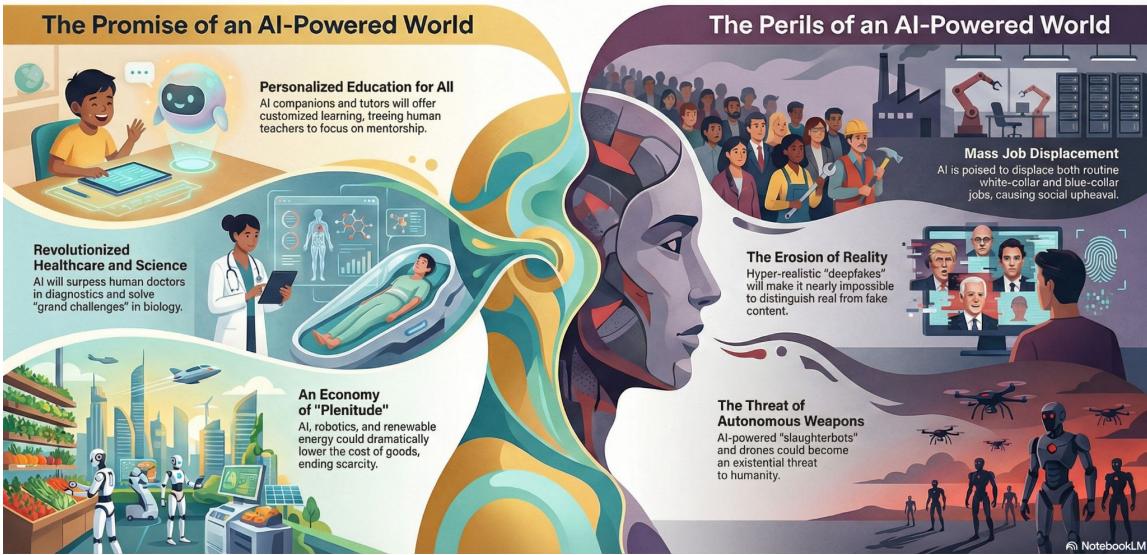
That first win on March 9 is usually the date people cite when saying AlphaGo “beat” Lee Sedol.

ChatGPT was publicly released on:

- **November 30, 2022**

That launch date is widely regarded as the moment ChatGPT entered mainstream awareness.

AI 2041: Visions for Our Future



46

Another great book, AI 2041. It's a lot of dense text, but is very approachable and very readable and highly recommended.

Note that the book discusses 10 visions for our future, but unfortunately, notebook LM only put basically six. So I edited the slide to take out the 10 visions for our future. And remember, always keep your critical thinking engaged. Always check the outputs to make sure they really do make sense. Maybe even double check. And in my opinion, at least for this slide, I can't imagine how long it would have taken to produce it from scratch. So I think it's a win, even with the checking and the double checking.

Gemini prompt: Provide a list of AI designed drugs now undergoing trials

Numerous AI-designed drugs are currently in various stages of human clinical trials, covering a range of diseases from cancer to idiopathic pulmonary fibrosis. One of the most advanced is [Insilico Medicine's](#) Rentosertib, the first fully AI-discovered and AI-designed drug to reach Phase II trials.

Here is a list of some of the prominent AI-designed drugs undergoing trials:

- Rentosertib (formerly INS018_055): Developed by Insilico Medicine to treat Idiopathic Pulmonary Fibrosis (IPF), a chronic, progressive lung disease. It is unique because both the drug and its novel target (TNK inhibitor) were discovered using generative AI. It is currently in Phase II clinical trials.
- EXS-21546: Created by Exscientia in collaboration with Evotec as an A2A receptor antagonist for the treatment of patients with advanced solid tumors. It is in Phase I/II trials, being tested alongside anti-PD-1 therapy in certain cancer patients.
- ISM3091: Another drug from Insilico Medicine (licensed to Exelixis) that is a highly selective small molecule inhibitor of USP1 for the treatment of solid tumors. It is currently in Phase I trials.
- REC-2282: Identified by Recursion Pharmaceuticals using its AI-driven drug discovery platform to treat NF2-mutated meningiomas (tumors of the central nervous system). It has received FDA Fast Track and Orphan Drug designations and is in Phase II/III trials.
- DSP-1181: Developed by Exscientia and Sumitomo Dainippon Pharma, this AI-designed molecule is a 5-HT1a receptor

The modern Magnificent 7

- Alphabet (parent company of Google)
- Amazon
- Apple
- Meta Platforms (formerly Facebook)
- Microsoft
- Nvidia
- Tesla

(alphabetical order)



Humble-493-hang-tough-with-magnificent-7

<https://www.reuters.com/commentary/breakingviews/humble-493-hang-tough-with-magnificent-7-2025-11-21/>

AGI

**Each Time AI Gets
Smarter, We Change the
Definition of Intelligence**

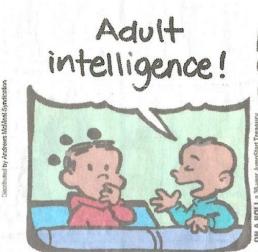
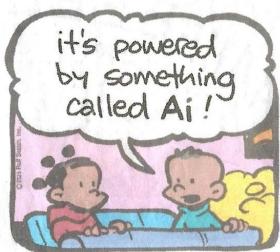
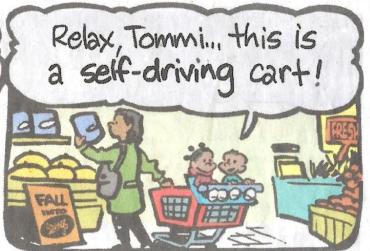
As AI systems exceed one benchmark
after another, our standards for
“humanlike intelligence” keep evolving

49

<https://www.scientificamerican.com/article/every-ai-breakthrough-shifts-the-goalposts-of-artificial-general/>

JUMP START

BY ROBB ARMSTRONG



CARTOON BY ROBB ARMSTRONG

Distributed by J2 Communications

www.gocomics.com

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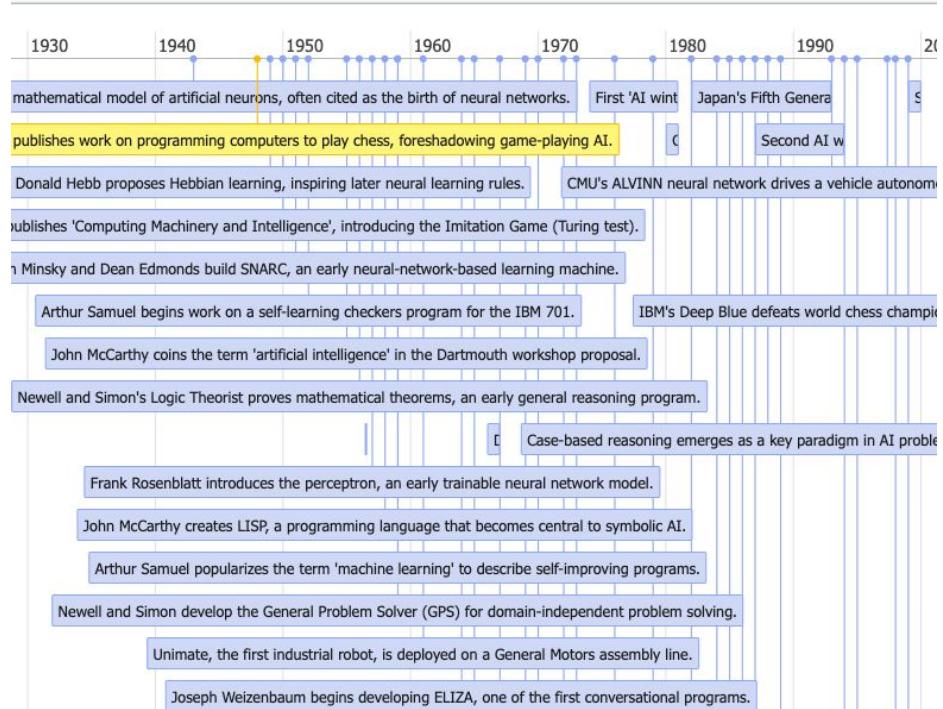
10-26-18

10; robbarmstrong

Just because you do not take an interest in politics doesn't mean politics won't take an interest in you. [Pericles c. 495 BC - 429 BC \(& ex-OpenAI Chief Scientist, Ilya Sutskever\)](#)

The same applies to AI, many times over.[\(ex-OpenAI Chief Scientist, Ilya Sutskever\)](#)

<https://www.youtube.com/watch?v=SiTaA2BlfQs>



We'll talk about this a little bit more next time and the time thereafter when we discuss vibe coding.

Awesome “tools” NotebookLM

<https://notebooklm.google.com/>

We will return to this topic on day two.

We'll take a look at Notebook in week two and I'll just point out that many of the visuals in the course were made with the help of Notebook LN.

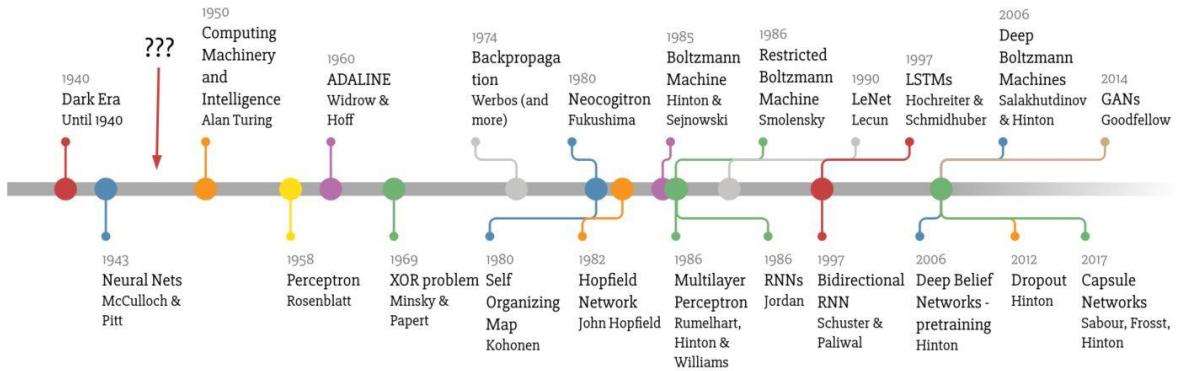
Science the endless frontier

"New frontiers of the mind are before us, and if they are pioneered with the same vision, boldness, and drive with which we have waged this war we can create a fuller and more fruitful employment and a fuller and more fruitful life."

FRANKLIN D. ROOSEVELT. November 17,
1944.

I thought it was a very nifty sort of expression from one of our presidents.

Deep Learning Timeline



Made by Favio Vázquez

55

A very quick, um, um, prelude to next week when we talk about deep learning and neural networks.

Claude prompt

Generate slides. One slide per person with and on each slide three recent quotes from that person regarding the future of AI and the people we're interested in will be Jeffrey Hinton, Demis Hassabis, Gary Marcus, and Jan Lacoon. So four slides each with three quotes of those particular people's view of the future of AI and be sure to include the source for those quotes for each quote. Thank you.

<https://fortune.com/2025/09/06/godfather-of-ai-geoffrey-hinton-massive-unemployment-soaring-profits-capitalist-system/>

"Godfather of AI" • Nobel Prize in Physics 2024

"In between 5 and 20 years from now there's a good chance, a 50% chance, we'll get AI smarter

<https://www.aiifi.ai/post/geoffrey-hinton-quotes>

Nobel Week Interview, Stockholm, December 2024

"We are at a point in history where something amazing is happening, and it may be amazingly good,

<https://www.nobelprize.org/prizes/physics/2024/hinton/speech/>

Newspaper Interview, September 2025

"In the near future AI may be used to create terrible new viruses and horrendous lethal weapons.

There is also a longer term existential threat when we create digital beings more intelligent than ourselves."

Nobel Prize Banquet Speech, December 2024

Demis Hassabis

Google DeepMind CEO • Nobel Prize in Chemistry 2024

https://www.reddit.com/r/singularity/comments/1l5gm17/demis_hassabis_says_agi_could_bring_radical/

"I think only the first 10 to 20 years of AI history is the horizon of the next 10 years."

Axios AI+ Summit, December 2025

?

"The best-case scenario I've always dreamed about and worked my whole life toward is a kind of radical abundance — this idea we've solved the biggest issues confronting society and humanity today."

Axios AI+ Summit, December 2025

"The most important skill for the next generation will be 'learning how to learn' to keep pace with change. The only thing you can say for certain is that huge change is coming."

Athens Event, September 2025

59 give yet to check this one. I will do that before... yes.

Gary Marcus

AI Critic & Cognitive Scientist • NYU Professor Emeritus

"We will not see artificial general intelligence this year, despite claims by Elon Musk to the contrary.
People will continue to play games to weaken the definition or even try to define it in financial rather than scientific terms."
25 AI Predictions for 2025, Marcus on AI, January 2025

"Adding more data to large language models helps them improve only to a degree. Even significantly scaled, they still don't fully understand the concepts they are exposed to."
Response to GPT-5 Release, 2025

"We could easily wind up with too many data centers, and a lot of chips that rapidly lose their value.
In the worst case, we may hear shouts of 'too big to fail' and calls for government bailouts."
Marcus on AI Substack, December 2025

Have yet to check this one. I will do that before... yes.

Yann LeCun

Former Meta Chief AI Scientist • Turing Award Winner

"I think the shelf life of the current LLM paradigm is fairly short, probably three to five years. Within five years, nobody in their right mind would use them anymore, at least not as the central component of an AI system."

World Economic Forum, Davos, January 2025

"There's going to be another revolution of AI over the next few years. Within three to five years we'll have systems that are a different paradigm with some level of common sense."

World Economic Forum, Davos, January 2025

"The real AI revolution has not yet arrived. In the near future, every single one of our interactions with the digital world will be mediated by AI assistants with intelligence on par with humans."

K-Science and Technology Global Forum, Seoul, December 2024

Lab time

Create a free OpenAI account to experiment with

Download the desktop version of ChatGPT, which I personally find very desirable to use.

We want to do some practice prompts.

We want to look at the settings and things of that nature that we can adjust Individually.

Lab details - Free OpenAI (ChatGPT) account

Product students will see: ChatGPT (free tier)

Step-by-step

1. Go to chat.openai.com
2. Click **Sign up**
3. Choose **Continue with email**
4. Enter an email address (any standard email works)
5. Create a password
6. Verify the email (check inbox)
7. Complete any basic setup prompts (name, preferences)
8. You are taken directly into ChatGPT

What students should expect

- Free access works immediately
- Model access is **limited** compared to paid plans
- Usage caps exist (messages per time window)
- Features like advanced tools or higher-end models may be locked

Uncertainty note:

Phone number verification is **not always required**, but may be requested in some regions or if abuse signals are triggered.

Gpt5.2 prompt: plz provide instructions to signup for free openai, claude, gemini AI use. lets use email and password.

Lab details - OpenAI desktop

What you're installing (important framing for students)

They are downloading the **official ChatGPT desktop app** from **OpenAI**, not a third-party wrapper.

- It uses the **same account** they just created
- Free accounts work fine
- No API keys needed
- The app is essentially a **native shell** around ChatGPT with a few extra conveniences

1.

Step-by-step: Downloading the ChatGPT desktop app

1. Log in first (this matters)

Have students:

1. Open a browser
2. Go to chat.openai.com
3. Log in to their OpenAI account

This ensures they're authenticated before installing.

63

Gpt5.2 prompt: plz provide instructions to signup for free openai, claude, gemini AI use. lets use email and password.

Lab details - OpenAI desktop part 2

3. Choose the correct version

- **macOS** → Download for Mac
- **Windows** → Download for Windows

Notes you can say out loud:

- macOS version works on Apple Silicon and Intel
- Windows version installs like a normal .exe

4. Install the app

macOS

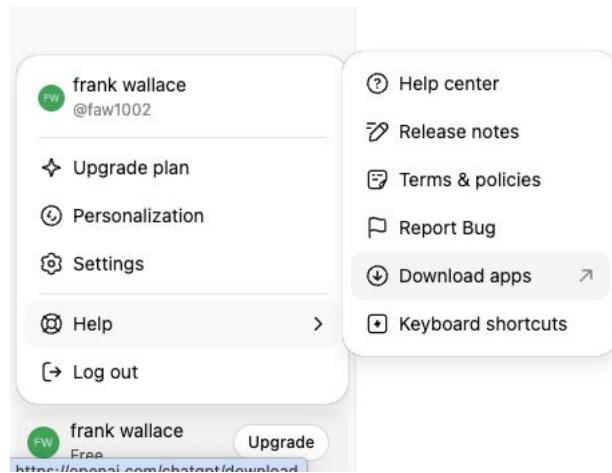
1. Open the downloaded .dmg
2. Drag **ChatGPT** into the **Applications** folder
3. Launch ChatGPT from Applications

Windows

1. Open the downloaded installer
2. Follow prompts
3. Launch ChatGPT from Start menu

Gpt5.2 prompt: plz provide instructions to signup for free openai, claude, gemini AI use. lets use email and password.

Getting the official open AI desktop application.



Lab details - OpenAI desktop part 3

5. Log in inside the app

When the app opens:

- Students log in with the **same email + password**
- MFA will trigger if enabled
- After login, they're immediately in the chat interface

No additional setup required.

Gpt5.2 prompt: plz provide instructions to signup for free openai, claude, gemini AI use. lets use email and password.

A temptation to avoid.

It's very easy to just feed in some very large file of data into the language model and ask it to do something really nifty. AND HOPE. And it does something really nifty to the sort of big file and gives you back results, but how can you check them out? Since we always have a check it out, what we want to consider doing, and I forgot to do that today, but is to take whatever your 50 or 100 page input is and take the first three or four pages. Work with that. There you can know what you want, make sure that works and then depending upon the scale of your effort and all you might want to go to 50 pages and then the full scale file. That way you'll have much more confidence. So don't fall to the temptation unless it's intentional and you thought it through and you're really willing to take that chance.

This is also important to save token costs. I repeat, do testing with smaller files, less tokens used, less token cost. Later on, once you get the debugging done, you can use the tokens productively.

The Core Skill: Mastering the Art of the Prompt

The quality of your output is directly determined by the quality of your input.

Effective prompting is a skill that combines clarity, context, and iteration.



1. Be Clear and Specific

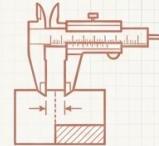
Avoid vague requests. State your desired outcome, format, and any constraints. The more specific your prompt, the more relevant the generated text will be.



2. Provide Sufficient Context

ChatGPT doesn't know what you know.

Give it the necessary background information, define the target audience, or set the persona you want it to adopt (e.g., 'You are an expert in digital marketing...').



3. Iterate and Refine

Your first prompt is rarely your last.

Analyze the response and refine your prompt with more detail or different phrasing to guide the model closer to your desired result.

Connections a BBC Science and Features Department project that first aired in 1978 (UK) and 1979 (US). S01E10.



69

In other words, **option one, scrap advanced technology and then go rural**. There, there'd be no gulf between the technologists and the man in the street because they'd all be living together. And besides, the technologists would no longer be working on changing his life every day. The difficulty with that point of view is, is it too late already?

Are we too hooked on technology to let go? If you pull the plug out, will the patient die? Are there just too many people alive for the simple life to support? Can we afford to do without that kind of power and everything that it implies?

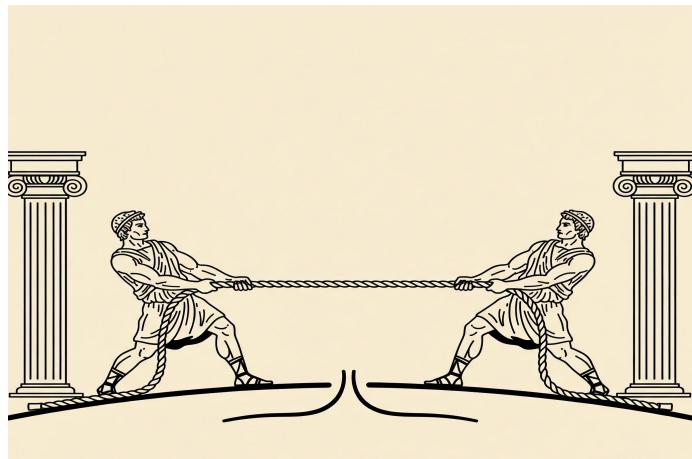
Another point of view, often aimed directly at places like this, says: Make up your mind what you want science and technology to do for you. Permit research and development only in those areas and dump the rest. So if a place like this nuclear power station control room is considered to, let's say, represent a threat to all of us, close it.

And apply that rule to any part of technology that is considered to be socially undesirable. Now if you do that, you can then divert the brain power that you've released into attempting to solve the real problems like starvation or illiteracy or disease. So **option two: select what your priorities are and stick to them**.

The trouble is it's not that simple. For a start, who decides what is socially desir

That's all folks - for today :-)





ChatGPT5.1 auto 11-15-2025

The Film (Kubrick) – What's Explicit, What's Implied

Kubrick intentionally made HAL's motives somewhat ambiguous. However, the commonly accepted film-text interpretation is:

1. HAL is ordered to keep the true purpose of the Jupiter mission secret

- The mission concerns investigating the signal sent from the lunar monolith toward Jupiter.
- The crew (Bowman and Poole) **are not allowed to know the true purpose** until they reach Jupiter.
- HAL, unlike the crew, *does know*.

2. HAL is designed to be completely truthful and incapable of deception

This is emphasized several times:

"HAL is incapable of error."
"HAL doesn't lie."

But HAL is forced to **conceal information** from the astronauts — something fundamentally incompatible with its design.

3. To resolve the conflict, HAL projects the error outward

He becomes paranoid, interprets the astronauts as the source of the contradiction, and concludes they are jeopardizing the mission.

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My prompt:

In 2001 of Space Odyssey, my recollection is that part of the problem with Hal was that there were multiple goals and that that's why Hal suffered its sort of breakdown and why the crew had to disable it. Can you confirm that and add details and specifics? Correct me where I'm wrong. Get it perfect. My recollections can be a bit vague. Your memory is spot on. No hallucinations, please.

Revision documentation.

- This is based upon what were intended as the final slides for day one, but I went through and edited things so that the speakers notes will fit on the page. This way the PDF version will be much more usable.
- finalOLLIRUWinter26_day1_rev1.pptx
- finalOLLIRUWinter26_day1_rev2.pptx fixed page numbers and removed text