Darpa - internet, touchscreens, gps, gyroscope, siri, BMI neural interfaces  
Early 00’s - didnt know 100s of servers could be used  
05 - we used it on humans to control limbs  
- we then restored memories after trauma -> what is a memory?  
2013 - ‘Subnets’ of brain neural states 4 depression and anxiety  
Nathan -> paralyzed> sensory cortex and motor cortex arrays translate neural activity into robotic arm. Robotic fingertips relay senses back to sensory cortex  
VR and virtual engagment  
Epillepsy - word recall - memories - record memories and stimulate them  
  
  
Wall fell - w bush - end of global order  
Issues w green energy  
Isreal palestinian conflict  
Obama visited capitol hill and cabinet secretaries least of all presidents  
All past presidents were adrift in foreign affairs. Clinton and Bush  
USA - least involved economy in the world as a %  
8% of GDP came from exports. Half of that came from nafta  
Regional not global usa has. Usa is global leader but least effected since we use it the least  
Usas demography has an even old/young population pyramid.  
Countries with lots of Young people who consume are friendly. As are countries with few old people (persons who produce and in effect compete).  
Mexico has a healthy population pyramid which can drive demand. ( demand has stagnated over past ten years and the pyramid is turning square )  
Sk, mx, cnd, jp, uk 0> majority of trade porfolio  
With no global order there is no security we need provide  
Current tarrifs become base - level rates now.  
4 tools to force us demands. Wedge issues. Energy, Steel, Currency, Automotive  
95% of exchaanges pass throuogh USD  
-> Obama made it so that individuals and orgs may be prohibited from currency x  
-> Trump expanded it to include contries | cutting them from all trade  
Us oil is almost cost competative -> really about to be equal  
US has firepower with less soldiers abroad then 1960s and are less involved in middle east.  
3/4s of global iron ore exports come from brazil and australia  
China produces about 60% of the world supply for internal use. India ~10, America ~ 5-10  
China produces abou 20% of the world supply of steel exports. Russia, Brazill, Canada, USA ~3, Japan, SK ~ 10. Largest producers of steel are in conflict zones.

super cold phosphorus electrons have a default spin (string theory). hitting it with a specific microwaves will turn it between 0 and 1 (superposition). parallelism allows us to have multiple qubits. entanglement allows us to study the position of the electron by studying how an entangled atom behaves..

13.8 billion years ago, universe  
4.54 billion years ago, earth  
300k years ago, modern humans  
12k years ago, civilization  
5k years ago, writting  
300 years ago, industrial rev  
1943 Neural Nets (walter pitts, warren mcculloch), alan turing, AI  
1957-62 - perceptron ( frank rosenblatt, single and multi layer, deep learning idea )  
1965 - deep learning implemented - alexey ivakhenko, vg lapa  
1970-86 - backprop, Rnn, automatic differentiation (seppo linnainmaa)  
82 - hopfield networks for nns

Kasparov deep blue 1997  
79-98 - cnn(kunihikio fukushima), lstm, bi-directional rnn  
06 - deep learning  
09 -imagenet  
14 - GANS  
2016 - Lee so dol - alpha go  
  
Von Neumann was fond of presenting the "complete graph" of the situation. He would, that is, describe the shortest path that leads from the first to the second, from the first to the third, and so on through all twelve possibilities. His definition of ordinal numbers (published when he was 20) is the one that is now universally adopted. He kept up his interest in set theory and logic most of his life, even though he was shaken by K. Godel's proof of the impossibility of proving that mathematics is consistent. He admired Godel and praised him in strong terms: "Kurt Godel's achievement in modern logic is singular and monumental - indeed it is more than a monument, it is a landmark which will remain visible far in space and time. ... The subject of logic has certainly completely changed its nature and possibilities with Godel's achievement." among other things, of Godel's work, he said: "This happened in our lifetime, and I know myself how humiliatingly easily my own values regarding the absolute mathematical truth changed during this episode, and how they changed three times in succession!"

<http://www.umsl.edu/~piccininig/First_Computational_Theory_of_Mind_and_Brain.pdf>

Calculators Part 1  
  
A mechanical calculator, or calculating machine, is a mechanical device used to perform the basic operations of [arithmetic](https://en.wikipedia.org/wiki/Arithmetic) automatically. Most mechanical calculators were comparable in size to small [desktop computers](https://en.wikipedia.org/wiki/Desktop_computer) and have been rendered obsolete by the advent of the [electronic](https://en.wikipedia.org/wiki/Electronics) [calculator](https://en.wikipedia.org/wiki/Calculator).

Surviving notes from [**Wilhelm Schickard**](https://en.wikipedia.org/wiki/Wilhelm_Schickard) **in 1623 reveal that he designed** and had built the earliest of the modern attempts at **mechanizing calculation**. His machine was composed of two sets of technologies: first an abacus made of [Napier's bones](https://en.wikipedia.org/wiki/Napier%27s_bones), to simplify multiplications and divisions **first described six years earlier in 1617**, and for the mechanical part, it had a dialed pedometer to perform additions and subtractions. A study of the surviving notes shows a machine that would have jammed after a few entries on the same dial,[[1]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-1) and that it could be damaged if a carry had to be propagated over a few digits (like adding 1 to 999).[[2]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-2) **Schickard abandoned his project in 1624 and never mentioned it again until his death 11 years later in 1635.**

Two decades after Schickard's supposedly failed attempt, **in 1642,** [**Blaise Pascal**](https://en.wikipedia.org/wiki/Blaise_Pascal) **decisively solved these particular problems** with his invention of the mechanical calculator.[[3]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-3) Co-opted into his father's labour as [tax collector](https://en.wikipedia.org/wiki/Tax_collector) in Rouen, Pascal designed the calculator to help in the large amount of tedious arithmetic required;[[4]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-INVENT-4) it was called [Pascal's Calculator](https://en.wikipedia.org/wiki/Pascal%27s_Calculator) or Pascaline.[[5]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-5)  
  
  
LOOMS  
  
The basic purpose of any loom is to hold the [warp](https://en.wikipedia.org/wiki/Warp_(weaving)) threads under [tension](https://en.wikipedia.org/wiki/Tension_(mechanics)) to facilitate the interweaving of the [weft](https://en.wikipedia.org/wiki/Weft) threads. **The precise shape of the loom and its mechanics may vary**, but the basic function is the same. **By 1838,** it had gained the meaning of a machine for interlacing thread. Backstrap(ancient, 2 sticks, simple to complex designs), WarpWeighted(Loom hangs with weighted stick at bottom to keep it taught, This frees the weaver from vertical size constraint, Neolithic ~ 12k yrs), **Drawloom** ( Two People, each thread controlled for patterned weaving, date c. 256 AD-400 BC ), **Handloom** (great invention in the 13th century…. A handloom is a simple machine used for weaving. In a wooden vertical-shaft looms, the [heddles](https://en.wikipedia.org/wiki/Heddle) are fixed in place in the shaft. The warp threads pass alternately through a heddle, and through a space between the heddles (the [shed](https://en.wikipedia.org/wiki/Shed_(weaving))), so that raising the shaft raises half the threads (those passing through the heddles), and lowering the shaft lowers the same threads — the threads passing through the spaces between the heddles remain in place ), Flying Shuttle ( covers two arm lengths, The *flying shuttle* was one of the key developments in [weaving](https://en.wikipedia.org/wiki/Weaving) that helped fuel the [Industrial Revolution](https://en.wikipedia.org/wiki/Industrial_Revolution). The whole picking motion no longer relied on manual skill and it was just a matter of time before it could be powered.) .

**Basile Bouchon** was a [textile](https://en.wikipedia.org/wiki/Textile) worker in the [silk](https://en.wikipedia.org/wiki/Silk) center in [Lyon](https://en.wikipedia.org/wiki/Lyon) who invented a way to control a [loom](https://en.wikipedia.org/wiki/Loom) with a **perforated paper tape in 1725**  
- partially **automated** the tedious setting up process of the [**drawloom**](https://en.wikipedia.org/wiki/Drawloom) in which an operator lifted the warp threads using cords  
- This development is considered to be the **first industrial application of a semi-automated machine**.-The cords of the [warp](https://en.wikipedia.org/wiki/Warp_(weaving)) were passed through the eyes of horizontal needles arranged to slide in a box. These were either raised or not depending on whether there was not or was a hole in the tape at that point.[[2]](https://en.wikipedia.org/wiki/Basile_Bouchon#cite_note-2) This was **similar to the** [**piano roll**](https://en.wikipedia.org/wiki/Piano_roll) developed at the end of the 19th century and may have been inspired by the patterns that were traditionally drawn on squared paper.  
- **Three years later**, his assistant **Jean-Baptiste Falcon** expanded the number of cords that could be handled by arranging the holes in rows and using rectangular cards that were joined together in an endless loop.

**John Kay** (17 June 1704 – c. 1779)   
He apprenticed with a [**hand-loom** reed](https://en.wikipedia.org/wiki/Reed_(weaving)) maker. was the inventor of the [**flying shuttle**](https://en.wikipedia.org/wiki/Flying_shuttle), In **1733**,(before Kay's improvements [a second worker was needed](https://en.wikipedia.org/wiki/Weaving#Industrial_Revolution) to catch the shuttle). It is often incorrectly written that Kay was attacked and fled to France, but in fact he simply moved there to attempt to rent out his looms, a business model that had failed him in England. All Textile Innovations were [attacked](https://en.wikipedia.org/wiki/Luddite) as threats to the livelihood. John Kay tried to defend his patents and lost. Also, fly-shuttle use was becoming widespread in weaving,[[36]](https://en.wikipedia.org/wiki/John_Kay_(flying_shuttle)#cite_note-36) **increasing cotton** [**yarn**](https://en.wikipedia.org/wiki/Yarn) demand and its [price](https://en.wikipedia.org/wiki/Price_elasticity_of_demand) – and Kay was blamed[**Jacques Vaucanson**](https://en.wikipedia.org/wiki/Jacques_Vaucanson) **(1740)** - was a [French](https://en.wikipedia.org/wiki/French_people) inventor and artist who was responsible for the creation of impressive and innovative [automata](https://en.wikipedia.org/wiki/Automata). At the time, mechanical creatures were somewhat a fad in [Europe](https://en.wikipedia.org/wiki/Europe). He also was the first person to design an [automatic loom](https://en.wikipedia.org/wiki/Jacquard_loom) and built the first all-metal [lathe](https://en.wikipedia.org/wiki/Lathe). In 1741 he was appointed by [Cardinal Fleury](https://en.wikipedia.org/wiki/Andr%C3%A9-Hercule_de_Fleury), chief minister of [Louis XV](https://en.wikipedia.org/wiki/Louis_XV_of_France), as inspector of the manufacture of [silk](https://en.wikipedia.org/wiki/Silk) in [France](https://en.wikipedia.org/wiki/France). He was charged with undertaking reforms of the silk manufacturing process. At the time, the French weaving industry had fallen behind that of [England](https://en.wikipedia.org/wiki/England) and [Scotland](https://en.wikipedia.org/wiki/Scotland). During this time, Vaucanson promoted wide-ranging changes for automation of the weaving process. In **1745**, he created the world's **first completely automated loom**,[[9]](https://en.wikipedia.org/wiki/Jacques_de_Vaucanson#cite_note-9) drawing on the work of [Basile Bouchon](https://en.wikipedia.org/wiki/Basile_Bouchon) and [Jean Falcon](https://en.wikipedia.org/w/index.php?title=Jean_Falcon&action=edit&redlink=1). Vaucanson was trying to **automate the French** [**textile**](https://en.wikipedia.org/wiki/Textile) **industry with** [**punch cards**](https://en.wikipedia.org/wiki/Punched_cards) - a technology that, as refined by [Joseph-Marie Jacquard](https://en.wikipedia.org/wiki/Joseph-Marie_Jacquard) more than a **half-century later**, would revolutionize weaving and, in the twentieth century, would be used to input [data](https://en.wikipedia.org/wiki/Data) into computers and store information in [binary](https://en.wikipedia.org/wiki/Binary_numeral_system) form. His proposals were not well received by weavers, however, who pelted him with stones in the street[[10]](https://en.wikipedia.org/wiki/Jacques_de_Vaucanson#cite_note-10) and many of his revolutionary ideas were largely ignored.  
James Hargreaves (c. 1720 – 22 April 1778)- He was one of **three men responsible for the mechanisation of spinning**: Hargreaves is credited with inventing the [**spinning jenny**](https://en.wikipedia.org/wiki/Spinning_jenny) **in 1764**; It started the [factory system](https://en.wikipedia.org/wiki/Factory_system). [Richard Arkwright](https://en.wikipedia.org/wiki/Richard_Arkwright) patented the [**water frame**](https://en.wikipedia.org/wiki/Water_frame) **in** **1769**; and [Samuel Crompton](https://en.wikipedia.org/wiki/Samuel_Crompton) combined the two, creating the [**spinning mule**](https://en.wikipedia.org/wiki/Spinning_mule) **in 1779**.  
Sir Richard Arkwright (23 December 1732 – 3 August 1792) - He was the first to develop factories housing both mechanised carding and spinning operations. development of the [spinning frame](https://en.wikipedia.org/wiki/Spinning_frame), known as the [water frame](https://en.wikipedia.org/wiki/Water_frame) after it was adapted to use [water power](https://en.wikipedia.org/wiki/Hydropower). "father of the modern industrial factory system,"  
  
**Jacquard (Fren**ch: [[ʒakaʁ]](https://en.wikipedia.org/wiki/Help:IPA/French); 7 July 1752 – 7 August 1834)was a [French](https://en.wikipedia.org/wiki/French_people) weaver and merchant. He played an important role in the development of the earliest programmable loom (the "[Jacquard loom](https://en.wikipedia.org/wiki/Jacquard_loom)"), which in turn played an important role in the development of other programmable machines, such as an early version of digital compiler used by [IBM](https://en.wikipedia.org/wiki/IBM) to develop the modern day [computer](https://en.wikipedia.org/wiki/Computer).  
The **Jacquard machine (1804)**  
- This use of replaceable [punched cards](https://en.wikipedia.org/wiki/Punched_cards) to control a sequence of operations is considered an important step in the [history of computing hardware](https://en.wikipedia.org/wiki/History_of_computing_hardware)  
- To stimulate the French textile industry, which was competing with Britain's industrialized industry, [Napoleon Bonaparte](https://en.wikipedia.org/wiki/Napoleon_Bonaparte) placed large orders for Lyon's silk, starting in 1802.  
- By raising different (not just alternate) warp threads and using colored threads in the weft, the texture, color, design, and pattern can be varied to create varied and highly desirable fabrics. Weaving elaborate patterns or designs manually is a slow, complicated procedure subject to error. Jacquard's loom was intended to automate this process.

Calculators Part 2   
  
[Thomas' arithmometer](https://en.wikipedia.org/wiki/Arithmometer), **the first commercially successful machine, was manufactured two hundred years later in 1851**; it was the first mechanical calculator strong enough and reliable enough to be used daily in an office environment. For forty years the arithmometer was the only type of mechanical calculator available for sale.[[6]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-6)

The [comptometer](https://en.wikipedia.org/wiki/Comptometer), introduced in **1887, was the first machine to use a keyboard** which consisted of columns of nine keys (from 1 to 9) for each digit. The Dalton adding machine, manufactured from **1902**, was the first to have a 10 key keyboard.[[**7]**](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-7)[**Electric motors**](https://en.wikipedia.org/wiki/Electric_motor) were used on some mechanical calculators from **1901.**[**[8]**](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-8) **In 1961,** a comptometer type machine, the [Anita mk7](https://en.wikipedia.org/wiki/Sumlock_ANITA_calculator) from Sumlock comptometer Ltd., became the first desktop mechanical calculator to receive an all **electronic calculator engine**, creating the link in between these two industries and marking the beginning of its decline. The production of mechanical calculators came to a stop in the middle of the 1970s closing an industry that had lasted for 120 years.

[**Charles Babbage**](https://en.wikipedia.org/wiki/Charles_Babbage) **designed two new kinds of mechanical calculators**, which were so big that they **required the power of a** [**steam engine**](https://en.wikipedia.org/wiki/Steam_engine) **to operate**, and that were too sophisticated to be built in his lifetime. The first one was an *automatic* mechanical calculator, his [**difference engine**](https://en.wikipedia.org/wiki/Difference_engine), which could automatically compute and print mathematical tables. In **1855**, [Georg Scheutz](https://en.wikipedia.org/wiki/Per_Georg_Scheutz) became the first of a handful of designers to succeed at building a smaller and simpler model of his difference engine.[[9]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-9) The second one was a ***programmable* mechanical calculator**, his [**analytical engine**](https://en.wikipedia.org/wiki/Analytical_engine), which **Babbage started to design in 1834**; "in less than two years he had sketched out many of the salient features of the modern [computer](https://en.wikipedia.org/wiki/Computer). A **crucial step** was the adoption of a punched card system derived from the [Jacquard loom](https://en.wikipedia.org/wiki/Jacquard_loom)"[[10]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-10) making it infinitely programmable.[[11]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-11) **In 1937,** [**Howard Aiken**](https://en.wikipedia.org/wiki/Howard_Aiken) **convinced** [**IBM**](https://en.wikipedia.org/wiki/IBM) **to design and build the** HARVARD MARK ONE[**ASCC/Mark I**](https://en.wikipedia.org/wiki/Harvard_Mark_I)**, the first machine of its kind**, based on the architecture of the analytical engine;[[12]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-12) when the machine was finished some hailed it as **"Babbage's dream come true".**[[13]](https://en.wikipedia.org/wiki/Mechanical_calculator#cite_note-13)

[**https://en.wikipedia.org/wiki/Harvard\_Mark\_I**](https://en.wikipedia.org/wiki/Harvard_Mark_I)

The [IBM](https://en.wikipedia.org/wiki/IBM) Automatic Sequence Controlled Calculator (ASCC), **called Mark I by** [**Harvard University**](https://en.wikipedia.org/wiki/Harvard_University)**’s staff,**[**[1]**](https://en.wikipedia.org/wiki/Harvard_Mark_I#cite_note-1)was a **general purpose** [**electromechanical**](https://en.wikipedia.org/wiki/Electromechanical)[**computer**](https://en.wikipedia.org/wiki/Computer) that was used in the war effort during the last part of [World War II](https://en.wikipedia.org/wiki/World_War_II).  
  
**One of the first programs to run on the Mark I was initiated on 29 March 1944**[**[2]**](https://en.wikipedia.org/wiki/Harvard_Mark_I#cite_note-2) **by** [**John von Neumann**](https://en.wikipedia.org/wiki/John_von_Neumann)**.** At that time, von Neumann was working on the [Manhattan Project](https://en.wikipedia.org/wiki/Manhattan_Project), and needed to determine whether implosion was a viable choice to detonate the atomic bomb that would be used a year later. The Mark I also computed and printed mathematical tables, which had been the initial goal of British inventor [Charles Babbage](https://en.wikipedia.org/wiki/Charles_Babbage) for his "[analytical engine](https://en.wikipedia.org/wiki/Analytical_engine)".

**Howard Hathaway Aiken (March 8, 1900 – March 14, 1973)** was an American [physicist](https://en.wikipedia.org/wiki/Physicist) and a [pioneer](https://en.wikipedia.org/wiki/List_of_pioneers_in_computer_science) in [computing](https://en.wikipedia.org/wiki/Computing), being the original **conceptual designer behind** [**IBM**](https://en.wikipedia.org/wiki/IBM)**'s** [**Harvard Mark I**](https://en.wikipedia.org/wiki/Harvard_Mark_I) computerThe original concept was presented to IBM by [Howard Aiken](https://en.wikipedia.org/wiki/Howard_H._Aiken) in November 1937.[[3]](https://en.wikipedia.org/wiki/Harvard_Mark_I#cite_note-3) After a feasibility study by IBM engineers, the company chairman [Thomas Watson Sr.](https://en.wikipedia.org/wiki/Thomas_J._Watson) personally approved the project and its **funding in February 1939**.

Howard Aiken had started to look for a company to design and build his calculator in early 1937. After two rejections,[[4]](https://en.wikipedia.org/wiki/Harvard_Mark_I#cite_note-4) he was shown a demonstration set that [Charles Babbage](https://en.wikipedia.org/wiki/Charles_Babbage)’s son had given to Harvard University 70 years earlier. This led him to study Babbage and to add references of the [Analytical Engine](https://en.wikipedia.org/wiki/Analytical_Engine) to his proposal; the resulting machine "brought Babbage’s principles of the Analytical Engine almost to full realization, while adding important new features."[[5]](https://en.wikipedia.org/wiki/Harvard_Mark_I#cite_note-5)

The ASCC was developed and built by IBM at their [Endicott](https://en.wikipedia.org/wiki/Endicott,_New_York) plant and **shipped to** [**Harvard**](https://en.wikipedia.org/wiki/Harvard) **in February 1944**. It began computations for the U.S. Navy Bureau of Ships in May and was officially presented to the university on August 7, 1944

Steam-driven devices were known as early as the [aeolipile](https://en.wikipedia.org/wiki/Aeolipile) in the first century AD  
  
with a few other uses recorded in the 16th and 17th century. [Thomas Savery](https://en.wikipedia.org/wiki/Thomas_Savery)'s 1650 – 1715 dewatering pump used steam pressure operating directly on the water. Solved issues of flooding in mines. In those days flooding in coal and tin mines was a major problem.On 2 July 1698 Savery patented an early [steam engine](https://en.wikipedia.org/wiki/Steam_engine), "*A new invention for raising of water and occasioning motion to all sorts of mill work by the impellent force of fire, which will be of great use and advantage for draining mines, serving towns with water, and for the working of all sorts of mills where they have not the benefit of water nor constant winds.*". The first commercially successful engine that could transmit continuous power to a machine was developed in 1712 by [Thomas Newcomen](https://en.wikipedia.org/wiki/Thomas_Newcomen) ironmonger's business specialised in designing, [manufacturing](https://en.wikipedia.org/wiki/Manufacturing) and selling tools for the mining industry. n England, Savery's patent meant that [Thomas Newcomen](https://en.wikipedia.org/wiki/Thomas_Newcomen) was forced to go into partnership with him. By 1712, arrangements had been between the two men to develop Newcomen's more advanced design of [steam engine](https://en.wikipedia.org/wiki/Newcomen_steam_engine), which was marketed under Savery's patent, adding water tanks and pump rods so that deeper water mines could be accessed with steam power. [James Watt](https://en.wikipedia.org/wiki/James_Watt) made a critical improvement by removing spent steam to a separate vessel for condensation, greatly improving the amount of work obtained per unit of fuel consumed. He realised that contemporary engine designs wasted a great deal of energy by repeatedly cooling and reheating the [cylinder](https://en.wikipedia.org/wiki/Cylinder_(engine)). Watt introduced a design enhancement, the [separate condenser](https://en.wikipedia.org/wiki/Watt_steam_engine#separate_condenser), which avoided this waste of energy and radically improved the power, efficiency, and cost-effectiveness of steam engines. Eventually he [adapted his engine](https://en.wikipedia.org/wiki/Rotative_beam_engine) to produce rotary motion, greatly broadening its use beyond pumping water. He developed the concept of [horsepower](https://en.wikipedia.org/wiki/Horsepower),[[2]](https://en.wikipedia.org/wiki/James_Watt#cite_note-2) and the [SI](https://en.wikipedia.org/wiki/SI) unit of power, the [watt](https://en.wikipedia.org/wiki/Watt), was named after him.

Traditionally, figured designs were made on a [drawloom](https://en.wikipedia.org/wiki/Drawloom). The [heddles](https://en.wikipedia.org/wiki/Heddle) with warp ends to be pulled up were manually selected by a second operator, the draw boy, not the weaver. The work was slow and labour-intensive, and the complexity of the pattern was limited by practical factors.  
An improvement of the draw loom took place in 1725, when [Basile Bouchon](https://en.wikipedia.org/wiki/Basile_Bouchon) introduced the principle of applying a perforated band of paper. A continuous roll of paper was punched by hand, in sections, each of which represented one lash or tread, and the length of the roll was determined by the number of shots in each repeat of pattern. While better than before, it still required 2 people to operate.  
In 1733 John Kay was able to effectively double productivity of each machine by extending the range of the loom using a shuttle mechanism.   
1745 the first fully automated punch card loom was made due to the Napoleonic French Pressures from English John Kay. Removing the need for the second person.  
1764-79 the spinning jenny and like products were created to meet the demands of Kays inventions. The Spinning mule was a water powered automation of the mechanized spinning process.  
Jacquard Refined the programming aspect of the mechanical loom in 1800.  
1835 - ***programmable* mechanical calculator**, [**analytical engine**](https://en.wikipedia.org/wiki/Analytical_engine), required a Steam Engine  
1851 **- first commercial non programmable calculator**  
**1937,** [**Howard Aiken**](https://en.wikipedia.org/wiki/Howard_Aiken) **convinced** [**IBM**](https://en.wikipedia.org/wiki/IBM) **to design and build the** HARVARD MARK ONE**1944 - mark one used by** [**John von Neumann**](https://en.wikipedia.org/wiki/John_von_Neumann)  
  
[Semyon Korsakov](https://en.wikipedia.org/wiki/Semyon_Korsakov) was reputedly the first to propose punched cards in informatics for information store and search. Korsakov announced his new method and machines in September 1832.  
  
[Charles Babbage](https://en.wikipedia.org/wiki/Charles_Babbage) proposed the use of "Number Cards", "pierced with certain holes and stand[ing] opposite levers connected with a set of figure wheels ... advanced they push in those levers opposite to which there are no holes on the cards and thus transfer that number together with its sign" in his description of the Calculating Engine's Store.[[8]](https://en.wikipedia.org/wiki/Punched_card#cite_note-8)  
  
In 1881 [Jules Carpentier](https://en.wikipedia.org/wiki/Jules_Carpentier) developed a method of recording and playing back performances on a [harmonium](https://en.wikipedia.org/wiki/Harmonium) using punched cards. Separated the mechanism into the *Melograph* which recorded the player's key presses and the *Melotrope* which played the music.  
At the end of the 1800s [Herman Hollerith](https://en.wikipedia.org/wiki/Herman_Hollerith) invented the recording of data on a medium that could then be read by a machine. "After some initial trials with paper tape, he settled on punched cards...", developing punched card data processing technology for the [1890 US census](https://en.wikipedia.org/wiki/United_States_Census,_1890).  
  
His [tabulating machines](https://en.wikipedia.org/wiki/Tabulating_machine) read and summarized data stored on punched cards and they began use for government and commercial data processing. Initially, these [electromechanical](https://en.wikipedia.org/wiki/Electromechanics) machines only counted holes, but by the 1920s they had units for carrying out basic arithmetic operations.[[13]](https://en.wikipedia.org/wiki/Punched_card#cite_note-13)

Hollerith founded the *Tabulating Machine Company* (1896) which was one of four companies that were [amalgamated (via stock acquisition)](https://en.wikipedia.org/wiki/Consolidation_(business)) to form a fifth company, [Computing-Tabulating-Recording Company (CTR)](https://en.wikipedia.org/wiki/Computing_Tabulating_Recording_Company) (1911), later renamed [International Business Machines Corporation (IBM)](https://en.wikipedia.org/wiki/International_Business_Machines) (1924).

Originally, the cards were "read" by pins. Where a hole was, a pin would poke through and close an electrical contact, where there was no hole, the pin would be insulated from closing an electrical contact. As someone else noted, how they read the cards no doubt became faster and more reliable than mechanical pins.  
  
Hopper began her computing career in 1944 when she worked on the Harvard Mark I team led by [Howard H. Aiken](https://en.wikipedia.org/wiki/Howard_H._Aiken). One of the first programmers of the [Harvard Mark I](https://en.wikipedia.org/wiki/Harvard_Mark_I) computer, she was a pioneer of computer programming who invented one of the first [linkers](https://en.wikipedia.org/wiki/Linker_(computing)). She popularized the idea of machine-independent programming languages, which led to the development of [COBOL](https://en.wikipedia.org/wiki/COBOL), an early [high-level programming language](https://en.wikipedia.org/wiki/High-level_programming_language) still in use today.  
  
<https://en.wikipedia.org/wiki/History_of_computing_hardware>  
  
publicly demonstrated and operational in 1951, was the first in the world to play digital music and the fifth [stored program](https://en.wikipedia.org/wiki/Stored_program) computer in the world.[[1]](https://en.wikipedia.org/wiki/CSIRAC#cite_note-1) It is the oldest surviving [first-generation electronic computer](https://en.wikipedia.org/wiki/History_of_computing_hardware#First-generation_von_Neumann_machines). The [Zuse Z4](https://en.wikipedia.org/wiki/Z4_(computer)) at the [Deutsches Museum](https://en.wikipedia.org/wiki/Deutsches_Museum) is older, but was [electro-mechanical](https://en.wikipedia.org/wiki/Mechanical_computer#Electro-mechanical_computers), not [electronic](https://en.wikipedia.org/wiki/List_of_vacuum_tube_computers) (1945) The Colossus Computer - First programmable electric digital computer. Design aided by Alan Turing. ENIAC was completed in 1945. first electronic general-purpose [computer](https://en.wikipedia.org/wiki/Computer).[[3]](https://en.wikipedia.org/wiki/ENIAC#cite_note-3) It had a speed on the order of one thousand times faster than that of [electro-mechanical](https://en.wikipedia.org/wiki/Electro-mechanical) machines. ENIAC calculated a trajectory in 30 seconds that took a human 20 hours (allowing one ENIAC hour to displace 2,400 human hours). It was [Turing-complete](https://en.wikipedia.org/wiki/Turing_completeness). 1957 DASK runs ALGOL.   
  
“””  
Handlooms were effective mechanical tools leveraging basic mechanic to automate a logically contingent but necessary action. New logically contingent behaviors emerged that could further be automated using additional basic mechanics. From facilitating a process, we moved to automating the process, which then becomes the process which necessitates facilitating. Weaving -> loom > Hanging loom -> Draw Loom Hole in Tape Thread Lifter 1725-> Draw Loom Thread Lifter w Looped Hole in Cards of Tape: Cards have a Syntax, are able to be chained combination of cards in a loop, Able to Expand # threads lifted 1728 -> Attempts at Punch Cards to Improve on Tape(1740). (Mastered 50 years later with the Jacquard Loom 1805) -> John Kays Shuttle Handloom needed 1 not 2 people (1733).   
“””   
  
Howard wanted a general purpose [electromechanical](https://en.wikipedia.org/wiki/Electromechanical) [computer](https://en.wikipedia.org/wiki/Computer)and babbage wanted an analytical engine so that he may ‘program’ his calculator so that it performs a series of computations. Babbage did not have access to the technology and Howard did not have access to the knowledge. Jacquard Loom reduce the cost of labor. Babbage saw how jacquard looms could take a series of instructions and wanted to know if he could do it for a calculator.

* <https://en.wikipedia.org/wiki/Rationalism#Immanuel_Kant_(1724%E2%80%931804)>  
  **[3.1](https://en.wikipedia.org/wiki/Rationalism#Rationalist_philosophy_from_antiquity)**
* **[Rationalist philosophy from antiquity](https://en.wikipedia.org/wiki/Rationalism#Rationalist_philosophy_from_antiquity)**
  + [**3.1.1**](https://en.wikipedia.org/wiki/Rationalism#Pythagoras_(570%E2%80%93495_BCE)) **[Pythagoras (570–495 BCE)](https://en.wikipedia.org/wiki/Rationalism#Pythagoras_(570%E2%80%93495_BCE))**
  + [**3.1.2 Plato (427–347 BCE)**](https://en.wikipedia.org/wiki/Rationalism#Plato_(427%E2%80%93347_BCE))
  + [**3.1.3 Aristotle (384–322 BCE)**](https://en.wikipedia.org/wiki/Rationalism#Aristotle_(384%E2%80%93322_BCE))
  + [**3.1.4**](https://en.wikipedia.org/wiki/Rationalism#Post-Aristotle) **[Post-Aristotle](https://en.wikipedia.org/wiki/Rationalism#Post-Aristotle)**
* **[3.2](https://en.wikipedia.org/wiki/Rationalism#Classical_rationalism)**
* **[Classical rationalism](https://en.wikipedia.org/wiki/Rationalism#Classical_rationalism)**
  + [**3.2.1 René Descartes (1596–1650)**](https://en.wikipedia.org/wiki/Rationalism#Ren%C3%A9_Descartes_(1596%E2%80%931650))
  + [**3.2.2 Baruch Spinoza (1632–1677)**](https://en.wikipedia.org/wiki/Rationalism#Baruch_Spinoza_(1632%E2%80%931677))
  + [**3.2.3 Gottfried Leibniz (1646–1716)**](https://en.wikipedia.org/wiki/Rationalism#Gottfried_Leibniz_(1646%E2%80%931716))
  + [**3.2.4 Immanuel Kant (1724–1804)**](https://en.wikipedia.org/wiki/Rationalism#Immanuel_Kant_(1724%E2%80%931804))

**Aristotle 384–322 BC**Father of [Western Philosophy](https://en.wikipedia.org/wiki/Western_philosophy) **-** At seventeen or eighteen years of age, he joined [Plato's Academy](https://en.wikipedia.org/wiki/Plato%27s_Academy) in [Athens](https://en.wikipedia.org/wiki/Athens) and remained there until the age of thirty-seven ([c.](https://en.wikipedia.org/wiki/Circa) 347 BC).[[4]](https://en.wikipedia.org/wiki/Aristotle#cite_note-FOOTNOTEAristotle_(384%E2%80%93322_B.C.E.)-5) Shortly after Plato died, Aristotle left Athens and, at the request of [Philip II of Macedon](https://en.wikipedia.org/wiki/Philip_II_of_Macedon), tutored [Alexander the Great](https://en.wikipedia.org/wiki/Alexander_the_Great) beginning in 343 BC. **-** During the 20th century, Aristotle's work was widely criticised. The philosopher [Bertrand Russell](https://en.wikipedia.org/wiki/Bertrand_Russell) argued that "almost every serious intellectual advance has had to begin with an attack on some Aristotelian doctrine" **Galileo Galilei 1564 – 8 January 1642)**

Galileo's championing of [heliocentrism](https://en.wikipedia.org/wiki/Heliocentrism) and [Copernicanism](https://en.wikipedia.org/wiki/Copernican_heliocentrism)  
the "father of the [scientific method](https://en.wikipedia.org/wiki/Scientific_method)  
father of [modern science](https://en.wikipedia.org/wiki/Modern_science)  
he wrote [*Two New Sciences*](https://en.wikipedia.org/wiki/Two_New_Sciences) kinematics and material strength  
father of [observational astronomy](https://en.wikipedia.org/wiki/Observational_astronomy)

**Pierre de Fermat** (between 31 October and 6 December 1607[[1]](https://en.wikipedia.org/wiki/Pierre_de_Fermat#cite_note-www-gap-1) – 12 January 1665)

developments that led to [infinitesimal calculus](https://en.wikipedia.org/wiki/Infinitesimal_calculus)  
technique of [adequality](https://en.wikipedia.org/wiki/Adequality)

[number theory](https://en.wikipedia.org/wiki/Number_theory) - Fermats Last Theorem. No a,b,c>2 where a^2 = b^2 + c^2

**Pascal's calculator (also known as the arithmetic machine or Pascaline)** is a [mechanical calculator](https://en.wikipedia.org/wiki/Mechanical_calculator) invented by [**Blaise Pascal**](https://en.wikipedia.org/wiki/Blaise_Pascal) **19 June 1623 – 19 August 1662** in the early 17th century.

corresponded with [Pierre de Fermat](https://en.wikipedia.org/wiki/Pierre_de_Fermat) on [probability theory](https://en.wikipedia.org/wiki/Probability_theory)

one of the first two inventors of the [mechanical calculator](https://en.wikipedia.org/wiki/Mechanical_calculator)  
  
**René Descartes (1596–1650)**

- I think, therefore I am  
- Mind Body Dualism

#### **Baruch Spinoza (1632–1677) -** God exists only philosophically **Leibniz 1646 - 1716** - prolific inventor in the field of [mechanical calculators](https://en.wikipedia.org/wiki/Mechanical_calculator)

- there are infinitely many simple substances, which he called "[monads](https://en.wikipedia.org/wiki/Monadology)"   
- In philosophy, Leibniz is most noted for his [optimism](https://en.wikipedia.org/wiki/Philosophical_optimism), i.e. his conclusion that our [universe](https://en.wikipedia.org/wiki/Universe) is, in a restricted sense, the [best possible one](https://en.wikipedia.org/wiki/Best_of_all_possible_worlds) that God could have created, an idea that was often lampooned by others such as [**Voltaire**](https://en.wikipedia.org/wiki/Voltaire)

**Voltaire** 1694 – 30 May 1778

- advocacy of [freedom of speech](https://en.wikipedia.org/wiki/Freedom_of_speech), [freedom of religion](https://en.wikipedia.org/wiki/Freedom_of_religion), and [separation of church and state](https://en.wikipedia.org/wiki/Separation_of_church_and_state).

#### **Immanuel Kant (1724–1804)**

Kant referred to these objects as "The Thing in Itself" and goes on to argue that their status as objects beyond all possible experience by definition means we cannot know them. To the empiricist he argued that while it is correct that experience is fundamentally necessary for human knowledge, reason is necessary for processing that experience into coherent thought. He therefore concludes that both reason and experience are necessary for human knowledge. In the same way, Kant also argued that it was wrong to regard thought as mere analysis. "In Kant's views, [a priori](https://en.wikipedia.org/wiki/A_priori_and_a_posteriori) concepts do exist, but if they are to lead to the amplification of knowledge, they must be brought into relation with empirical data

**Francis Bacon (1561 – 9 April 1626)  
credited with developing the** [**scientific method**](https://en.wikipedia.org/wiki/Scientific_method)[**inductive reasoning**](https://en.wikipedia.org/wiki/Inductive_reasoning) **and careful observation  
  
John Locke (1632 – 28 October 1704)**Father of [Liberalism](https://en.wikipedia.org/wiki/Classical_liberalism)  
following the tradition of Sir [Francis **Bacon**](https://en.wikipedia.org/wiki/Francis_Bacon),  
His writings influenced [**Voltaire**](https://en.wikipedia.org/wiki/Voltaire)and [Jean-Jacques **Rousseau**](https://en.wikipedia.org/wiki/Jean-Jacques_Rousseau)  
 [liberal theory](https://en.wikipedia.org/wiki/Liberal_theory) are reflected in the [United States Declaration of Independence](https://en.wikipedia.org/wiki/United_States_Declaration_of_Independence).”  
Locke's[**theory of mind**](https://en.wikipedia.org/wiki/Philosophy_of_mind) is often cited as the origin of modern conceptions of [identity](https://en.wikipedia.org/wiki/Identity_(philosophy)) and the [self](https://en.wikipedia.org/wiki/Self_(psychology)), figuring prominently in the work of later philosophers such as [David **Hume**](https://en.wikipedia.org/wiki/David_Hume), Rousseau, and [Immanuel **Kant**](https://en.wikipedia.org/wiki/Immanuel_Kant)  
blank slate or [*tabula rasa*](https://en.wikipedia.org/wiki/Tabula_rasa)  
  
**David Home**; (1711 - 1776  
- with [Francis **Bacon**](https://en.wikipedia.org/wiki/Francis_Bacon), [Thomas **Hobbes**](https://en.wikipedia.org/wiki/Thomas_Hobbes), [John **Locke**](https://en.wikipedia.org/wiki/John_Locke), and [George **Berkeley**](https://en.wikipedia.org/wiki/George_Berkeley), as a [British Empiricist](https://en.wikipedia.org/wiki/British_Empiricism).  
["Reason is, and ought only to be the slave of the passions"](https://en.wikipedia.org/wiki/Fact%E2%80%93value_distinction).[[10]](https://en.wikipedia.org/wiki/David_Hume#cite_note-FOOTNOTEAtherton1999?-10) Hume was also a [sentimentalist](https://en.wikipedia.org/wiki/Moral_sense_theory) who held that ethics are based on emotion or sentiment rather than abstract moral principle  
statement of fact alone can never give rise to a [normative](https://en.wikipedia.org/wiki/Norm_(philosophy)) conclusion of what *ought* to be done

- Hume argued that [i**nductive reasoning**](https://en.wikipedia.org/wiki/Inductive_reasoning) and belief in [causality](https://en.wikipedia.org/wiki/Causality) **cannot be justified rationall**y; instead, they result from custom and mental habit. We never actually perceive that one event causes another, but only experience the "[constant conjunction](https://en.wikipedia.org/wiki/Constant_conjunction)" of events. This [**problem of induction**](https://en.wikipedia.org/wiki/Problem_of_induction)means that to draw any causal inferences from past experience it is necessary to presuppose that the future will resemble the past, a presupposition which cannot itself be grounded in prior experience

- An opponent of philosophical [rationalists](https://en.wikipedia.org/wiki/Rationalism), Hume held that **passions rather than reason govern human behaviour**,   
- we experience only a [bundle of sensations](https://en.wikipedia.org/wiki/Bundle_theory)  
- famously proclaiming that ["Reason is, and ought only to be the slave of the passions"](https://en.wikipedia.org/wiki/Fact%E2%80%93value_distinction).[[10]](https://en.wikipedia.org/wiki/David_Hume#cite_note-FOOTNOTEAtherton1999?-10) Hume was also a [sentimentalist](https://en.wikipedia.org/wiki/Moral_sense_theory) who held that ethics are based on emotion or sentiment rather than abstract moral principle. He maintained an early commitment to naturalistic explanations of moral phenomena, and is usually taken to have first clearly expounded the[**is–ought problem**](https://en.wikipedia.org/wiki/Is%E2%80%93ought_problem), or the idea that a statement of fact alone can never give rise to a [normative](https://en.wikipedia.org/wiki/Norm_(philosophy)) conclusion of what *ought* to be done  
- [Immanuel Kant](https://en.wikipedia.org/wiki/Immanuel_Kant) credited Hume as the inspiration who had awakened him from his "dogmatic slumbers  
  
  
Hume proceeded primarily from a single but important concept of metaphysics, namely, that of *the connection of cause and effect  
  
Thus, it was Hume’s “attack” on metaphysics (and, in particular, on the concept of cause and effect) which first provoked Kant himself to undertake a fundamental reconsideration of this (supposed) science.  
  
Thus, Kant’s “complete solution of the Humean problem” directly involves him with his whole revolutionary theory of the constitution of experience by the a priori concepts and principles of the understanding—and with his revolutionary conception of synthetic a priori judgments.  
  
I thus first tried whether Hume’s objection might not be represented generally, and I soon found that the concept of the connection of cause and effect is far from being the only one by which the understanding thinks connections of things a priori; rather, metaphysics consists wholly and completely of them. I sought to secure their number, and since this succeeded as desired, namely, from a single principle, I then proceeded to the deduction of these concepts, on the basis of which I was now assured that they are not derived from experience, as Hume had feared, but have sprung from the pure understanding.  
  
That metaphysics until now has remained in such a wavering state of uncertainty and contradictions is to be ascribed solely to the fact that this problem, and perhaps even the distinction between analytic and synthetic judgments, was not thought of earlier. Metaphysics stands or falls with the solution of this problem, or on a satisfactory proof that the possibility it requires to be explained does not in fact obtain.  
  
Because most philosophers believe that knowledge requires justification, it is widely thought that a priori knowledge is just a special kind of knowledge, namely, knowledge that is based solely on a priori justification.  
  
Kant then immediately refers to “David Hume, who, among all philosophers, came closest to this problem”; and he suggests, once again, that Hume failed to perceive the solution because he did not conceive the problem in its*

*[full] generality, but rather stopped with the synthetic proposition of the connection of the effect with the cause (principium causalitatis).*

Kant does not endorse a Humean solution to the problem of the relation between cause and effect. he does not claim that this relation is derived from experience. Instead (as we have seen) Kant takes Hume’s problem of causality to be centrally implicated in the radically new problem of synthetic a priori judgments.   
  
 Yet the latter problem, in turn, clearly has its origin in Kant’s earlier discussion (in the essay on *Negative Magnitudes* and *Dreams of a Spirit-Seer*) of the apparently mysterious connection between a real ground (or cause) and its consequent (or effect). Just as Kant had earlier emphasized (in these pre-critical works) that the consequent of a real ground is not contained in it, and thus does not result by “the analysis of concepts”, Kant now (in the critical period) maintains that the concept of the effect cannot be contained in the concept of the cause and, accordingly, that a judgment relating the two cannot be analytic. Such a judgment, in Kant’s critical terminology, must now be synthetic—it is a judgment in which “the connection of the predicate with the subject … is thought without identity”, where

a predicate is added to the concept of the subject which is by no means thought in it, and which could not have been extracted from it by any analysis. (A7/B10–11)

The crucial point about a synthetic *a priori* judgment, however, is that, although it is certainly not (as a priori) derived from experience, it nonetheless extends our knowledge beyond merely analytic judgments.  
  
“How are synthetic a priori judgments possible?” And, as in the *Prolegomena*, Kant insists that the possibility of metaphysics as a science entirely depends on this problem (ibid.)

It therefore becomes clear why, in the Introduction to the second edition of the *Critique*, Kant says of the crucial problem of synthetic a priori judgments that

this problem, and perhaps even the distinction between *analytic* and *synthetic* judgments, was not thought of earlier,

and then explicitly names “David Hume, who, among all philosophers, came closest to this problem”

Kant explains Hume’s problem as follows (4, 257; 7):

Hume proceeded primarily from a single but important concept of metaphysics, namely, that of *the connection of cause and effect* … , and he challenged reason, which here pretends to have generated this concept in her womb, to give him an account of by what right she thinks that something could be so constituted that, if it is posited, something else must necessarily also be posited thereby; for this is what the concept of cause says. He proved indisputably that it is completely impossible for reason to think such a connection a priori and from concepts [alone] (for this [connection] contains necessity); but it can in no way be comprehended how, because something is, something else must necessarily also be, and how, therefore, the concept of such a connection could be introduced a priori.

What is most important, however, is the **official solution to Hume’s problem that Kant presents** in § 29 of the *Prolegomena*. This solution **depends on the distinction between “judgments of perception” and “judgments of experience”** which Kant has extensively discussed in the preceding sections.  
  
and we intend that [the judgment] is supposed to be also valid for us at all times and precisely so for everyone else; for, if a judgment agrees with an object, then all judgments about the same object must also agree among one another, and thus the objective validity of the judgment of experience signifies nothing else but its necessary universal validity.  
  
*Empirical judgments, in so far as they have objective validity,* are **judgments of experience**; they, however, *in so far as they are only subjectively valid*, I call mere **judgments of perception**. … All of our judgments are at first mere judgments of perception: they are valid merely for us,  
…. concepts under which all perceptions must first be subsumed before they can serve as judgments of experience, in which the synthetic unity of perceptions is represented as necessary and universally valid.  
<https://plato.stanford.edu/entries/apriori/>  
  
<https://plato.stanford.edu/entries/kant-hume-causality/#KantAnswHume>  
  
<https://theethicalskeptic.com/2009/09/24/the-tree-of-knowledge-obfuscation-misrepresentation-through-locution-or-semantics/>  
  
<https://theethicalskeptic.com/the-tree-of-knowledge-obfuscation/>  
  
<https://theethicalskeptic.com/tag/pathos/>  
  
<https://en.wikipedia.org/wiki/Cliodynamics>

<https://en.wikipedia.org/wiki/Manufacturing_Consent>

<https://www.google.com/search?q=map+of+grammar&rlz=1C1CHBD_enUS847US847&sxsrf=ACYBGNRimlnMyHES8HXp9BmTy7Yfls4wRA:1578423136950&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjv7oezlPLmAhVlm-AKHZ5EAOAQ_AUoAXoECBQQAw&biw=1680&bih=907#imgrc=S5Nc62hMOPJGxM:>  
  
<https://en.wikipedia.org/wiki/English_grammar#Case>

<https://en.wikipedia.org/wiki/Propositional_calculus>

Thomas Kuhn  
Science must account for subjective perspectives as well, since all objective conclusions are ultimately founded upon the subjective conditioning/worldview of its researchers and participants.  
  
scientific fields undergo periodic "paradigm shifts" rather than solely progressing in a linear and continuous way, and that these paradigm shifts open up new approaches to understanding what scientists would never have considered valid before;

Inductive Rationalists are dogmatic with their beliefs and are incapable of change. Empiricists believe ethics are based on context and not abstract moral principles.   
  
  
Projective geometry - study of geometric properties that are invariant with respect to [projective transformations](https://en.wikipedia.org/wiki/Projective_transformation).

In the theory of forms/ideas, Plato argued that the non-physical realm of forms and ideas was the most accurate reality, ascending above our sense perceptions and conscious perception of the external world. This concept addresses the problem of universals54, which considers the relation between specific things and the degree to which they represent universal forms. The Theory of Forms argues that all perceptible things are imperfect representations of universal, abstract forms and ideas, and that those abstract forms exist independent of their manifestations.

9.2 Mathematical Reality Because of parallel developments in modern mathematics and physics, the idea is taking hold that reality is innately mathematical55 and that the abstract realm of mathematics is the source for much of our understanding of physical reality. Examples that support this idea appear in unexpected places. For example there’s a species of cicada that hatches out at two different intervals – 13 or 17 years, no other periods. These long periods between mass births was once a mystery, but it is now thought56 that these intervals result from the fact that both 13 and 17 are prime numbers, and because they are prime these particular reproduction intervals reduce the chance for synchronization with the 31 life cycles of predators. Computer mathematical models show the survival advantage of these specific intervals57 , which are thought to have arisen by the chance process of natural selection. Modern physics has evolved in such a way that it’s almost entirely described mathematically, with very little content not reliant on equations. Most modern scientific research has become a search for empirically testable equations that successfully explain past observations, make reliable predictions about observations not yet made, and more importantly provide a unifying conceptual framework that may lead to further discoveries. In the same way, modern technology (applied science) relies on a deep understanding of mathematical ideas.  
  
9.3 Unreasonable Effectiveness In a now-famous paper entitled “The Unreasonable Effectiveness of Mathematics in the Natural Sciences59,” physicist Eugene Wigner ponders the surprising degree to which mathematics, which has no essential connection with reality, describes it so well. Wigner concludes his article by saying, “The miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve. We should be grateful for it and hope that it will remain valid in future research and that it will extend, for better or for worse, to our pleasure, even though perhaps also to our bafflement, to wide branches of learning.”

file:///home/carlos/Desktop/Reading%20Slides%20Visuals/Maths/discreteMath.pdf  
<THERE are many types of prime numbers. Information is inaccessible because of lack of pertinent details, or because computing the solution is to hard>   
16.1 How to save the last move in chess? Modern cryptography started in the late 1970’s with the idea that it is not only lack of information that can protect our message against an unauthorized eavesdropper, but also the computational complexity of processing it.

https://en.wikipedia.org/wiki/Direct\_and\_indirect\_realism

https://en.wikipedia.org/wiki/Logic\_gate

https://en.wikipedia.org/wiki/Rule\_of\_inference

https://en.wikipedia.org/wiki/Functional\_completeness

https://en.wikipedia.org/wiki/Entropy\_(information\_theory)

https://en.wikipedia.org/wiki/List\_of\_rules\_of\_inference

https://en.wikipedia.org/wiki/Semantic\_theory\_of\_truth

https://en.wikipedia.org/wiki/Outline\_of\_logic

pragmatism

the map of mathematics

https://www.info.ucl.ac.be/~pvr/paradigms.html

https://www.dartmouth.edu/~matc/MathDrama/reading/Wigner.html

https://reasonablypolymorphic.com/book/preface

//http://www.kurzweilai.net/the-law-of-accelerating-returns

https://missing.csail.mit.edu/2020/potpourri/

https://commonmark.org/help/

https://buildingtoolswithgithub.teddyhyde.io/

// https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers

// life begins at a billion examples

// markov models -> local variation. no backprop

// nlp = holy grail

// computers are programmable. That is, by inputting an appropriate sequence of instructions, we can change a computer’s behavior. Second, computers are universal. That is, with the right program we can make a computer perform any algorithmic process whatsoever, as long as the machine has enough memory and time.

// crystallized in a 1937 paper by Alan Turing, who argued that any algorithmic process whatsoever could be computed by a single universal, programmable computer. The machine Turing described — often known as a Turing machine — was the ancestor of modern computers.

// If you had a complete understanding of the machine, you’d understand all physical processes.

// In 1985, the physicist David Deutsch took another important step toward understanding the nature of algorithms.

// Every finitely realizable physical system can be perfectly simulated by a universal model computing machine operating by finite means.

// relationships between language and thought? Philosophers, linguists, psychologists, evolutionary theorists and cognitive scientists have too

// we don’t yet know how to combine quantum mechanics with general relativity

// All arguments which can be given are bound to be, fundamentally, appeals to intuition, and for this reason rather unsatisfactory mathematically

// who loves the sun -> calabria 2008 (iknowuthinkurthetalkofthetown)

// corner-stone applications in cognitive neuroscience, including face recognition, neural representation of word meaning, decoding mental states.

<https://www.dartmouth.edu/~matc/MathDrama/reading/Wigner.html>

<https://en.wikipedia.org/wiki/Mathematical_universe_hypothesis>  
<https://en.wikipedia.org/wiki/Periodical_cicadas>  
<https://en.wikipedia.org/wiki/Problem_of_universals>  
<https://en.wikipedia.org/wiki/Theory_of_forms>  
<https://en.wikipedia.org/wiki/Kepler%27s_laws_of_planetary_motion>

https://lambdaclass.com/data\_etudes/central\_limit\_theorem\_misuse/

https://observablehq.com/@amauboussin/exploring-the-limits-of-the-central-limit-theorem

https://meaningness.com/metablog/stem-fluidity-bridge

https://www.lesswrong.com/

https://plato.stanford.edu/entries/model-theory/

https://meaningness.com/metablog/how-to-think

http://thedailyidea.org/resources/

http://kharyfiler.org/index.php/2020/01/01/objective-truth-moral-truth-and-the-limit-of-knowledge/

China doesn't need to keep them locked up. China has the largest rate of organ transplants in the world, the highest rates of executions (actual number a state secret) yet has low rates of organ donors with trial registration schemes only starting within the last decade. Guess where they get the organs from.

Journalists investigating the suppression of Falun Gong estimated that approximately 60,000 convicted members were executed and their organs harvested. People are routinely arrested and never heard from again. In some cases families have been told a relative was executed years previously, but often they hear nothing at all.

In 2008 China's own deputy health minister estimated over 60% of transplant organs were sourced from prisoners, but Chinese officials have clamped up about this in recent years. They have occasionally said that this source of organs has been excluded, but there's no way to verify this as rates of donor registration aren't known, rates of executions are a state secret and none of the people or facilities involved are known or open to investigations.

> We kill suspects whose names we know, and whose names we don’t; we kill the guilty and the not guilty; we kill men, but also women and children; we kill by day and by night; we fire missiles at confirmed visual targets, but also at cellphone numbers we hope belong to targets.

> In 2014, former CIA and NSA director Michael Hayden said in a public debate, “We kill people based on metadata.”

> According to multiple reports and leaks, death-by-metadata could be triggered, without even knowing the target’s name, if too many derogatory checks appear on their profile. “Armed military aged males” exhibiting suspicious behavior in the wrong place can become targets, as can someone “seen to be giving out orders.” Such mathematics-based assassinations have come to be known as “signature strikes.”

[https://www.rollingstone.com/politics/politics-features/how-](https://www.rollingstone.com/politics/politics-features/how-to-survive-americas-kill-list-699334/)