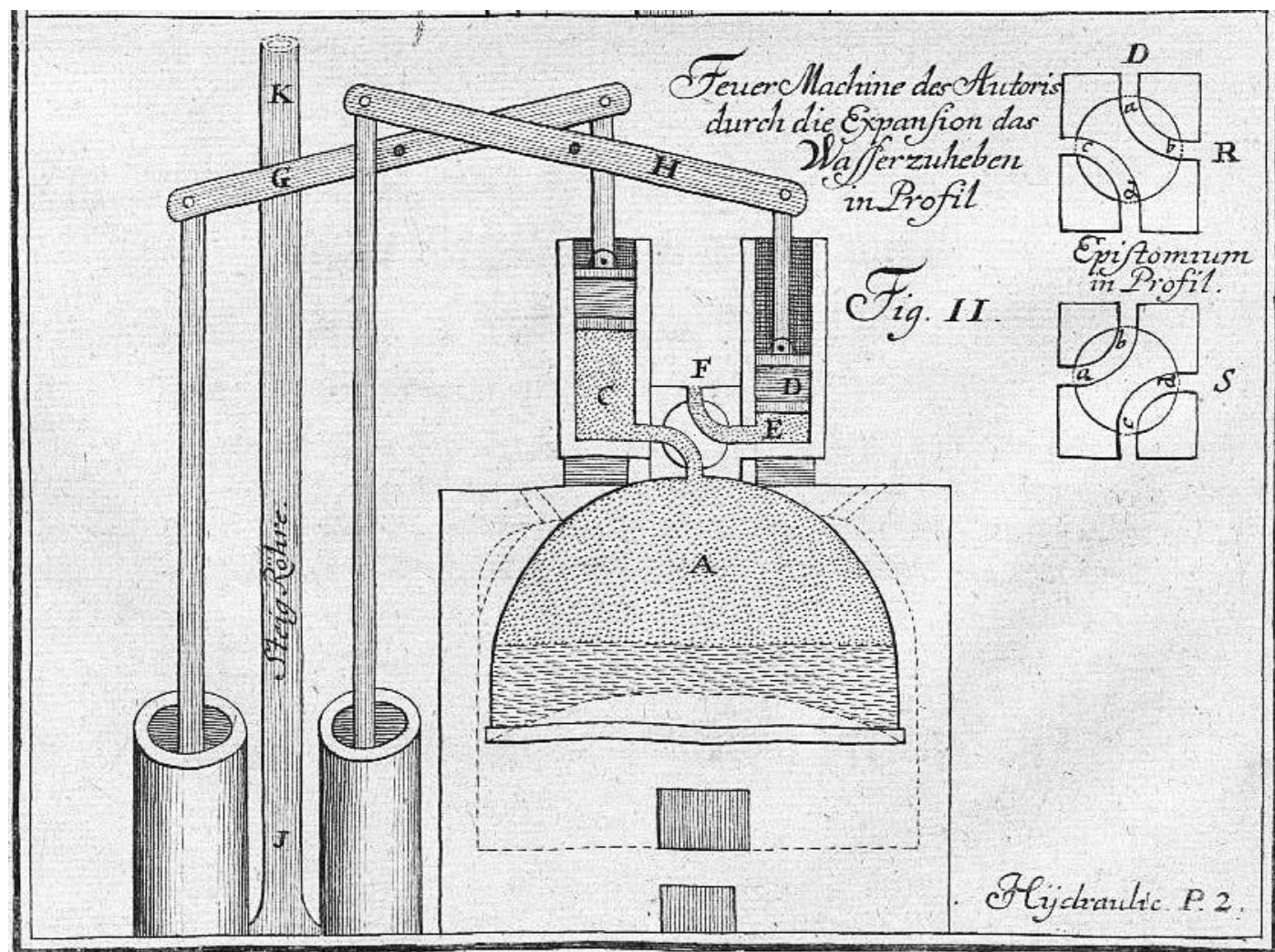


Is AI a Steam Engine or a Calculator?

How historical analogies shape our understanding of the AI revolution

[George Dillard](#)



An early design of a steam engine, 1720 ([public domain](#))

We humans love to mine the past to give context to new circumstances and events. We compare our current economic troubles to historic recessions and depressions and describe modern authoritarians in light of Julius Caesar or Benito Mussolini. In many ways, it's a natural thing to do. Our brains, when they encounter something new, try to place it in the context of what we already know. So, when something new comes along, we want to say, "This new thing is like that old thing I already understand!"

In some ways, this isn't surprising. Our brains are lazy, and, rather than coming up with an entirely new understanding of the world, they prefer to map new information about a phenomenon like artificial intelligence onto an old template. Essentially, we've trained our minds on a great deal of

information from our schooling and life experience. They work as [prediction engines](#), using that data to make sense of what's coming.

In other words, we behave kind of like large language models.

The problem with this tendency in our thinking is that new events don't exactly conform to the way things have worked in the past. This means that the historical analogies on which we choose to base our understanding of new developments will shape — and constrain — our sense of what's possible.

What historical events might we compare to the rise of artificial intelligence? How might they shape our understanding of what's coming?

AI as a steam engine

Some people see AI as a very big deal — equal in impact to the [Industrial Revolution](#). This is an aggressive claim. The Industrial Revolution was the biggest change in the way humans live since farming was invented thousands of years ago.

Once humans learned to unlock the energy trapped in fossil fuels and to reorganize workplaces and societies around efficient, productive labor, everything changed. The number of people on the planet octupled, life expectancies more than doubled, and a previously unimagined level of material abundance became possible for many of the people on the planet.

The steam engine also unleashed an array of problems. In the short term, it created terrible working and living conditions for the people living in new industrial cities. In the long term, it began a process of pumping greenhouse gases into the atmosphere that would harm every ecosystem on the planet.

If AI is this big of a deal — one of the three most important events in human history, after the invention of agriculture and the Industrial Revolution — it will upend everything.

What we do for work, how we communicate, how we interact with each other (or our digital companions), and much more will be transformed by the invention of AI. This interpretation also lends itself to the idea that AI is an unstoppable force. Just as fossil-fuel energy and the factory system, once unleashed on the world, came to change everything, the rise of AI will do the same. If this analogy is true, there's no point in resisting such a change — you might as well just adapt to it.

AI as a self-driving car

When my kids were little, I hoped I'd never have to teach them to drive. Rather than clenching my teeth and gripping the armrest while they learned, by trial and error, to pilot a 3,000-pound machine, I could just let the car take them where they wanted to go. I was told by [tech visionaries](#), after all, that self-driving technology was just around the corner. My kids would never have to grip a steering wheel.

My kids are now legal adults, and a world where we're all riding around in driverless cars seems just as far away now as it did back then.

The devil has been in the details. Yes, there are some self-driving cars on the road, performing limited tasks in certain locations, but they're nowhere near replacing most human drivers. As engineer Missy Cummings [argues](#), after decades of development, "real-world applications of transportation AI are or are not working." The computers still can't make crucial distinctions about the [social aspects of driving](#) — *What's that pedestrian about to do? Is that car going to let me merge in?* — well enough to earn our trust.

Unfortunately, cars that safely get us to our destination most of the time aren't good enough, and it's unclear whether the technology will ever be sufficient to get us there all of the time. The development curve on self-driving technology was steep at first, but it seems to be flattening as the technology matures.

Right now, AI shows great promise as a technology, but it's not quite ready for prime time. It does a lot of cool stuff, but it's unclear how useful or reliable its output is. If I ask a chatbot for information, I still have to go back and check the sources to see if it hallucinated. If I'm unwilling to trust AI for [simple informational searches](#), I certainly wouldn't want it to diagnose my diseases or edit my contracts. Maybe, as with self-driving cars, we're headed for a future in which AI shows great promise as a technology — but making it truly useful and reliable will prove devilishly difficult.

AI as a calculator

I don't do a lot of my own math. Why would I, when there are calculators for that? I enter a student's grades in my electronic grade book, and it spits out an average for the semester. I let my phone calculator do the work whenever I have to multiply or divide big numbers. I guess I could do some long division if I had to, but it seems like a waste of time.

I don't feel like I'm missing out on much from my calculator use. The calculators in my life do the pointless mathematical grunt work so I can have time to focus on more important things. The students in my school use calculators liberally in their math classes; their teachers like this because it frees the kids up to learn the more advanced concepts of mathematics.

Calculator use seems pretty uncontroversial, but it wasn't always so. As Michael Crow and others [write](#),

A survey in the mid-1970s carried out by Mathematics Teacher magazine found that 72 percent of respondents — mainly teachers and mathematicians — opposed equipping seventh graders with calculators... Calculators met resistance from educators who feared an overdependence on technology would erode students' math skills. As one [professor observed](#) of students and calculators, "I have yet to be convinced that handing them a machine and teaching them how to push the button is the right approach. What do they do when the battery runs out?"

But those fears were unfounded. Calculators liberated students and teachers to learn math in more [innovative and effective ways](#), focusing on critical thinking and problem solving.

Could AI do the same, but for a much wider range of subjects? Will those of us who worry about AI damaging a generation's ability to read and think seem as foolish as the people who feared that the calculator would be the end of mathematical literacy?

AI as a moonshot

In the 1950s and 1960s, the United States and Soviet Union spent billions of dollars trying to get men into space and then onto the moon. Though the Soviets took an early lead, launching satellites, dogs, and Yuri Gagarin into the great unknown, the Americans managed to pull ahead and plant the stars and stripes on the moon.

The space race was a lot of things. It was a contest of ideologies, as the Soviets tried to show the world that central planning could achieve great things, while the Americans tried to demonstrate what free markets could do. It was a not-particularly-veiled way to test ICBM technology which could be used for nuclear war as easily as space exploration. It became a hub of useful innovation, as space programs spun off all sorts of [inventions](#) — from image sensors to solar panels to velcro — that became useful here on

Earth. And not least, it was a genuinely inspiring project of exploration and discovery that inspired people all over the world.

The space race was an event that had the potential to both raise and diffuse tension between the superpowers. It provided another field of competition, but perhaps giving the Soviets and Americans a scientific and technological arena to jockey for position created a release valve for tensions that might have otherwise resulted in conflict. After Neil Armstrong's moon walk confirmed that the Americans had won, the countries' interest in space exploration began to dwindle. It turned out that, without competition to drive us, we weren't actually all that excited about going to the moon.

Some [commentators](#) see AI as an arena for competition between China and the United States. The nation that comes out ahead will be able to claim supremacy. As [Jessica Brandt](#) and others write, "At stake in this competition are the prestige and reach of liberal values, as well as the economic competitiveness and national security of the United States and its allies and partners." If AI takes on characteristics of the space race, it may attract immense investment from global powers. But will they abandon it once the race is won?

AI as a pollutant

When environmental scientists test pollutants, they focus on measures like the median toxic dose and the median lethal dose. These figures represent how much of the pollutant is needed to cause harm or death to more than 50% of a population. A little bit of that pollutant might not be that big a deal; no one will notice its effects. But once it crosses a threshold, people will begin to regret their exposure to the substance very quickly.

Right now, our information ecosystem is filling up with AI pollution. Our web searches are turning up more and more websites full of [AI slop](#) (complete with a Google-generated extra helping of slop at the top of the page). Social networks are [filling](#) with fake, AI-generated images.

What's worse, AI models are running out of training data and may begin training themselves on AI-generated text and images. Perhaps now the LLMs will ingest slop and spit out new slop that's slightly more putrid.

Right now, the slop is relatively easy to distinguish from valuable, human-generated content. And most of what we find on the internet is still useful. But that may not be true for very long. When social networks and search results reach a critical mass of AI-generated garbage, will they become

useless? Will there be so much pollution in the system that its inhabitants start to feel poorly?

I hope you've found these analogies interesting, and perhaps they've encouraged you to think about AI in different ways. But we shouldn't rely solely on analogies like these. One of the shortcomings of LLMs is that they're just prediction machines that spit out content based on what they've ingested. They can't really think creatively; they can only average what they know and summarize it.

As humans, we can do better. The future isn't always just like the past, and it's likely that all of these analogies — and any that others can think of — will prove inadequate. Only we, not the machines, can conceive of the unique possibilities that this new technology presents.