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How Mathematicians Made Pooping More Fun

For most of human history, poop-time was a solemn affair. Man was relegated to a state of silence as he squatted in the grass. The more civilized cultures would have the luxury of storing their waste in a chamber pot and subsequently tossing it out a window, but they still crouched in silence, forced to contemplate their bowels. But mankind, with its indomitable tenacity, refused to submit to such a sordid state of affairs. And so now, after centuries of toil, man may rejoice as he plays Angry Birds on the can.

Here we are, carrying around powerful devices capable of performing complex calculations in times imperceptible to human awareness. And our smartphones are smaller versions of the powerful devices we use at work and in the home. We hook these computational engines up to glowing rectangles and use them for nearly everything, from weather forecasting to reading “books”. So where did these things come from? Surprisingly, computers did not, in fact, come into existence from a driven effort to make pooping more enjoyable. Rather, they’re the spectacular byproduct of math.

Computers are pretty new, but people have been doing math since before the time of Soh-Crates. In fact, “computer” used to refer to someone who computed. It was an occupation. People even invented tools such as the abacus, which made computing easy and in the 1800s, Charles Babbage built a machine made out of gears for the purpose of calculating astronomical tables. (Humans make far too many errors.) These tools for calculation grew more and more complex, until there were systems of gears used to calculate ballistic trajectories and even a network of pipes is the USSR which used water pressure to solve integrals.

So are modern computers are just the logical progression of this technology? Like hyper-advanced abacuses? Nope. These machines all used specific mechanical processes to solve a specific kind of problem. They showed the use for powerful computing devices, but such machines were the uncle, rather than the grandfather of modern computers. Our modern machines, which can solve a wide array of problems (including the calculation of a cartoon bird’s trajectory in real-time) descend from theoretical, rather than practical, considerations.

Consider the following:

“This sentence is false.” Is the previous sentence true?

If you try to answer this question, you run into a paradox. No biggy though. English is a pretty messy language. It’s the realm of poetry, not math. Well, some pretty clever guys figured out how to ask similar questions using math, causing a whole lot of philosophical angst.

This type of problem particularly bugged an influential German dude named David Hilbert, so Hilbert said to his fellow math buddies “Hey, let’s fix these holes in math and stop the angst!” In particular, Hilbert wanted a well-defined system where all true things could be proven true, and he wanted a way to prove them as such.

Unfortunately for poor Hilbert, a guy named Gödel proved that you can’t get rid of these problems in all of math. And after Gödel opened the door, another guy came in and finished off Hilbert’s grand idea. This guy’s name was Alan Turing.

Basically, Hilbert had this really clever way to find the answer to anything by simply starting with the basic rules of math and coming up with conclusions. If you find the answer to the question, then you can stop. If the answer doesn’t exist, then you just keep on coming up with conclusions. So all Hilbert needed to figure out the answer to any mathematical question was some way to figure out if his algorithm stopped our went on forever. This was called the halting problem, and this was what Turing tried to solve.

Long story short, Turing showed that you can’t do that. You can’t cheat and solve every problem without knowing how you got there. In order to show this, he had to design a theoretical device which can calculate any calculable problem. So he imagined a device moving along a series of symbols, erasing those symbols, and printing 1 or 0. By analyzing such theoretical machines, Turing showed that not everything was calculable. As such, we now know that it isn’t possible to, as Hilbert had hoped, learn everything without actually having to figure anything out.

Wow, this Turing guy was such a downer. Well, at least his theoretical machine is pretty interesting. I mean, who would have ever thought of something so wacky except him? An editable series of 1’s and 0’s which can be used for any calculation?   
 Oh.  
 Oh my.

Before too long, people were ditching their limited gears and pipes, and exploring the kinds of devices imagined by Turing. They shrank down the components needed to implement the device, they printed the 1s and 0s in microscopic form and used lasers to read them. And before too long, they began to use them while pooping. And in this way, Alan Turing saved us all.