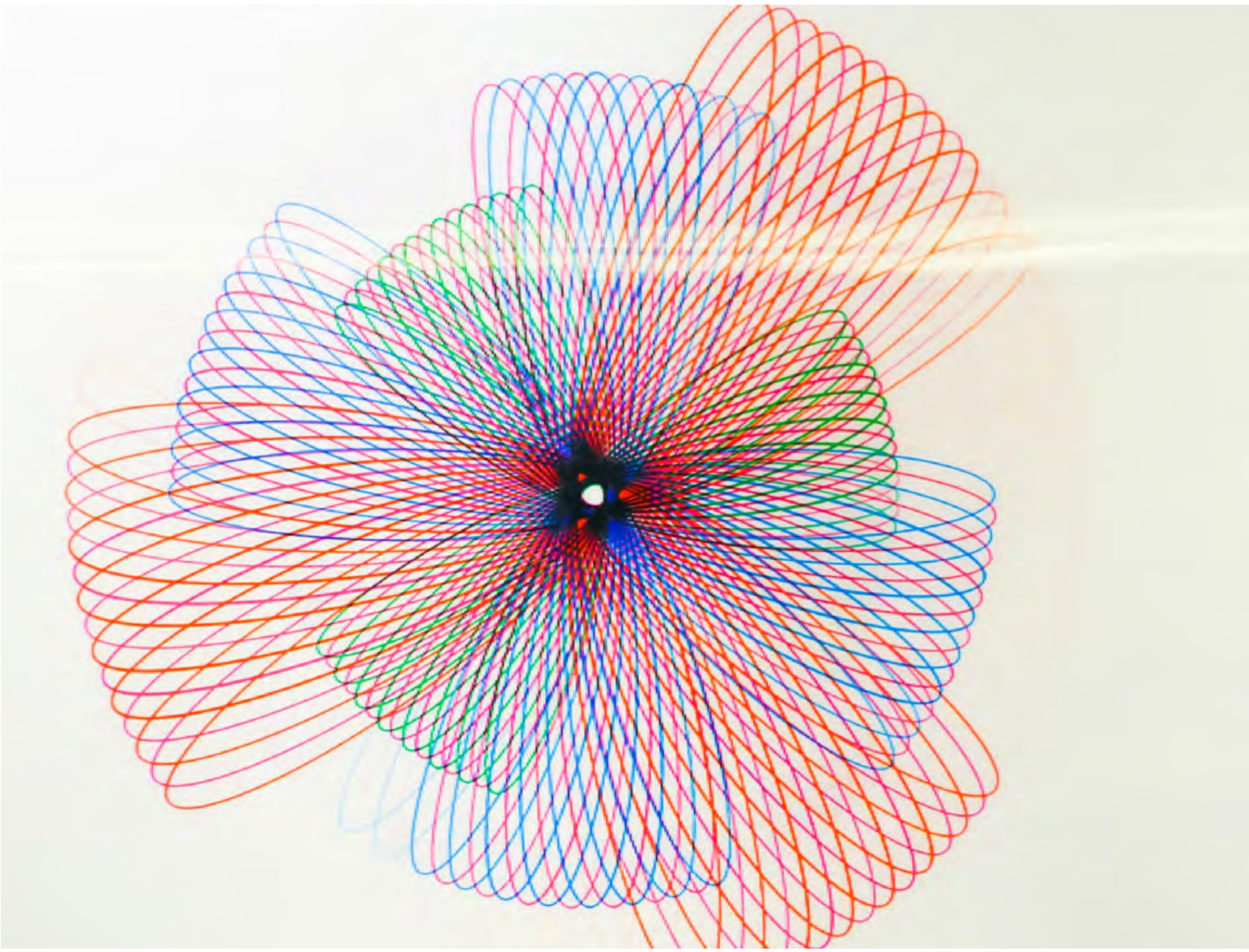

What Bits Want

Digital bits have lives. They work for us, but we totally ignore them. What do bits really want? Here are the life stories of four different bits.

(A)

The first bit—let's call it Bit A—was born on the sensor of a Cannon 5D Mark II camera. A ray of light glancing off a black plastic handle of baby stroller in New York City enters the glass lens of the camera and is focused onto a small sheet the size of a large postage stamp. This dull rainbow-colored surface is divided up into 21 million rectangular dimples. The light photons from the white highlight of stroller handle pass through a mosaic of red, green and blue filters in the camera, and collect in the micro-well of red pixel #6,724,573. Outside, when the photographer trips the shutter button, red pixel #6,724,573 counts the number of photons it has collected, compares it to its green and blue neighbors, and calculates the color it has captured. Pixel #6,724,573 generates 15 new bits, including our Bit A, which helps indicate the pixel is pure white. Immediately Bit A is sent along a wire to the camera's chip where it is processed along with 300 million sibling bits, all born at the same moment. Bit A is copied several times as the camera swaps the siblings around from one part of its circuit to another in order to rearrange the bits into what we call a picture, which the camera displays on a screen. In another few milliseconds a copy of Bit A is duplicated on a memory card. Now there are two Bit As, but within a moment the original is erased as another image is captured on the sensor. An hour later, Bit A is duplicated from the memory card into the CPU of the photographer's laptop. A half second later, half of the sibling bits are simply erased as the computer compresses the image into a jpeg file. Luckily Bit A, of pure white, remains in the set. Another copy of it is made on the laptop's hard disk and another copy is made as the software Photoshop is opened. When the photographer retouches a speck in the image, millions of pixel bits are constantly being reshuffled, copied, erased, and effectively moved as Photoshop creates new bits and erases existing ones. Through all this shuffling the tiny white glare on the stroller handle remains untouched and Bit A persists. The photographer is a veteran and Bit A is copied again by another CPU, and backed up on another hard disk. Bit A now has many identical cousins. The photographer uploads Bit A together with its million sibling bits to the internet. Bit A is copied, deleted, and recopied by 9 intermediate servers along the way to a website. There Bit A is copied onto more local hard disks, one of which serves the bit to anyone clicking on a web thumbnail image. When people do click, Bit A is copied to their computer's CPU, displayed on their screen as a speck of white. When humans see the full image, millions of them copy it to disks, and sent yet more copies to their friends. Within days, Bit A has been copied several hundred million times. There are now half a billion copies of Bit A contained as a tiny detail of the first paparazzi photo of Kim Kardashian taking her newborn baby girl out on a stroll. Bit A will likely remain in circulation for many decades, being copied forward onto new media as old medium die, active on at least one CPU in the world, ready to be linked. It will live for centuries. For a bit, this is success.

(B)

Bit B has a different story. Bit B is born inside the EDR (event data recorder) chip mounted beneath the dashboard of the photographer's Toyota Camry. Every automobile manufactured since 2012 contains a EDR which serves as the car's blackbox, recording 15 different metrics such as the car's speed, steering, braking, seat belt use and engine performance. Originally designed to be plugged into a service mechanic's on-board diagnostic computer to determine whether the airbags were working, the data it generates while the car is running can also be summoned by insurance companies and lawyers as evidence in an accident. In this case Bit B makes up part of the digit "7" in a time stamp that says that on Tuesday July 8, 2014, our Camry was going 57 miles per hour. The EDR holds the last 5 seconds of information. After that time it overwrites the existing bits with new information. The Camry was accident-free and didn't need maintenance, so Bit B was copied once and stored. Increasingly, it is cheaper to store data than to figure out whether it should be erased, so almost no data is erased deliberately. But many bits disappear when their medium rots or is tossed into the garbage. Most bits die of inactivity. Bit B will spend decades untouched, unlit, before it is lost forever.

(C)

The third bit is of a different type. Bit C was not generated in the environment. It was not born in a camera, or on the keyboard, or swipe of a phone, or in a wearable sensor, or by a thermometer, traffic pad, or any other kind of input device. Bit C was born from other bits. Bit C is the type of bit created by a software program in response to Bit A or Bit B. Think of the internal bookkeeping your computer does as it keeps track of everything a program does. The photographer using Photoshop can "undo" a change to color (or you can undo a deletion to your Word document) because the computer keeps a log, and that log is new bits about the bits. Our Bit C is generated by the telephone company's servers as it uploads the photographer's image files. It is the third digit in the log of the memory allotment for that upload. Bit C is copied to a telecom hard disk, and this meta-data (data about data, or bits about bits) will be retained by the telecom long after the actual content vanished. Beyond meta-data there is meta-meta-data; information about meta-data. The meta chain can cascade up infinitely, and the amount of meta-data in the world is increasing at a faster rate than the primary data. For a bit to be born meta is a huge thing, because meta-data is more likely to be exercised, duplicated, shared and linked. Bit C will be copied and recopied, so that eventually hundreds of copies of Bit C live on.

(D)

However, nothing is as exciting for a bit as to become part of a software program. In code, a bit graduates from being a static number to being an active agent. When you are a bit that is part of a program, you act upon other bits. If you are really lucky you might be part of a code that is so essential that it is maintained as a core function and preserved in the digital universe over many generations. Most sophisticated programs are dead and gone in 5 years, but some primeval code, say like the code that governs internet protocols, or runs the basic sorting algorithms for the files on your PC OS. The story of Bit D, our fourth bit, revolves around the small string of code that produces ASCII—the letters and numbers we see on a screen. This has not changed for many decades. Bit D lives as the part of the code that generates the English letter “e”. It is invoked nearly every hour by me, and billions of times per second around the world. It might be among the most commonly reproduced bits in the digital universe. There are probably zillions of Bit Ds in the digital universe today. And in 100 years from now, there is likely to still be ASCII and the letter e, and a bazillion more Bit Ds. For a bit, it is immortal.

The best destiny for a bit is to be deeply related to other bits, to be copied and shared. The worst life for a bit is to remain naked and alone. A bit uncopied, unshared, unlinked with other bits will be a short-lived bit. If an unshared bit lives long, its future will be parked in a dark eternal vault. What bits really want is to be clothed with other related bits, replicated widely, and maybe elevated to become a meta-bit, or an action bit in a piece of durable code.

Bits want to move.

Bits want to be linked to other bits. They need other bits.

Bits want real time.

Bits want to be duplicated, replicated, copied.

Bits want to be meta.

Of course this is pure anthropomorphization. Bits don't have wills. But they do have tendencies. Bits that are related to other bits will tend to be copied more often. Just as selfish genes tend to replicate, bits do too. And just as genes "want" to code for bodies that help them replicate, selfish bits also want systems that help them replicate and spread. All things being equal, bits want to reproduce, move and be shared. If you rely on bits for anything, this is good to know.

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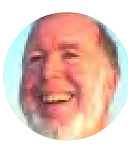

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