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Remembering After the Deluge

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If you wish to confirm your ugliest suspicions about the comparative advantages of an Ivy League education, I would urge you to search out a certain two-decades-old video on YouTube titled "Harvard Graduates Explain Seasons." It features a collection of recent graduates of America's most prestigious institution of higher learning, freshly attired in black gowns and mortarboards, who have been asked by an off-camera interlocutor to explain why we experience winter, spring, summer, and fall.

"The earth goes round the sun," asserts one newly minted bachelor of the arts, "and it gets hotter when we get closer to the sun, and colder when it gets farther away." The camera lingers for a moment so that we can appreciate his misplaced self-confidence, and then the video carries on with a depressing number of his fellow classmates offering some version of this same incorrect reason for the seasons.

How are we to account for the fact that these recipients of the very best education our society has to offer seem not to know such a fundamental fact? Of course it goes without saying that not all Harvard graduates are equally uninformed, and that this video is by no means a representative sampling. The stupidest responses have been cherry picked by an editor with an ungenerous agenda. But we know from broader surveys of American students that a shocking number are incapable of recounting even the most basic scraps of knowledge that one would hope they'd have picked up at some point along the way. According to one recent survey, roughly two-thirds of American 17-year-olds can't tell you within half a century when the American Civil War occurred. One in five don't know whom the U.S. fought in World War II. And nearly half think that the subject of the *Scarlet Letter* was either a witch trial or a piece of correspondence.

Are we to believe that in 17-odd years of education, the Harvard graduates polled in this video were never taught the causes of the seasons? Or that two thirds of American high school students never learnt when the Civil War occurred? I find that simply impossible to believe. At some point, probably in grade school, a teacher surely explained that the earth rotates about an axis that is tilted relative to its plane of orbit, and that the Civil War took place during the 1860s. I would wager that these are not failures of learning,

but failures of memory. That is to say, this is knowledge that was once imparted, once read, once taught—and later forgotten.

I want to call your attention to this video and to these statistics not to mock the undereducated students at Harvard, nor to lament the historic illiteracy of Americans. Rather, I think they point us to some much bigger questions about knowledge and our culture's profoundly strange relationship to it.

Why do I say profoundly strange?

I'd like to ask you to engage in a brief introspective experiment. I'd like you to think back to the courses you took in your freshman year of college—for which you or your parents (or your government) probably paid quite dearly. How much of the raw knowledge imparted to you in those courses do you still remember today? Do you want your money back? Or take a moment to ponder a book you read in the last year. What parts of it do you still remember today? How much of it will you remember a year from now? A decade from now?

If the point of reading were simply to retain knowledge, it would probably be the single least efficient activity many of us engage in. I, for one, can spend a half dozen hours reading a book and then put it down having only the foggiest notion of what it was about. All those facts and anecdotes, even the stuff interesting enough to be worth underlining, have a habit of briefly making an impression on me and then disappearing into who-knows-where. I don't think I'm an exceptionally bad reader. I suspect that many people, maybe even most, are like me. We read and read and read, and we forget and forget and forget.

We are living amid an epidemic of amnesia. Inundated with information, we have become like sieves capturing only the smallest nuggets, while most of what we encounter washes right over us. We spend the better part of our formative years in schools having information crammed into our skulls, and yet an astonishingly small amount of it actually sticks around into adulthood. What is profoundly strange is that we all know this to be the case, and yet we don't seem to find it particularly weird, or even scandalous.

Of course, we read for many reasons beyond simply stocking our mental storehouses with information. We read for the pleasure of a story well told and a phrase well turned, and perhaps out of some hazy hope that the lens through which we view the world will somehow be slightly altered by the experience. Likewise, our schools serve many purposes, from socialization to fostering reasoning skills to cultivating virtues. But surely one of their most important functions is to imbue the next generation with the culture's collective knowledge. At this, they do a demonstrably terrible job. And we all know it—not just from statistics, but from our own experiences. And yet

we keep on putting our kids through the same schools, we keep on voraciously consuming books and newspapers and magazines and web sites—and we keep on forgetting what we learn. If, as the 12th-century educator Hugh of St. Victor put it, "The whole usefulness of education consists only in the memory of it," then is it possible our whole orientation to the acquisition knowledge is profoundly, radically wrong?

Chronic, pervasive forgetfulness is a fundamental feature of our culture—one so deeply ingrained that we take it as a given. But this was not always the case. Once upon a time, there was nothing to do with thoughts except remember them. There was no alphabet to transcribe them in, no paper to set them down upon. Anything that had to be preserved had to be preserved in memory. Any story that was going to be retold, any idea that was going to be transmitted, any piece of information that was going to be conveyed, first had to be remembered.

Today we have photographs to store images, books to store knowledge, and now, thanks to the Internet, we rarely have to remember anything more than the right set of search terms to access mankind's collective memory. We've supplanted our own natural memory with a vast superstructure of technological crutches that have relieved us of the burden of storing information in our brains. These technologies for externalizing our memories and storing our knowledge outside of ourselves have helped make our modern world possible, but they've also changed how we think and how we use our brains. We've devalued our internal memories. Having little need to remember anymore, it sometimes seems as though we've forgotten how. It's worth dwelling for a moment on how this situation came to be. How did we come to save our memories but lose our memory?

Living as we do amid a deluge of printed words—would you believe that over a million new titles were printed last year?—it's hard to imagine what it must have been like to read in the age before Gutenberg, when a book was a rare and costly handwritten object that could take a scribe months of labor to produce. Today we write things down precisely so we don't have to remember them, but through the late Middle Ages, books were thought of not merely as replacements for memory, but also as *aides-mémoire*. Even as late as the fifteenth century, there might be just several dozen copies of any given text in existence, and those copies were quite probably chained to a desk or lectern in some library, which, if it contained a hundred other books, would have been considered particularly well stocked. If you were a scholar reading a book, you knew that there was a reasonable likelihood you'd never see that particular text again, and so a high premium

was placed on remembering what you read. One ruminated on texts—chewed them up and regurgitated them like cud—and in the process, became intimate with them in a way that made them one's own. As Petrarch put it in a letter to a friend, "I ate in the morning what I would digest in the evening; I swallowed as a boy what I would ruminate upon as an older man. I have thoroughly absorbed these writings, implanting them not only in my memory but in my marrow."

When the point of reading is remembering, you approach a text very differently than most of us do today. Now we put a premium on reading quickly and widely, and that breeds a kind of superficiality in our reading, and in what we seek to get out of books. You can't read a page a minute, the rate at which most of us read today, and expect to remember what you've read for any considerable length of time. If something is going to be made memorable, it has to be dwelled upon, repeated, made one's own.

In his essay "The First Steps Toward a History of Reading," Robert Darnton describes a switch from "intensive" to "extensive" reading that occurred as printed books began to proliferate. Until relatively recently, people read "intensively," says Darnton. "They had only a few books—the Bible, an almanac, a devotional work or two—and they read them over and over again, usually aloud and in groups, so that a narrow range of traditional literature became deeply impressed on their consciousness."

With the introduction of the printing press around 1440, things began gradually to change. In the first century after Gutenberg, the number of books in existence increased fourteen-fold. It became possible, for the first time, for people without great wealth to have a small library at their disposal, and a trove of easily consulted external memories close at hand.

The accompanying explosion of knowledge pushed the boundaries of human understanding in new directions, vastly expanding the envelope of what one needed to know in order to be a well-rounded generalist. By the seventeenth century, the polymath, or "renaissance man," had already become a rarified commodity. And by the turn of the eighteenth century, you find a man like Athanasius Kircher, the Jesuit scholar who had his fingers in just about every interesting intellectual subject of his time—authoring books on subjects as diverse as China and vulcanology—described as the "last man to know everything."

Today, we read books "extensively," without much in the way of sustained focus, and, with rare exceptions, we read each book only once. We value quantity of reading over quality of reading. We have no choice, if we want to keep up with the broader culture. Even in the most highly specialized fields, it can be a Sisyphean task to try to stay on top of the ever-

growing mountain of words loosed upon the world each day. Which means it's virtually impossible to make any serious effort to meaningfully commit what we read to memory. We simply do not have the luxury to tattoo ideas onto our souls in the way that Petrarch did. Looking up at my shelves, at the books that have drained so many of my waking hours, is always a dispiriting experience. There are books on my shelf that I can't even remember whether I've read or not.

In our schools, we likewise privilege breadth over depth in learning, with devastating consequences for long-term retention. One of the best demonstrated principles of memory—proven both in the controlled setting of the laboratory and in studies conducted in the wilds of the the classroom—is the value of what's known as "spaced learning." Cognitive scientists have found that the best way to secure memories for the long term is to impart them in repeated sessions spaced out across time, with other material interleaved in between. If you want to make information stick, it's best to learn it, go away from it for a while, come back to it later, leave it behind again, and once again return to it. The effect on retention of learning in this manner is staggering. One recent study found that you can get just as good long-term retention from having learning sessions spaced out every two months as having twice as many learning sessions spaced every two weeks. And yet, our entire system for teaching is set up in a manner completely antithetical to this well-established principle of cognitive science. Rather than revisiting material at regular intervals to reinforce it, curricula are structured in blocks. Even though we know that the secure transfer of knowledge requires an ongoing relationship with the material that one wishes to master, we tend to learn material in one-off bursts. Typically, a single subject will be taught in a relatively short amount of time, like a three-month semester. Students are asked to cram for a final exam, which supposedly tests their retention of that information, and then the very next day, they are allowed to completely forget everything they have just learned. Rarely, if ever, is there any followup at a later date to see if students still remember what they were taught. Everything we know about how memory works suggests this is a terrible way of going about learning. Our binge and purge mentality is a recipe for forgetfulness.

In contemporary pedagogy, memorization has become almost a four-letter word. The only activity more antithetical to the ideals of modern education is probably corporal punishment. The gradual devaluing of classroom memory had its philosophical roots in Jean Jacques Rousseau's polemical 1762 novel, *Emile: Or, On Education*, in which the Swiss philosopher imagined a fictional child raised by means of a "natural education," learning

only through self-experience. Rousseau abhorred memorization, as well as just about every other stricture of institutional education. “Reading is the great plague of childhood,” he wrote. The traditional curriculum, he believed, was little more than fatuous “heraldry, geography, chronology and language.”

The educational ideology that Rousseau was rebelling against truly was mind-numbing, and much in need of a correction. More than a hundred years after *Emile*’s publication, when the muckraker Dr. Joseph Mayer Rice toured public schools in 36 cities, he came away appalled at what he saw, calling one New York City school, “the most dehumanizing institution that I have ever laid eyes upon, each child being treated as if he possessed a memory and the faculty of speech, but no individuality, no sensibility, no soul.” At the turn of the twentieth century, rote memorization was still the preferred way to put information, especially history and geography, into kids’ heads. Students could be expected to memorize poetry, great speeches, historical dates, times tables, Latin vocabulary, state capitals, the order of American presidents, and much else.

Memorization drills weren’t just about transferring information from teacher to student, they were actually thought to have a constructive effect on kids’ brains that would benefit them throughout their lives. Rote drills, it was thought, built up the faculty of memory. The *what* that was memorized mattered, but so too did the mere fact the memory was being exercised. The same was thought to be true of Latin, which, at the turn of the twentieth century, was taught to nearly one in two American high school students. Educators were convinced that learning the extinct language, with its countless grammatical niceties and difficult conjugations, trained the brain in logical thinking and helped build “mental discipline.” Tedium was actually seen as a virtue. And the teachers were backed up by a popular scientific theory known as “faculty psychology,” which held that the mind consisted of a handful of specific mental “faculties” that could each individually be trained, like muscles, through rigorous exercise.

Towards the end of the 19th century, a group of leading psychologists led by William James and Edward Thorndike began to question the empirical basis of “faculty psychology.” They concluded that the ancillary benefits of “mental discipline” were “mythological” and that general skills, like memorization, were not nearly as transferable as had once been thought. “Pedagogues quickly realized that [their] experiments had undermined the rationale for the traditional curriculum,” writes the historian of education Diane Ravitch.

Into this void rushed a group of progressive educators led by the American philosopher John Dewey, who began making the case for a new kind of education that would radically break with the constricted curriculum and methods of the past. They echoed Rousseau's romantic ideals of childhood, and put a new emphasis on "child centered" education. They did away with rote memorization and replaced it with a new kind of "experiential learning." Students would study biology not by memorizing plant anatomy from a textbook but by planting seeds and tending gardens. They'd learn arithmetic not through times tables but through baking recipes. Dewey declared, "I would have a child say not, 'I know,' but 'I have experienced.'"
The last century has been an especially bad one for memory. A hundred years of progressive education reform have discredited memorization as oppressive and stultifying—not only a waste of time, but positively harmful to the developing brain. Schools have deemphasized raw knowledge (most of which gets forgotten anyway), and instead stressed their role in fostering reasoning ability, creativity, and independent thinking.
But is it possible we've been making a huge mistake? The influential critic E.D. Hirsch complained in 1987: "We cannot assume that young people today know things that were known in the past by almost every literate person in the culture." Hirsch has argued that students are being sent out into the world without a basic level of cultural literacy that is necessary to be good citizens, and what's needed is a kind of educational counter-reformation that reemphasizes hard facts. Hirsch's critics—his first book *Cultural Literacy: What Every American Needs to Know* sparked a firestorm that was so far reaching it even made him into the butt of a Saturday Night Live sketch—have pointed out that the curriculum he advocates is Dead White Males 101. That criticism is both overstated and fundamentally misses the point. The fact is that facts still matter. If one of the goals of education is to create curious, knowledgeable people, then you need to give students the most basic signposts that can guide them through a life of learning.

Perhaps, we are entering a new age in which internal knowledge—possessing a cultivated, well-furnished mind—simply no longer matters in the way in way it once did. A study published earlier this year in the journal *Science* provoked much hand wringing on the other side of the Atlantic from a growing segment of the punditocracy that bemoans the negative effects that the Internet is having on how we think. A clever set of experiments conducted by researchers at Columbia University demonstrated that when we learn a piece of information and simultaneously know that it is being

held in storage elsewhere on a computer, our relationship to that piece of information changes. Knowing that there is a backstop to remember the information for us, we invest less in the act of remembering it ourselves. We become more forgetful. "Is Google making us dumb?" asked one television reporter. "Is Google ruining our memories?" asked another. And should we care if it is?

Those questions are much older than Google. We've been using technology to externalize our memories ever since the first human smeared paint on the inside of a cave wall. And people have been worrying about the effects of that externalization for nearly as long. Two and a half millennia ago, according to the *Phaedrus*, Socrates was concerned about the effects of a new technology called writing would have on the human mind. Socrates fretted that once people began taking their thoughts out of their minds and putting them down on papyrus, they would become like empty vessels. People would imagine an equivalence between knowledge stored externally and knowledge stored internally, and think themselves intelligent. The culture, as he saw it, was headed down a treacherous path towards forgetfulness. Fortunately, someone had the good sense to write down Socrates' disdain for the written word, otherwise we'd have no record of it today. (Thank you very much, Plato.)

We've come a long way from worrying about writing to worrying about Google, and from our present vantage point, I think we'd all agree that Socrates was overstating the case. Having lived with the technology of writing for two and half millennia, we're more inclined to see its benefits than its pitfalls. However, I think we can also recognize something of contemporary relevance in what Socrates was fretting about.

These days, when there is some piece of information we don't know, a question that needs to be answered, we pull out our smart phones and look it up. We have the entire collective knowledge of human civilization—a sizable portion of it, at least—just a few thumb taps away. Even if I don't know the overwhelming majority of all the information stored in Google, the fact that I *can* know it is extraordinary powerful.

In terms of an interface between our internal and external memories, a smart phone is still rather clunky. We still have to use our fingers to enter our question into a machine, and wait for the machine to download the answer. The whole process takes a couple seconds. Sometimes, we have to scroll through several possible search results to find what we're looking for. And then, of course, we have to input that information back into our minds by way of our eyes. The distance between our internal memories and our

external memories is still rather substantial. But it is shrinking, seemingly by the day.

What are our phones, our books, our photographs, and our libraries if not a vast mnemonic scaffolding, to use a phrase coined by the philosopher Andy Clark, to support and supplements the memories in our brain We even function as scaffolding for each other. Subtly, and often unconsciously, we offload responsibility for certain memories not just to devices, but to the people we are closest to. There are memories I know I don't have to keep in my head, like the birthdays of family members, because they're in my wife's head, and likewise there are things that she knows she doesn't need to know because they're in my head, like where we store old tax returns. Those are semantic memories, but what's even more dramatic is the extent to which our episodic memories will become increasingly intertwined and co-dependent as we age. Over the years, as couples rehash their lives together, their independent memories of events begin to merge. Two remembrances get rewritten as one. I think of my own wedding, and the respective stories my wife and I tell about it: the details that belong to her, and the details that are mine. I imagine that someday, when death inevitably does us part, the pain of one of us losing the other will be compounded by the realization of just how much we knew only through each other.

As westerners, we tend to think of the "self," the ineffable essence of who we are, as if it were some starkly delimited entity. Even if modern cognitive neuroscience has rejected the old Cartesian idea of a homuncular soul that resides in the pineal gland and controls the human body, the fact is that most of us still believe there is a distinct "me" somewhere up there driving the bus. In fact, what we think of as "me" is almost certainly something far more diffuse and far hazier than it's comfortable to contemplate. At the very least, most people assume that their self could not possibly extend beyond the boundaries of their epidermis into books, computers, and other people. But why should that necessarily be the case?

We are living through a momentous technological transformation that is bringing that fact clearly into focus—and which is poised to profoundly change what it means to be human. Increasingly, the distance between our internal memories and the memories stored outside of ourselves is shrinking, and the interface between the two is rapidly approaching seamlessness. More and more, we are using devices as lenses through which to process the world and mediate our experience of reality. The next stage in this technological progression is augmented reality, a technology that is showing up in a growing number of mobile devices, and which many believe is poised to transform computers from things we hold into things that we wear. iPhone

5.0 may be a device you interact with using your fingers, but iPhone 20.0 is going to be something you experience like a pair of glasses, and iPhone 50.0 may very well be channeled straight into your cortex. Rather than having to communicate indirectly with our external memories, they will increasingly be integral to how we perceive and process the world, automatically augmenting our thoughts and perceptions with a vast layer of information and processing power.

This cyborg future is, indeed, the stated vision of Google's founders. Larry Page has said that he looks forward to the day when his product will be channeled straight into people's brains. "When you think about something and don't really know much about it, you will automatically get information," he says. "Eventually you'll have the implant, where if you think about a fact, it will just tell you the answer." His partner Sergi Brin adds that, "Ultimately I view Google as a way to augment your brain with the knowledge of the world."

This may sound like distant science fiction, but already cochlear implants exist that can convert sound waves directly into electrical impulses and channel them into the brain stem, allowing previously deaf people to hear. In fact, they've already been installed in more than 100,000 human brains. And primitive cognitive implants that create a direct interface between the brain and computers have already allowed parapalegics and patients with ALS (Lou Gehrig's disease) who have lost control of their muscles to control a computer cursor, a prosthetic limb, even a digital voice simply through the force of thought. These neuroprosthetics, which are still highly experimental and have been implanted in only a handful of patients, essentially wiretap the brain, and allow direct communication between man and machine. The next step is a brain-computer interface that allows the mind to exchange data directly with a digital memory bank, a project that a few cutting-edge researchers are already working on, and which is bound to become a major area of research in the decades ahead. From there, it's only a matter of time before we have the entire Internet, every book ever published, and perhaps the digital memories of everyone else on earth piped directly into our cortices.

In a world in which we are plugged in directly to the Internet and every fact that is known—or has ever been known—is immediately accessible, and every question is answered as soon as it is asked, how will that change how we think about knowledge? About education? About wisdom?

As the distance between our internal and external memories disappears, so too, I suspect, will the imperative to remember. Why bother imbuing students with knowledge when all information is a mere click—or a mere

thought—away? It is easy to imagine the wonderful benefits of this new relationship with technology, but the costs will be harder to calculate. I suspect that part of the reason that the recent research on Google's effect on our memories provoked so much conversation and anxiety is that it was one of the first studies to really attempt to quantify—albeit in a very limited way—some of those harder-to-identify negative consequences.

How we perceive the world and how we act in it are products of how and what we remember. We're all just a bundle of habits shaped by our memories. And to the extent that we control our lives, we do so by gradually altering those habits, which is to say the networks of our memory. No lasting joke, invention, insight, or work of art was ever produced by Google or the Internet. Not yet, at least. Our ability to find humor in the world, to make connections between previously unconnected notions, to create new ideas, to share in a common culture: All these essentially human acts still depend on a human mind. And though the magical, alchemical process that transforms a three-pound mass of neurons into a machine for creativity and insights is something we may never understand, we do know that these processes require raw material to work with. They require memory. Someday in the cyborg future that Larry Page and Sergi Brin prevision, when our internal and external memories fully merge, we may come to possess infinite knowledge. But that's not the same thing as wisdom.