The Deep Space of Digital Reading

Why we shouldn’t worry about leaving print behind.

Paul La Farge By Paul La Farge Illustration by Irene Rinaldi January 7, 2016

In A History of Reading, the Canadian novelist and essayist Alberto Manguel describes a remarkable transformation of human consciousness, which took place around the 10th century A.D.: the advent of silent reading. Human beings have been reading for thousands of years, but in antiquity, the normal thing was to read aloud. When Augustine (the future St. Augustine) went to see his teacher, Ambrose, in Milan, in 384 A.D., he was stunned to see him looking at a book and not saying anything. With the advent of silent reading, Manguel writes,

... the reader was at last able to establish an unrestricted relationship with the book and the words. The words no longer needed to occupy the time required to pronounce them. They could exist in interior space, rushing on or barely begun, fully deciphered or only half-said, while the reader’s thoughts inspected them at leisure, drawing new notions from them, allowing comparisons from memory or from other books left open for simultaneous perusal.

To read silently is to free your mind to reflect, to remember, to question and compare. The cognitive scientist Maryanne Wolf calls this freedom “the secret gift of time to think”: When the reading brain becomes able to process written symbols automatically, the thinking brain, the I, has time to go beyond those symbols, to develop itself and the culture in which it lives.
16th-CENTURY INTERNET: The “book wheel,” invented in 1588, was a rotating reading desk that allowed readers to flit among texts by giving the wheel a quick spin. Wikipedia

A thousand years later, critics fear that digital technology has put this gift in peril. The Internet’s flood of information, together with the distractions of social media, threaten to overwhelm the interior space of reading, stranding us in what the journalist Nicholas Carr has called “the shallows,” a frenzied flitting from one fact to the next. In Carr’s view, the “endless, mesmerizing buzz” of the Internet imperils our very being: “One of the greatest dangers we face,” he writes, “as we automate the work of our minds, as we cede control over the flow of our thoughts and memories to a powerful electronic system, is ... a slow erosion of our humanness and our humanity.”

There’s no question that digital technology presents challenges to the reading brain, but, seen from a historical perspective, these look like differences of degree, rather than of kind. To the extent that digital reading represents something new, its potential cuts both ways. Done badly (which is to say, done cynically), the Internet reduces us to mindless clickers, racing numbly to the bottom of a bottomless feed; but
done well, it has the potential to expand and augment the very contemplative space that we have prized in ourselves ever since we learned to read without moving our lips.

Critics like to say the Internet causes our minds to wander off, but we’ve been wandering off all along.

The fear of technology is not new. In the fifth century B.C., Socrates worried that writing would weaken human memory, and stifle judgment. In fact, as Wolf notes in her 2007 book *Proust and the Squid: The Story and Science of the Reading Brain*, the opposite happened: Faced with the written page, the reader’s brain develops new capacities. The visual cortex forms networks of cells that are capable of recognizing letterforms almost instantaneously; increasingly efficient pathways connect these networks to the phonological and semantic areas of the cortex, freeing up other parts of the brain to put the words we read into sentences, stories, views of the world. We may not keep the *Iliad* in our heads any longer, but we’re exquisitely capable of reflecting on it, comparing it to other stories we know, and forming conclusions about human beings ancient and modern.

The Internet may cause our minds to wander off, and yet a quick look at the history of books suggests that we have been wandering off all along. When we read, the eye does not progress steadily along the line of text; it alternates between saccades—little jumps—and brief stops, not unlike the movement of the mouse’s cursor across a screen of hypertext. From the invention of papyrus around 3000 B.C., until about 300 A.D., most written documents were scrolls, which had to be rolled up by one hand as they were unrolled by the other: a truly linear presentation. Since then, though, most reading has involved codices, bound books or pamphlets, a major advantage of which (at least compared to the scroll) is that you can jump around in them, from chapter to chapter (the table of contents had been around since roughly the first century B.C.); from text to marginal gloss, and, later, to footnote.

In the age of print, nonlinear reading found its most elaborate support in the “book wheel,” invented by the Italian engineer Agostino Ramelli in 1588: a “rotary reading desk” which allowed the reader to keep a great number of books at once, and to switch between them by giving the wheel a turn. The book wheel was—unfortunately!—a rarity in European libraries, but when you think about all the kinds of reading that print affords, the experience of starting a text at its beginning and reading all the way to the end, which we now associate with “deep” reading, looks less characteristic of print in general than of the novel in particular: the one kind of book in which, we feel, we might be depriving ourselves of something vital if we skipped or skimmed.
The quality of digital media poses one kind of problem for the reading brain; the quantity of information available to the wired reader poses a different and more serious problem. But it’s worth noting that readers have faced this problem before, too. Gutenberg printed his first Bible in 1455, and by 1500, some 27,000 titles had been published in Europe, in a total of around 10 million copies. The flood of printed matter created a reading public, and changed the way that people read.
The German historian Rolf Engelsing argues that a “reading revolution” took place at the end of the 18th century: Before that point, the typical European reader had only a few books—the Bible, an almanac, maybe a work of devotional literature—and he read them over and over, so that they were deeply impressed on his consciousness. Afterward, Europeans read all kinds of material—novels, periodicals, newspapers—and they read each item only once before racing on to the next. Contemporary critics were doubtless appalled, but on the other hand, from that flood of printed matter, we got the Enlightenment, Romanticism, the American and French revolutions.

It’s true that studies have found that readers given text on a screen do worse on recall and comprehension tests than readers given the same text on paper. But a 2011 study by the cognitive scientists Rakefet Ackerman and Morris Goldsmith suggests that this may be a function less of the intrinsic nature of digital devices than of the expectations that readers bring to them. Ackerman and Goldsmith note that readers perceive paper as being better suited for “effortful learning,” whereas the screen is perceived as being suited for “fast and shallow reading of short texts such as news, e-mails, and forum notes.” They tested the hypothesis that our reading habits follow from this perception, and found it to be correct: Students asked to read a text on-screen thought they could do it faster than students asked to read the same text in print, and did a worse job of pacing themselves in a timed study period. Not surprisingly, the on-screen readers then scored worse on a reading comprehension test.

If those same students expected on-screen reading to be as slow (and as effortful) as paper reading, would their comprehension of digital text improve? A 2015 study by the German educator Johannes Naumann suggests as much. Naumann gave a group of high-school students the job of tracking down certain pieces of information on websites; he found that the students who regularly did research online—in other words, the ones who expected Web pages to yield up useful facts—were better at this task (and at ignoring irrelevant information) than students who used the Internet mostly to send email, chat, and blog.

Meanwhile, some writers are taking advantage of the formal possibilities of digital media to tell stories and communicate information in new ways. One of these new forms is what people in the 1990s called “hypertext”: text divided into units called “lexia,” which are connected by links, sometimes in a branching or tree-like structure, sometimes in webs or cats’-cradles or other tangled forms. (Technically, the Web is a hypertext, but the word often refers to single works with an internally linked structure.)
The impact of hypertext on the reading brain has, as you’d expect, received a fair amount of scientific attention. In 2005, the psychologists Diana DeStefano and Jo-Anne LeFevre reviewed 38 studies of hypertext reading; their expectation was that hypertext would be found to impose a greater cognitive load on the reader than linear text, because of the effort involved in scanning a page for links, and deciding which link, if any, to follow. DeStefano and LeFevre further hypothesized that this increased cognitive load would cause readers’ recall and comprehension to suffer. They concluded that this expectation was, generally speaking, correct, and Carr cited it in his 2011 book *The Shallows*, as evidence that the Internet is making us stupid.

In fact, though, DeStefano and LeFevre’s findings were equivocal. The cognitive load imposed by hypertext doesn’t correspond in a straightforward way to the number of choices presented at a decision point, or to the total number of links in a hypertext. (Indeed, a 1996 study by Michael Wenger and David Payne found that hypertext did not impose a greater cognitive load on readers than linear text, a result that DeStefano and LeFevre note in passing.) In two studies, hypertext seemed to improve comprehension. One involved readers with little prior knowledge of a subject, who were able to use a highly structured hypertext (one whose structure mirrored the organization of its subject matter) to learn more effectively than similar readers of linear text. In the other study, academically gifted readers learned better from unstructured hypertext than from linear text. The author, Amy Shapiro, hypothesized that these readers were obliged to engage more actively with the hypertext, in order to figure out the relation between its parts; this engagement led to increased understanding, the way puzzling over a difficult poem yields more than reading quickly through an easy one.

DeStefano and LeFevre also remark that “[f]ew of the studies that we reviewed considered affective factors such as engagement or enjoyment.” This may seem like a small point, but it’s not. In a 2008 study by the psychologists Tal Yarkoni, Nicole Speer, and Jeffrey Zacks, subjects were given two narratives to read, while their brain activity was monitored by a functional MRI scanner. One narrative was a fairly straightforward account of a day in a boy’s life; the other was the same account with the sentences scrambled. Here’s a bit of the latter:

Mrs. Birch called in a pleasant tone, “Raymond, take a bath and then you can go to bed.” Raymond noticed this immediately and asked curiously, “Am I four feet high?” He stood and went toward them in a slow, jogging run.

Based on the fMRI data, Yarkoni, Speer, and Zacks concluded that the scrambled
sentences forced the readers to keep remaking their “situation models,” their mental representations of what was happening in the story. Situation models guide reading comprehension and memory; without them, we get lost, which explains, in neuropsychological terms, why the scrambled sentences were harder to remember. And yet, when I read the two experimental texts, I found myself thinking about how much more interesting the scrambled one was, and how much more fun it was to read. Maybe I’m just the kind of person who likes building situation models, but I don’t think I’m alone in this. If there were no pleasure in reading things that don’t make sense, who would read the Surrealists? Who would giggle at bad subtitles, or Mad Libs?

Comprehension matters, but so does pleasure. In *Proust and the Squid*, Wolf, director of the Center for Reading and Language Research at Tufts University, observes that the brain’s limbic system, the seat of our emotions, comes into play as we learn to read fluently; our feelings of pleasure, disgust, horror and excitement guide our attention to the stories we can’t put down. Novelists have known this for a long time, and digital writers know it, too. It’s no coincidence that many of the best early digital narratives took the form of games, in which the reader traverses an imaginary world while solving puzzles, sometimes fiendishly difficult ones. Considered in terms of cognitive load, these texts are head-bangingly difficult; considered in terms of pleasure, they’re hard to beat.
SHAPE OF READING TO COME: Reading’s future is signaled by interactive novels like *Pry*, which, along with text, uses video clips to expose its protagonist’s memories. Samantha Gorman and Danny Cannizzaro

A new generation of digital writers is building on video games, incorporating their interactive features—and cognitive sparks—into novelistic narratives that embrace the
capabilities of our screens and tablets. Samantha Gorman and Danny Cannizzaro's 2014 iPad novella, *Pry*, tells the story of a demolitions expert returned home from the first Gulf War, whose past and present collide, as his vision fails. The story is told in text, photographs, video clips, and audio. It uses an interface that allows you to follow the action and shift between levels of awareness. As you read text on the screen, describing characters and plot, you draw your fingers apart and see a photograph of the protagonist, his eyes opening on the world. Pinch your fingers shut and you visit his troubled unconscious; words and images race by, as if you are inside his memory. *Pry* is the opposite of a shallow work; its whole play is between the surface and the depths of the human mind. Reading it is exhilarating.

There’s no question when you read (or play) *Pry* that you’re doing something your brain isn’t quite wired for. The interface creates a feeling of simultaneity, and also of having to make choices in real time, that no book could reproduce. It asks you to use your fingers to do more than just turn the page. It communicates the experience of slipping in and out of a story, in and out of a dream, or nightmare. It uses the affordances of your phone or tablet to do what literature is always trying to do: give you new things to think about, to expand the world behind your eyes. It’s stressful, at first. How are you supposed to know if you’re reading it right? What if you miss something? But if you play (or read) it long enough, you can almost feel your brain begin to adapt.

Most of the Web is not like *Pry*—not yet, anyway. But the history of reading suggests that what we’re presently experiencing is probably not the end times of human thought. It’s more like an interregnum, or the crouch before a leap. Wolf points out that when it comes to reading, what we get out is largely what we put in. “The reading brain circuit reflects the affordances of what it reads,” she notes: affordances being the built-in opportunities for interaction. The more we skim, the more we’re likely to keep skimming; on the other hand, the more we plunge into a text, the more we’re likely to keep plunging. “We’re in a digital culture,” Wolf says. “It’s not a question of making peace. We have to be discerning, vigilant, developmentally savvy.” And of course we have to be surprised, delighted, puzzled, even disturbed. We have to enjoy ourselves. If we can do that, digital reading will expand the already vast interior space of our humanity.

*Paul La Farge is the author of three novels:* The Artist of the Missing, Luminous Airplanes, and Haussmann, or the Distinction; and a book of imaginary dreams, The Facts of Winter.