

Memory and the reading substrate

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From the first celts and arrowheads, technology has been regarded as a welcome servant. Mostly a trusted servant, though things do occasionally go wrong. As an all-purpose dogsbody, the digital electronic computer is without doubt the technology of technologies, the servant to outperform all servants. It is invading—or has already invaded—more aspects of our life than any other technology before it, and reaches parts other technologies cannot reach. Its very ubiquity, however, also makes us acutely aware of our dependence on it. Perhaps even more than that other ubiquitous technology, electricity, at times this dependence can make us feel rather uncomfortable, not to say vulnerable. This sense of vulnerability is what inspired the recent exhibition ‘Sky arts ignition: Memory palace’ in the Victoria and Albert Museum’s Porter Gallery.¹ It started from a specially commissioned fictional text by the novelist Hari Kunzru, describing a future world in which all digitally stored information has been lost through an event referred to as ‘the Withering’. In fact, in Kunzru’s story reading, writing, and even memory itself, are now illegal.

After language, writing has in all likelihood been the most influential technology ever developed. As Stanislas Dehaene writes: ‘More than five thousand years ago, the first scribes hit upon an extraordinary potential deeply embedded in our brain circuits: the possibility of conveying language through vision.’² This extraordinary concept of conveying language through vision has greatly accelerated cultural evolution. It is hard to imagine this pivotal and transformational cultural technology being outlawed, but this is precisely what Kunzru’s story does.

Writing was invented as a means to store outside the brain information about matters like quantities and ownership that needed to be remembered. Discovered as a means for communication across time and space, the technology caught on like wildfire. In the form of manuscript, printed, and digital text, written sources account for all of the world’s history. That is to say, by common consent everything that happened before it could be recorded in writing is referred to as prehistory. What is more, in the more than five thousand years since we started to write things down, we never came up with a better way of recording the vicissitudes of life as they happened, to turn them into history. So the result is that every child in the Western

¹ The exhibition, curated by Ligaya Salazar and Laurie Britton Newell took place 18 June–20 October 2013. Transforming novelist Hari Kunzru’s text into ‘a walk-in story’, it was described by its curators as ‘a book in an edition of one’.

² Stanislas Dehaene, *Reading in the brain: The science and evolution of a human invention*, New York: Viking, 2009, 149.

world today spends a good few years of their life learning, stroke by painstaking stroke, to make language visible.

In the digital era ushered in by the Web, we are scrambling to move our reading and writing to screens and keyboards. In fact most of our screens *are* keyboards now. As the incidence of smart phones and tablets rises, far-sighted educationalists are suggesting that in this brave new world of digital textuality it may no longer be necessary to learn to write. This is yet more evidence of how technology serves us like a well-trained servant! Indeed, if it works for writing, mightn't it also work for reading and learning more generally? The same screens that relieve us from the task of laboriously forming characters by hand offer permanent and reliable access to most of the world's information. In this, our 24/7 connected, state isn't rote learning beginning to look like a quaintly old-fashioned approach to the acquisition of knowledge? Why burden school children with such antiquated methods of schooling? Brain power freed from the need to memorise can be used for other tasks, such as improving our finding skills. Let's face it, if this became educational policy, wouldn't it merely be formalising what we're doing already anyway? How many phone numbers does anyone know by heart? In fact, one of the contributors to 'Memory palace', Maki Suzuki of Åbäke, is on record as saying that the project 'had made him aware that he no longer bothered to remember the names of people he met, relying on his iPhone to do it for him'.³

But having servants is a Janus-faced phenomenon. The more we rely on them, the more apt we are to become dependent on them, impairing our fitness to do without them. If we tell ourselves that we *need* text as an aid to memory, we are less likely to practise our power to memorise (which once was a great deal more prodigious than we can now readily believe). In fact, if we stop learning to write by hand, learning through doing, we might actually impair our reading fluency. This is at least what recent Japanese research appears to imply. Even if the researchers don't actually say it in so many words, they suggest that we are unlikely to become fluent readers unless we learn to write by hand first.⁴ Perhaps we need parents to volunteer their children for a conclusive experiment.

The case of writing furnishes a good illustration of the embodied nature of human cognition: that the way our brains work is decisively shaped and circumscribed by our corporeality. It leads one to wonder whether the close relationship between body and mind might not be also at play in the act of reading (and learning). This is precisely what Dehaene's account of the development of reading stresses. There is a

³ Emily King, 'The book, but not by the book', *V&A magazine*, Summer 2013, 58-65, at 64.

⁴ See Kimihiro Nakamura et al., 'Universal brain systems for recognizing word shapes and handwriting gestures during reading', *PNAS* 109:50 (11 December 2012), 20762-20767.

strong link between reading and the real world: ‘We recognise the written word using a region [of the brain] that has evolved over time and whose speciality, for the past ten million years or more, has been the visual identification of objects.’⁵ All of the world’s writing systems make use of the brain’s affinity with naturally occurring shapes. Mark Changizi has called this repurposing of natural shapes ‘harnessing’; he extends the notion to speech and music using real-world sounds.⁶ All this underlines the embodied nature of human cognition.⁷

Not surprisingly, there is a large body of scientific literature that shows that the embodied nature of cognition does indeed mean that the affordances of the reading substrate affect our cognition. Especially where memory and retention are concerned, digital text forms appear to perform less well than paper. Some of the inherent characteristics of digital text are less well suited to the way human memory works. In an excellent survey of recent reading research, Ferris Jabr observes that ‘the sensory experiences typically associated with reading—especially tactile experiences—matter to people more than one might assume’.⁸ Jabr discusses an impressive amount of scientific literature presenting evidence for the idea that digital text may present cognitive issues. Especially ‘mapping’ issues (suggesting that digital text offers fewer clues to aid navigation and retention) receive a great deal of attention. As Jabr explains, ‘When we read, we construct a mental representation of the text in which meaning is anchored to structure. The exact nature of such representations remains unclear, but they are likely similar to the mental maps we create of terrain—such as mountains and trails—and of man-made physical spaces, such as apartments and offices.’⁹ Mark Changizi, too, asserts that ‘[i]n nature, information comes with a physical address... And up until the rise of the web, the mechanisms for information storage were largely spatial and could be navigated, thereby tapping into our innate navigation capabilities... The web and e-books have upsides physical libraries do not, of course, but they are deeply lacking in spatial navigability.’¹⁰ Clearly, if screen-based reading is more physically and mentally taxing in terms of navigation and mental mapping (the so-called ‘cognitive load’)

⁵ Dehaene, *Reading in the brain*, 125.

⁶ Mark Changizi, *Harnessed: How language and music mimicked nature and transformed ape to man*, Dallas: Benbella Books, 2011.

⁷ See, for example, Alva Noë, *Action in perception*, Cambridge, Mass., and London: MIT Press, 2006, and Andy Clark, *Supersizing the mind: Embodiment, action, and cognitive extension*, New York: OUP, 2011.

⁸ Ferris Jabr, ‘The reading brain in the digital age: The science of paper versus screens’, *Scientific American*, 11 April 2013, <http://www.scientificamerican.com/article.cfm?id=reading-paper-screens>.

⁹ Jabr, ‘The reading brain’.

¹⁰ Mark Changizi, ‘The problem with the web and e-books is that there’s no space for them’, *Psychology today*, 7 February, 2011, <http://www.psychologytoday.com/blog/nature-brain-and-culture/201102/the-problem-the-web-and-e-books-is-there-s-no-space-them>.

than reading on paper, less mental space may be left for retention.

Remarkably, as Nicholas Carr has pointed out in *The Shallows* (2010), people appear to bring a more scanning attitude to screen reading than to paper reading in the first place. The research Carr cites in this respect¹¹ has since been corroborated by other research. '[P]eople appear to perceive the printed-paper medium as best suited for effortful learning, whereas the electronic medium is better suited for fast and shallow reading of short texts such as news, e-mails, and forum notes.'¹² For this reason, '[t]he common perception of screen presentation as an information source intended for shallow messages may reduce the mobilization of cognitive resources that is needed for effective self regulation' (ibid.). In other words, 'people seem less inclined to engage in what psychologists call metacognitive learning regulation—strategies such as setting specific goals, rereading difficult sections and checking how much one has understood along the way'.¹³

It is interesting to speculate whether this dismissive attitude to digital texts might reflect a perception that they are of inferior value overall. That a lesser value would be attributed to digital texts because of their immateriality is of course not inconceivable. In that case could it perhaps account for our changing ownership relation to text when it is in digital form? As books and their content are increasingly being consumed digitally (in the form of both digital born and legacy materials) they take on one vital characteristic of other media (newspapers, radio, television), viz. that their use—and usefulness—are defined in terms of access to the information they contain rather than ownership of the physical carrier.¹⁴ And if the importance of *material* ownership of information is indeed dwindling, would *mental* 'ownership' be far behind?

All in all, digital reading is a greater departure from our age-old habits than we realise. However, the point of pondering the effects of taking our reading and writing practices into the digital realm is not so much whether the effects of offloading the chores of learning to write or remember on our technological servants are good or bad. Yes, the technologies of first writing and then printing have left their indelible mark on our culture, and yes, they both affected our way of thinking—our literate mentality. So Plato was right to be concerned about writing, as were those who were

¹¹ Ziming Liu, 'Reading behavior in the digital environment: Changes in reading behavior over the past ten years', *Journal of documentation* 61:6 (2005), 700-712.

¹² R. Ackerman and M. Goldsmith, 'Metacognitive regulation of text learning: On screen versus on paper', *Journal of Experimental Psychology: Applied* 17:1 (2011), 18-32.

¹³ Jabr, 'The reading brain'.

¹⁴ Note that this now also applies increasingly to music and films. See Adriaan van der Weel, 'From an ownership to an access economy of publishing', *Logos*, forthcoming.

concerned about the effects of printing.¹⁵ But should we therefore lament, with Plato, the loss of the classical art of memory? Any concern about the effects of technology is always predicated on the desire that the status quo should not change. But in the face of Plato's misgivings we can only conclude that we adjusted to that first important externalisation of human memory through writing remarkably well. The changes caused by digital textuality are going to be huge in turn, but they will not spell the end of civilization either. The point is rather that the changes effected by technology are out of our control. We might of course wish to ponder what it is that we stand to lose that we think we cannot afford to, but even then I don't think we have a great deal of choice in the matter: technology runs away with us, even though we ought, as its inventors, by rights to be in charge of it. The discovery of a technology's uses takes time, and so its effects only become clear long after the invention is first introduced. Such uses and their effects are rarely part of the design. Indeed, it has frequently been remarked that technology demonstrates unexpected and uncalled-for autonomy: the servant turning out to be a sorcerer's apprentice.¹⁶ We can find solace in the fact that neuroscientific research keeps finding evidence of the brain's extreme plasticity. There is no reason to doubt that we will adapt to the current paradigm shift as well. But there is equally no doubt that it will cause a cultural landslide at least as big as that once caused by the discovery of the power of writing and reading—and that the speed at which the land slides will take us by surprise.

¹⁵ Plato, *Phaedrus*, 274d–277a.

¹⁶ Apart from its appearance in myths from all ages and cultures, the phenomenon is a tenacious object of scientific study (and argument), as witness the ongoing debates in the flourishing field of science, technology and society studies (STS).