

## **Digital Technology: Help or Hindrance? Remembering in the Twenty-first Century**

**Abstract:** Information managers as well as individuals are adapting to technologies such as smart phones, portable hard drives, USB keys, and online repertoires that are easy to acquire and use. People store documents, pictures, artwork, journals, and records onto portable digital tools. Since these tools have essentially become extensions of the human mind, we must ask an important question: are they eliminating our brain's ability to remember on its own? This paper will identify the present and possible future issues in portable digital tools use with regards to natural human memory functions. The switch from physical to digital records has changed human attitudes towards record keeping, causing a proliferation of massive file storage, but less file usage. Humans are experiencing an age that promises the safety of digital data, and yet technical malfunctions and lapses in human memory are problems with regards to modern information management. Message interruption research has also shown negative results regarding average memory retention. Implications for information managers are discussed, stressing the importance of creating backup copies, as well as introducing memory retention practices to the workplace.

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## Introduction

With the heightened use of digital storage and communication technologies, the tasks of the information manager are rising in importance as organizations continue to digitize physical data. While information managers are indeed masters of their digital repositories, forgetfulness and the ephemera of digital information is still a huge problem, as was demonstrated in a recent CBC News release. An important portable hard drive has gone missing in the Canadian Federal government, “containing personal information about more than half a million people who received student loans” (CBC News, 2013). The hard drive contained information regarding “583,000 Canadians who were clients of the Student Loans program from 2000 to 2006,” but thankfully did not include any banking or medical information (CBC News, 2013).

If this information was stored in print, it would have required one thousand times the physical space at least, but it certainly would have been more difficult to steal, misplace, or forget. Furthermore, the CBC article also notes that “this is the second incident involving missing personal information” in “less than a month,” the other device being a USB hard drive containing “personal information on about 5,000 Canadians” which went missing in November of 2012 (CBC News, 2013). The portable hard drive contained social insurance numbers, birth dates, and personal work/monetary information that would be easy to replicate if the files were not expertly encoded. There is so far no evidence that the data has been used for “fraudulent purposes,” but that rather, the hard drive was simply misplaced and/or forgotten (CBC News, 2013).

The role of the information manager is to be keenly aware of where they store data for businesses, governments, and institutions. While the ability to store files within digital repositories is convenient, the switch from managing physical information environments to digital information systems is relatively new. The ways in which this switch has affected the human mind have not yet been explored. Since portable digital tools have never been more sophisticated and convenient, we tend to believe that our data is always safe. As well, with the growth of wireless smartphone networks and the instantaneousness of the internet, we are provided with answers to nearly any question. Could smartphone technologies, along with the endless digital storage of files and memorabilia, negatively affect our brain’s ability to remember?

## But First: a Glance at Human Memory in the Past

In oral cultures, before the invention of the printing press, memory was highly respected. Expanding one’s memory capacity through specific lessons and actions was considered a noble practice, and memory recall was even thought to be an art. In his 1983 book *The Discoverers*, Daniel J. Boorstin colourfully expresses the respect given towards human memory:

For millennia personal Memory reined over entertainment and information, over the perpetuation and perfection of the crafts, the practice of commerce, the conduct of professions. By Memory and in Memory the fruits of education were garnered, preserved, and stored. Memory was an awesome faculty which everyone had to cultivate, in ways and for reasons we have long since forgotten (Boorstin, 1983, p.480).

According to Boorstin, the famous rhetorician Seneca the Elder (55 B.C.-A.D. 37) could “impress his students by asking each member of a class of two hundred to recite a line of poetry, and then he would recite all the lines they had quoted—in reverse order, from last to first” (p.482). While Seneca certainly possessed rare talents, the act of cultivating memory was undisputedly respected and practiced among scholars and students alike for hundreds of years to come.

Even though scholars continued to respect knowledge based on memory alone, they also began to value the practices of reading and writing in correlation to building effective memory. Nicholas Carr (2010) uses the example of Dutch humanist Desiderius Erasmus, a memorizing genius who had mastered “great swathes of classical literature, including the complete works of the poet Horace and the playwright Terence” (p.178). Erasmus also “stressed the connection between memory and reading” in his 1512 textbook *De Copia* (p.178). As quoted in Nicholas Carr’s *The Shallows* (2010), Erasmus recommended his students to write down any “striking words” they might encounter while studying, freely encouraging the use of written notes (p.178). Erasmus was a memory building enthusiast who asserted that memorizing would help to create a “deeper and more personal understanding of one’s reading” (Carr, 2010, p.179). Erasmus also realized that reading and writing notes aided in retaining knowledge, and was not entirely focused on the use of memory alone (Carr, 2010).

While Erasmus and Seneca may have been geniuses of memory, there were also those who did not always enjoy spending hours on memory lessons. Boorstin (1983) notes that once scholars were able to record their memories with books and writing, the interest in memory education declined (p.486). Boorstin explains that “by the late twentieth century, interest in Memory was being displaced by interest in aphasia, amnesia, hysteria, hypnosis, and . . . psychoanalysis” (1983, p.487). Since scholars were more able to remember with the help of writing and books, they did not have to focus so heavily on memory building techniques, which allotted them more time to work on new realms of study, such as psychology in the 1800s (Boorstin, 1983, p.487).

The old masters of memory cognition were certainly admirable in their profound talents, and were clear testaments to the power of the human brain’s exceptional adaptive ability. However, the lack of attention to memory building in the later centuries was due to the proliferation of a technology that helped individuals to remember without the necessity to memorize. The proliferation of books certainly had an impact on the human desire to commit facts to memory;

for example, people may not have continued to fully memorize the *Iliad* or the *Odyssey* as intently as before, since they could instead refer to books. With the advent of the printing press, people were able to write down their notes for later consultation. They stored them on book shelves, notebooks, libraries, and in personal study areas. Nevertheless, scholars still practiced memorization; of course, humans had not defeated forgetting, they just acquired new textual aides to help with the accumulation and preservation of records.

These days however, many North Americans have smartphones that can be used to find basic information at any time from nearly anywhere. Individuals no longer have to thumb through library books or even leave their homes to access basic knowledge. Furthermore, our smartphones can remind us to complete tasks, go to events, make appointments, take medications, et cetera. Certainly, information managers make use of these digital tools just as often as individuals do, if not more. People are constantly receiving text messages, notifications, and reminders of all sorts. All of these digital messages tend to interrupt us with the grand purpose of reminding us not to forget but do these interruptions really serve that purpose, or are they actually causing us to forget important day-to-day information such as where we put that small hard drive full of student loan data?

## **Digital Message Interruption and Memory Retention**

While these notifications are great at allowing individuals to stay current, people may not realize just how disrupting these messages can be especially in terms of how they affect a person's ability to remember. According to Oulasvirta and Saariluoma (2004), digital interruptions that occur "simultaneously" while performing a main job or task are especially able to disrupt the "transfer from short-term into long-term memory" (p.54). Oulasvirta and Saariluoma (2004) conducted a study that investigated the impact of interrupting digital messages on long-term human memory which, in the end, yielded worrying results.

They held three different experiments, all of which tested the cognitive effects of interrupting digital messages on a group of university students. Each experiment would perform message interruptions on computer monitors. The student would be put to work on a task, but would then be interrupted by the digital message. In the results of the first experiment, memory accuracy was decreased after the student attended to an interrupting message (Oulasvirta and Saariluoma, 2004). In the second experiment, four interrupting messages were used, and the result was replicated (Oulasvirta and Saariluoma, 2004). In the last experiment, Oulasvirta and Saariluoma discovered that an interrupting message was the most disturbing when it was "semantically very close to the main message" (2004, p.53). Overall, the experiments of Oulasvirta and Saariluoma (2004) "illustrated a vulnerability to interruptions; in all three experiments a negative effect of interruption was shown" (p.60). However, these tests focused on the effects of human-computer interaction on memory retention, and I was unable to find similar studies using a smartphone technology. Nevertheless, these results still imply that digital message interruption has a negative impact on the retention of human memory.

Consistently diverting our attention from one digital technology to another seems to affect human memory comprehension significantly. As quoted by Carr in *The Shallows* (2010), Müller and Pilzecker conclude that it takes “an hour or so for memories to become fixed” within the brain (p.184). Also noted by Carr (2010) is that the process of memory consolidation is “delicate,” and “any disruption, whether a jab to the head or a simple distraction, can sweep the nascent memories from the mind” (p.184).

Judging by the results of Oulasvirta and Saariluoma’s tests, Nicholas Carr’s (2010) assertion that “the key to memory consolidation is attentiveness” seems to be correct (p.193). However, where we choose to allocate that attention is also in transition. Individuals and information managers are especially paying more and more attention to digital environments than ever before. And yet, some scholars have argued that we actually tend to access our digital information less frequently than our physical information, a topic that will be further discussed in later sections.

## **Our New External Brains: Diverging Attitudes and Technological Malfunctions**

When comparing digital storage devices with the human brain, the main difference is that the human brain must be selective with its remembering while portable digital storage has the ability to grow and take in all the data we put into it. As Mayer-Schönberger (2009) notes in his book *Delete*, the human brain must deal with every single “sensual stimulus we receive,” which is a lot when factoring in the five human senses used to create memories (p.17). If humans could actually take in all the information of their surroundings, their “storage system would fill up,” and would soon need to be emptied (Mayer-Schönberger, 2009, p.17). Human brains purposely forget certain details as soon as new stimuli enter them in order to make room for new memories to form (Mayer-Schönberger, 2009, p.17). In terms of computer memory, larger hard drive space has become cheaper with each passing year, making it easier for people to expand their digital memory repositories (Mayer-Schönberger, 2009, p.66-67).

However, when it comes to the digital storage of information, how much attention do we actually give to these digital files? Are they as meaningful and memorable as they were in their physical forms? Since storage of records has shifted from physical to digital, humans are developing new attitudes towards digital information. As stated by Amber Case (2010) in a TedTalk presentation, the attachment we have to our digital devices is no longer a simple attachment: these devices have become extensions of our mental selves (2010, 1:45). Case explains how digital technologies are actually tools similar to early human tools acting as “physical modifications of self” (2010, 1:35). Some examples are bows and arrows that extend the range of our throwing arms, as well as sharp stones that allowed humans to skin animals. Clearly, humans have always modified their physical abilities in order to cope with their environments (Case, 2010, 0:50).

Devices such as smart phones, tablets, laptops, e-mails, portable hard drives, and memory sticks are tool extensions of the human mind. They can quickly store vast quantities of information. Now that parts of our mental selves are kept in small devices that fit in our pockets, our data is no longer a visible entity. It does not pile up beside us on book shelves, drawers, boxes, and file folders. It can exist in a two inch memory stick. Amber Case makes an interesting point in her TedTalk:

We are carrying around Mary Poppins technology. We can put anything we want into it, and it doesn't get heavier, and then we can take anything out. What does the inside of your computer actually look like? Well, if you print it out, it looks like a thousand pounds of material that you're carrying around all the time. (Case, 2010, 1:55)

Such a shift in the way people store information necessarily creates a different attitude towards their records. It creates an attitude where the files are considered invincible because there are so many ways to store them, and so much space available in which to do it. However, this coincides with an opposite attitude that has also emerged, where digital files are thought to be fragile due to technical malfunctions. Essentially, humans now live with both confidence and fear when it comes to the preservation of digital records.

Technical malfunctions are always possible. The information could be safe if a back-up copy is kept on another hard drive, or deposited in an online storage repository. Many individuals, as well as information managers dealing with institutional records, simply forget to create these back-up copies. It is too easy to get distracted with our own lives, and the tedious but important steps required ensuring the effective back-up of records are often put off and forgotten. Each person has his or her own horror story involving the loss of precious files that somehow vanish with a new software update or an unfortunate phone-to-laptop sync. In her *New York Times* article, Carina Chocano (2012) wrote about a friend who “lost her hard drive and backup drive storing years of work, her entire music collection, her photos and all her e-mail” (para.4). Later, Chocano herself lost “almost every photo ever taken” of her baby girl (para.4). Chocano was not able to back-up her photos due to hiccups in technological processing, forgetting her password, and simply running out of time before her phone, which contained all of the photos, simply died:

I could not connect my new laptop to my old external hard drive and had been planning to switch from MobileMe (to which I'd forgotten the password) to iCloud (I was holding off until I could back everything up on a hard drive, not yet purchased). My digital-storage problems had become so internecine that I didn't stop to consider my photos' vulnerability until it was too late (Chocano, 2012, para.4).

Personally, I have heard similar tragedies from a number of friends and family members. My cousin had her laptop stolen from her home, which contained all of her university school work, personal photographs and writings, and previous art work created over the past five years. The

feeling she described was one of deep loss, a loss she found extremely difficult to explain and accept because her data was non-material. She often perused the pawn shops around her neighbourhood, hoping that perhaps her laptop would turn up, even months after its disappearance. She lost everything simply because she had forgotten to lock her sliding glass door that particular night.

Chocano (2012) described how, weeks after the deletion of her photos, she continued to experience a “back-of-the-mind feeling” that someday, she would be able to “make the pictures reappear as magically as they vanished” (para.4). Her mind could not process the loss because “it felt at once real and illusory” (Chocano, 2012, para.4). Since individuals have the *ability* to store multiple digital copies, they may feel as though these new extensions are completely trustworthy, but people rarely take the time to create such copies. In the end, sometimes we pay for that, and we realize that our records are not as secure as we previously thought.

## **A New Attitude of Digital Miscellanea**

While we may have had negative experiences, we still do typically tend to trust our digital storage technologies. Chocano (2012) asserts that people and organizations have “collectively engaged in a mass conversion of what we used to call records, accounts, entries, archives, registers, collections, keepsakes, catalogs, testimonies, and memories into, simply, data” (p.44). Where distinctions between this information used to be apparent, we have now amassed it into one blurred conglomeration of files known as data, evidently creating a detached attitude towards these files. Since documents previously existed beside us physically, they were able to accrue differentiation, value, and meaning, making them more memorable. As individuals and information professionals convert all physical records into digital data, there is a loss of the depth, value, and meaning that was previously associated with the physical files, making them more forgettable. Should the information manager who lost the student loan data be punished, or is this loss actually the result of a new and unrecognized attitude shift towards our formless digital records?

A good example is the proliferation of digital photographs. David Weinberger (2007), author of *Everything is Miscellaneous*, discusses how his family ritual used to revolve around creating photo albums by getting together to pick through and sort photographs (p.14-15). He enjoyed constructing “our past for the future, making the decisions about which photographs to put next to which” (Weinberger, 2007, p.14-15). Digital cameras allow the storage of thousands of photos onto one SD memory stick, so there is not usually any storage capacity issues for average sized photos. However, when we upload our photos onto our computers, our cameras apply robotic names such as “DSC00165.jpg,” which are ultimately meaningless (Weinberger, 2007, p.12-13). Weinberger explains how much easier it is to simply *keep* all of the photos, rather than painstakingly deleting the bad ones:

To keep them, we just press a button to move them from our camera. To get rid of them, we have to look at each one, compare it with the others in the series, select the bad ones, press the Delete button, and then confirm our choice” (2007, p.12-13).

In the end, the photos usually remain as DSC00165.jpg, but perhaps are placed within a folder titled “Mexico Vacation” or “Family Pictures.” However, going through and re-naming the photographs from DSC00165.jpg to “auntie-zelda-and-uncle-nick-wedding.jpg” takes an exceptional period of time, and is a tedious process. The less attention these pictures receive while buried away in folders full of ambiguous files, the less they are remembered to even exist. Since digital files cannot be touched, smelled, or heard, associating meaning to them is more difficult, and so is committing them to our memories.

## **Digital Ephemera and Concerns about the Future**

James Mussell (2012) goes as far as to note that electronic environments actually foster “the proliferation of ephemera”—the rare and temporary access of digital files (p.86). This is primarily because of the way information is kept in pieces within electronic environments, on “memory sticks, local hard disks, network drives, cameras, phones, tablets and other portable devices,” allowing for memory to be “increasingly distributed” (p.86). Mussell also notes the way in which “cloud computing has outsourced memory, placing both what we mean to keep and what we forget to erase in private hands” (2012, p.86). He highlights the fact that the internet fosters this ephemeral transient attitude towards digital data, where some of records “will survive unintentionally, tucked away on discarded drives, reproduced on unknown sites, or abandoned on forgotten servers” (2012, p.90).

If humans lose sentimental attachment to memorabilia, will they then project these attachments in strange new ways? This is the first time our mental selves have been externalized in such an extreme fashion. The ramifications of moving into a true “cyborg” state, as Amber Case has insinuated, are still mysterious (2010, 0:10). Unique physical records previously stored on shelves in our homes and offices have morphed into characterless data that lies within multiple realms of storage—invisible and transient. Andrew Hoskins (2011) notes a developing attitude towards remembering as the “new careless memory,” where he refers to the act of remembering as a mere “obligation” to now be carried out by our mental “prostheses,” which is, in fact, our new digital brains (Hoskins, 2011, p.19).

Nicholas Carr and Mayer-Schönberger both make daunting predictions about a societal future dominated by the use of computer memory. Carr (2010) asserts that the more humans continue to use the internet, the more we effectively “train our brain to be distracted—to process information very quickly and very efficiently but without sustained attention” (p.194). As well, children growing up with the internet and smartphones at their fingertips certainly must be training their brains to interact with the world in a different way than previous generations did. With search engines like Google that can produce basic answers to simple questions

within a matter of seconds, Carr (2010) thinks that “our use of the Web makes it harder for us to lock information into our biological memory” (p.194). He believes people will be “forced to rely more and more on the Net’s capacious and easily searchable artificial memory,” and that this loop will go on into the future, continually depreciating our ability to meaningfully remember things (p.194). If this is indeed true, then information managers could also be subject to such problems.

Mayer-Schönberger (2009) believes that “digital remembering” may actually cause individuals to “cease trusting our human memory,” and elevate trust in digital devices to become the “primary source” for remembering past events (p.126). Where human memory can fail, digital memory cannot. So long as there are multiple back-up copies being made to guard against digital malfunction, we may never forget again. On the other hand, our ability to record information, as well as maintain it across multiple wireless mediums could actually cause people to distrust the past altogether (Mayer-Schönberger, 2009). Digital information “can be altered,” and once someone begins to alter the records of the past, people would no longer trust past digital information (Mayer-Schönberger, 2009, p.126). Mayer-Schönberger fears that this attitude of complete distrust towards the past may create a generation of people who solely exist in the “here and now,” creating a kind of “all-pervading past” and a sense of “an utterly ignorant present” (2009, p.127).

I believe these two concerns are plausible, and that there is some cause for alarm. If technology does not allow individuals to concentrate deeply and form meaningful connections with the information being absorbed, then they are unable to remember things as clearly. Nicholas Carr (2010) assumes that due to the “influx of competing messages” received every time people use the internet (and now smart phones), individuals “overload” their “working memory,” making it more difficult for the “frontal lobes to concentrate our attention on any one thing” (p.194). This hinders the initial process our brains must go through while beginning to store memories (Carr, 2010). It seems deeply ironic that our new external brains with their massive memory capacity may actually be causing our biological brains to forget how to remember. James Mussell (2012) states that “to prevent those digital objects that we want to preserve from becoming digital ephemera, we must choose to remember them” (p.88).

## **Implications for Information Managers**

As discussed at the beginning of this paper, the issues of memory loss and portable digital ephemera with regards to information management is a serious issue. In the situation with the lost student loan data, it is not just a matter of losing data about one person. It is not the information manager’s personal information, it is data about others. This information is supposed to be kept private, exclusively between Canadian citizens and the federal government. Such a situation should never have occurred, and the employees responsible for it must be feeling a profound loss. The federal government evidently does not have one single

multi-billion terabyte hard drive, but a number of small, more easily misplaced and forgotten hard drives that hold important information about Canadian citizens.

The Human Resources and Skills Development Minister, Diane Finley, expressed that employees in the HRSD departments across Canada will be required to participate in “mandatory training on a new security policy” (CBC News, 2013). However, one must wonder what exactly these training sessions will entail. Will the training include better physical storage practices when it comes to portable hard drives? Portable devices that can hold millions of files are often as small as standard smart phones, and USB drives are also small and easy to misplace and forget.

The new training should include human memory enhancement practices regarding the storage of digital information. Employees should be educated about this shift in attitudes towards the digital and physical data, so employees are more aware of the fact that digital data is easily forgettable. It should also be stressed that addressing too many interrupting messages on cell phones and computers could hinder their memory retention. As well, multiple copies of important data should be created and updated on a regular basis, and such back-up procedures should not be considered the least important task but instead, stressed as one of the most important. In light of these recent events, information managers must focus on memory training techniques and the creation of new policies regarding the importance of proper data backup and encoding practices.

## **Conclusion**

At this point, while we are still just beginning to experience a future dominated by wireless technologies, it is difficult to predict exactly what will happen to us and our new external brains. If we continue to experience losses like the recent HRSD incident, we may have to go back in time and retrieve Frances Yates’ *The Art of Memory* in order to re-teach ourselves the lost art. To help myself better remember where I have stored my digital files, I have taken to speaking out loud: “I have stored this document on my small gray USB drive. I will always keep it in the front pocket of my purse.” I find that it helps when I step back and make repetitive mental notes regarding what these files are and exactly where I have stored them. Individuals, and particularly information managers, must not make the act of remembering into a mere obligation. I believe that if we are not careful to pause and reflect—if we do not *choose to remember* our digital memorabilia—we may be adapting our brains to suit our technologies, rather than adapting our technologies to suit our brains.

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