TXT

THE BOOK ISSUE

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ISSUE

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A BRIEF EDITORIAL NOTE

What is it with books that we simply cannot put them away? I do not even mean throwing them in the bin per se, but passing them away to second hand stores or bookswap initiatives can be hard enough. Why is it that the tangibility of a book, its smell, its size and shape, are so determining for our reading experiences? How does handmade paper stand apart from paper fabricated in big rolls with machinery? What is it with books? That images of reading men appear to be material for an Internet hit with its own hashtag, Instagram account, and even wall calendars and – how suitable – books, with inside those same images.

What is it with books?

It may be the central question of *TXT Magazine: The Book Issue*, the issue you now find in front of you. In it, you will find articles addressing the central issue of the book; the paper codex. The articles have been distributed over three sections. The first one addresses the historical significance of the book, like it's symbolism in World War 2. The middle section addresses the materiality of the book. What is the significance of materiality, and what determines a codex' bookishness? In the final section, the social significance of the paper book is being discussed, for instance its significance within a bookswap project from Germany.

The magazine in front of you would not have come to existence without the help of all those who were involved in its production process. Of course the authors who wrote the articles which together make up this issue. The hard-working and dedicated members of the TXT editorial team, who put a lot of dedication and effort in this magazine, as did Adriaan van der Weel, one of the instructors of the Book and Digital Media Studies Master's Programme, who assisted our team. We would like to thank Amsterdam University Press, which has supported us in our work on this magazine. Without AUP, this issue could by no means have been realized. We owe them, and Max Haring and Vanessa de Bueger in particular, a great debt of gratitude.

Sam Koster
Editor-in-Chief

THE LANDSCAPE OF THE PHYSICAL BOOK

Space and Memory in the Printed Page

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Although useful, digital screens have not yet replaced physical books. The printed book offers three concurrent psychological advantages that explain its puzzling resilience: (1) Better learning and remembering are associated with the physical act of moving through the space of printed pages, which stimulates the visuo-spatial sketchpad component of working memory; (2) since reading is based on temporal, sequential processing, the fixed frame of reference of printed pages and their fixed shape are great aids to memory; (3) the properties of paper and the standard design of a printed book guarantee that it will always function properly: one day, a year, or many centuries later. One reads the same words on screen or in print, but the context in which the symbols are read is very different. The digital book appears and vanishes. The physical book – where kinesthetic experience is more vivid – remains as an actual, remembered space.

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The Screen Offers Simulation But Not Replication

Can a digital reader ever function as adequately as a physical book? In a 2010 CNN interview, the digital guru Nicholas Negroponte predicted that physical books had only five years left in them. Eight years have passed and the video of the interview has since been deleted from the internet.[1] The death of the book is not what it used to be. Lewis Carroll may have predicted why. In a novel he published in 1893, one of the

characters describes an actual-size map of the country which turned out to be rather useless. Carroll's satire plays up the initial enthusiasm for this far-fetched enterprise:

'We very soon got to six yards to the mile. Then we tried a hundred yards to the mile. And then came the grandest idea of all! We actually made a map of the country, on the scale of a mile to the mile! [2]'

But in the story, the proposed map is rejected by farmers who question its practicality and object to the adverse effects it would have on their crops. In the end, the country itself is used as its own map.[3] As digital devices become ever more advanced, with ever-more ingenious attempts to imitate paper and spatial location by means of a flat screen, perhaps, in some Alice-in-Wonderland world, with 3-D glasses, engineers may fool us into thinking we are holding an actual book.

But will we ever get to the ultimate Carroll map? It is doubtful because while a map is a map, a 2-D screen is never really a 3-D stack of pages. Let's now turn to some expert witnesses for the defence of the physical book. Their actual experiments show in more detail why this 3-D stack has distinct psychological advantages for scanning, remembering, finding, and learning.

Singer and Alexander recently studied the "effects of reading digital and print texts on comprehension."[4] They further surveyed research of the past twenty-five years into the process of reading and summarized the differences and trade-offs between reading in print versus reading on screen.[5] In an additional study, in collaboration with Berkowitz, they confirmed through measurements of comprehension of key points and other relevant information presented in text passages, that performance is significantly higher when reading in print versus reading on screen.[6]

The scientific literature on reading is openly revising its former predictions about the death of the book. *Scientific American* and *WIRED* have recently carried titles like 'Why the brain prefers paper'[7] and 'Why the smart reading device of the future may be… paper'.[8] These two sources alone cite over twenty-five scientific articles to support the advantages of paper. So long as the digital counterparts to the printed book remain suboptimal, the situation calls for a sober skepticism toward breathless futurism. Let's look at some of the reasons for the conservatism of our 'wetware' brains.[9]

For the college students involved in their recent 2017 studies, Singer Trakhman, Alexander, and Berkowitz also pointed out that '…the medium in which [they] are reading is more influential when the questions being answered go beyond a gist understanding of the text.'[10] Paradoxically, in these studies, students always judged their comprehension as better when reading on screen, while in fact they performed better when reading in print.[11] This unconscious advantage might explain why, in a 2015 international study by Naomi Baron, ninety-two percent of college students still indicated a preference for reading books in print versus on e-readers.[12]

'Building a physical map in my mind of where things are' is one of the revealing comments offered by students to explain this preference.[13]

So far, the ability of a screen to mimic a physical book seems to depend on whether engineers can manage to make a Lewis Carroll-style representation that goes all the way. In the meantime, sales of printed books continue to rise while sales of electronic books (e-books) continue to fall. For example, in the UK e-book sales declined from 26 percent of the market in 2015 to 25 percent in 2016.[14] People are still buying and reading physical books. Why? The study of memory provides a possible answer.

1. Working Memory and the Visuo-Spatial Sketchpad are Marshalled Better with Print

The remarkably durable model of human memory by Baddeley and Hitch explains why print fixes meaning in memory.[15] Originally, they built their 1974 model on the ground-breaking work by George Miller and his (magical) number seven limitation on the human brain's 'immediate', or short-term, memory capacity.[16] Later, they refined the view that this limitation is more one of time rather than number of items, hence the more precise definition of *working memory,* that time span of just a few seconds after exposure, after which immediate recall becomes quite difficult.[17]

Among its components, their model includes the *phonological loop*, which addresses verbal and auditory information, and the *visuo-spatial sketchpad* which addresses visual and spatial information, as well as movement through space.[18] One of the strengths of Baddeley's model, backed by decades of research, is the recognition that working memory processes are best viewed as a combination of *distinct* components: oral and auditory, verbal, visual, and spatial. The more physical the input, the more of these elements are present.

Viewed through Baddeley's working memory model, the process of reading appears to involve *all* these components, but what is most pertinent for this discussion is how the *spatial* in the visuo-spatial sketchpad component enhances the experience of reading a physical book and contributes to long-term memory storage and recall.

Reading on screen, the lack of physical space suggests that the spatial component processed by the visuo-spatial sketchpad is greatly diminished. If true, this loss is quite problematic for screen-based learning. For the development of the ability to read appears to be a direct adaptation of the eye's evolved ability to identify and distinguish physical objects in the surrounding landscape.[19] The decoding and recognition of written letters as 'objects' in the field of vision is associated in the brain with the same general area responsible for recognizing faces and physical objects.[20] This proximity of the region dealing with written language with the one dealing with physical objects suggests that '...the brain deals with letters as if they were physical objects.'[21]

There is not at first any apparent reason why humans' ability to orient themselves in their environment's physical space could not extend equally well to the two-dimensional space of the digital screen, just as it does for the two-dimensional space of the printed page. But it turns out that orientation on the printed page benefits memory and understanding, and is far superior to orientation on the electronic page. Indeed, the similarity of these two-dimensional spaces is deceiving. With paper, we can physically move left to right and front and back, much like we do in our physical world. With the screen, the left and right are generic as typically only one page is displayed at a given time. In the screen there is a front but no back: one can never get behind the screen, which has a *recto* but no *verso*. Don Bouwhuis points out that 'This prevents the reader from organizing text sections into a left/right structure as in a [printed] book, increasing the actual text planes to be remembered by a factor of two.'[22]

If reading a printed book involves the spatial perceptual apparatus at work in the visuo-spatial sketchpad component of working memory, the absence of physical space in reading on screen suggests that the same mental apparatus is likely to remain underused when facing a digital screen that lacks the surprising spatial depth of the printed page. The flat screen thus degrades this spatial reading process. If this psychological privileging of physical space is correct, it would mean that the flatness – of the screen with its lack of the familiar cues that one gets from the physical environment – omits important memory cues found when moving through a physical book.

Remembering better: Baddeley's visuo-spatial sketchpad component combines the visual and the spatial into a complementary pair. This duality was apparently noted in classical times, when physical space was often invoked as an aid to memory. This technique was known as *ars memoriae*, or art of memory, and consisted in remembering things by imagining them inside different rooms in a house.[23] The pages in a book are like the rooms in a house, and we typically remember where things are stored in different rooms. Likewise, we seem to remember if we read a passage in a left-hand page or in a right-hand page. The margins of a page are like the walls of a room: a discrete, finite, and fixed orientation system.

The familiar experience of moving through a house or walking down a street can indeed be an analog of our experience when flipping through and reading on the pages of a printed book. But with the screen

'Reading on screen, the lack of physical space suggests that the spatial component processed by the visuo-spatial sketchpad is greatly diminished'

our bodies cannot experience the same movement through space simply because that space is not there. Paper returns a deep, three-dimensional experience, the screen returns a flat, one-dimensional experience.

This difference is unimportant if the task is the quick consultation of an address, a procedure, or a standalone short text such as a dictionary definition. For this context the electronic medium's obvious advantages of large storage and fast retrieval are best retained and used as needed. But if the context is reading a novel, a long essay, or a chemistry textbook, this difference is much more important as physical space reinforces understanding and long-term storage and recall of the subject matter.

If the 3-D physical space afforded by a printed book cannot be replicated by the flat screen of a computer, tablet, e-reader or smartphone, perhaps it is wise for a student or professional to limit the reading activity on those devices to content that does not require long-term storage and retrieval. Memory mechanisms associated with such requirements seem indeed to benefit greatly when the medium of delivery is printed paper, and suffer when the medium is the screen. This is why so-called dead tree editions are currently alive and well.[24]

2. Print and Paper Offer a Familiar, Fixed Frame of Reference

The process of reading is based on temporal and sequential processing, thus the *fixed frame of reference* given by the left-right arrangement of the pages and the fixed, 'immutable' sequence of letters, words, phrases, sentences, paragraphs, and chapters are a great aid to memory and recall.[25] Although the fixed sequence of these elements may be identical, in a digital edition their overall shape is always elastic and subject to change, offering an ever-changing landscape, not a stable context. It is a paradox of the digital freedom from the static nature of the printed page that the digital introduces spatial uncertainty, thus dissolving the familiar, memorable, fixed frame of reference.

In a printed book, the third dimension of the stack of pages helps the reader remember the location of specific passages much like one is able to remember the location of objects in physical space. A King James Bible, open at the end of the Old Testament and beginning of the New Testament, gives when viewed from the side, a sharp depiction of the difference in size, in total pages, between the two sections. On the left, the stack of pages of the Old Testament is almost three times as tall as the stack of pages of the New Testament on the right.[26] Because the perception of the passing of time is fundamental in memory processes, the paper stack offers a nice, direct way of marking space (the number of pages) and time (the time spent reading

the pages) simultaneously: 'The importance of this is that there is an almost perfect correlation between the temporal organization of the reading process and the spatial organization of text.'[27]

Our eyes are constantly moving and constantly fixating, in a series of quick movements called saccades, repeated approximately two hundred times every minute, not just when reading but during our complete waking hours.[28] Reading, on a smaller scale, is a good model of our scanning the environment in large *saccades*, but also focusing on smaller, localized environments with smaller saccades. Each time one reads a line of text, the eyes jump forward in small saccades until the end of the line forces a necessary backward saccade to the beginning of the next line.[29]

The parallelism between the stack of printed pages and the space of our physical environment explains how our non-reading brain accommodated itself to our reading brain.[30] One's ability to recognize objects and get oriented on the surface of the earth explains in part one's ability to read a text on a page and sense the relations of the pages. Both abilities depend on a highly sophisticated mode of vision. The acculturated mode of vision in a book is a relatively recent human adaptation derived from a natural ability that required a much longer evolutionary development.

If proper orientation and understanding the physical environment was key to survival, and if the adaptation to reading required the rewiring of certain areas of the brain originally devoted to spatial cognition, then it would not surprise that this sense of space would reinforce the process of reading on a printed page in a way that would be lacking in the reading on a digital screen where a physical environment is absent. This kinship between reading and moving through space suggests that the apparent two-dimensional, spatial structure of the printed page is as conductive to reading a text as is the simple direct reading of the elements in a geographic map. Thorndike and Stasz showed that reading and understanding two-dimensional maps is one of the very few cognitive activities that does not show a difference between novices and experts.[31]

Thus a printed page and a geographic map both demonstrate one's ability to intuitively interpret and 'map' mental representations of two-dimensional space. In maps, this is possible due to the conventional expectation to find a direct isomorphism between the representation and the real corresponding areas on the earth. The printed page seems to offer a similar built-in isomorphism requiring zero cognitive load for interaction: left page = left hand, right page = right hand. Industrial designers picked up this type of efficient isomorphism when designing controls that are easily 'mapped', by their shape, location, and orientation, to the functions activated by the controls: from knobs, levers and switches for simple devices such as stovetops to more complex car seats and airplane cockpits.[32] This approach, termed natural mapping, is a sign of superior design where the product affords an immediate reading of its

functions without the need for labels, warnings, arrows or similar remedial directional crutches. Imagine a printed book with a picture of a thumb on the margin of every page: 'this is how you hold the book and turn the pages.' Alas, the white margin is an invitation to our fingers and we don't need instructions to understand its function. *Every good printed book is also a very good, natural map of itself.*

3.Paper and the Psychological Advantages of Materiality

In the future, will paper be a thing of the past? One such scenario is depicted in a 1954 short story by Isaac Asimov:

> Margie even wrote about it that night in her diary. On the page headed May 17, 2157, she wrote, 'Today Tommy found a real book!' It was a very old book. Margie's grandfather once said that when he was a little boy his grandfather told him that there was a time when all stories were printed on paper.[33]

Efforts to mimic the physical book's properties and turn its tactile experience into a digital electronic equivalent have so far failed to replicate the satisfying, traditional reading – and writing – experience.[34] Companies such as Apple have filed patents for electronic embedded signatures.[35] Some have experimented with raised keys for typing on a tablet.[36] Others have added to e-books the simulation of stacks of pages already read and still to be read.[37] While the visual mimicry of paper has somewhat been obtained in e-ink technology, a corresponding tactile experience has not been realized yet. But the unique properties of paper are difficult to replicate digitally and are the reason why virtually everyone today still uses some form of paper, as pointed out by Abigail Sellen and Richard Harper in *The Myth of the Paperless Office*.[38] A warning that could apply to the many unsuccessful developments in e-books and e-readers that try to replicate real books is 'Do not reinvent the wheel.'[39] Thus, a stack of sheets of paper bound on one side is a simple recipe – a kind of sandwich with ink and paper between two covers – that, if it cannot be improved is better left alone. The design of the printed book seems unlikely to get a major overhaul anytime soon. A printed book, like a pencil, is guaranteed to function properly every time it's used: one day, a year, or many centuries later.[40]

'Paper is a humble, simple material, and this simplicity may be the main reason why it has survived the continued attacks from its electronic simulations'

Of course, printed books should be protected from water damage and other perils, but in general, given proper care, their stability and permanence are quite remarkable. Printed books are not so easily damaged or destroyed. But if the same written content is stored inside an electronic device, it could vanish in

a blip, caused by a botched software update, an accidental delete, or worse, an intentional one performed remotely by an all-seeing electronic watchdog. Such was the case in 2009 when Amazon deleted, of all books, George Orwells's 1984 and *Animal Farm* from the Kindle e-readers that customers already owned.[41]

Paper is a humble, simple material, and this simplicity may be the main reason why it has survived the continued attacks from its electronic simulations, underscoring '… a quality […] that may be its greatest strength as a reading medium: its modesty', and '… unlike screens, paper rarely calls attention to itself or shifts focus away from the text'.[42] The major obstacle, so far, of digital books is that they can replicate some visual features of printed books and thus somewhat replicate the superficial retinal experience of reading, but they can only simulate the physical experience of flipping through the pages and reading with all the senses. So far, *paper has been simulated but not replicated.* Can it ever be?

The philosopher John Searle warns about the confusion between simulation and replication when discussing the digital: 'Even with a perfect computer emulation of a stomach, you cannot then stuff a pizza into the computer and expect the computer to digest it.'[43] Since the invention of the codex, the basic structure of the physical book has remained virtually unchanged. Today, where text is the main feature, pages are still rectangular, oriented in portrait format and bound along one of the long edges. A simple object, but a very hard one to replicate digitally.

If a printed book cannot be replicated digitally, perhaps it's best to simply make good use of the better properties of both media.[44] In a printed book, one can usefully exercise the natural ability of spatial orientation, fast random-access, and perception of the text in its entirety, all great aids to memory and understanding. But if what is needed is quick consultation of information such as addresses or dictionary definitions, or even complex procedural information like a sequence of instructions, perhaps a digital format is not only acceptable but superior. Another good example of the digital is the ability, for visually impaired users, to increase the font size of a text, especially since large print books have recently become less available. But focus, attention, comprehension and fixation in memory in the reading process of a long, complex text seem to benefit greatly from the physical interaction afforded by paper and the printed page. A physical interaction cherished by lovers of print like the singer-songwriter Patti Smith, for whom: 'There is nothing, in our material world, more beautiful than the book.'[4]

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