

Book Review

The Shallows: What the Internet Is Doing to Our Brains

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In the *New York Times* Bestseller and 2011 Pulitzer Prize finalist, *The Shallows: What the Internet is Doing to Our Brains*, author Nicholas Carr takes the reader on an historical journey of technological inventions perceived as advancements, as he informs and cautions the reader on the implications of the latest installment of these innovations, the Internet. Carr, a writer for the *New York Times*, the *Wall Street Journal*, *The Atlantic*, and *Wired* is also the author of *The Big Switch* and *Does IT Matter?*, books which are critical examinations of information technology and its potential for detrimental effects on the general public. *The Shallows* argues that the information highway is leading us to a questionable destination. By providing notable examples of technologies introduced throughout history and describing the negative cultural and societal consequences of the adoption of those technologies, *The Shallows* encourages the reader to ruminate on the effects the Internet has had on the human brain and the resulting changes in personal and societal behaviors.

In his examination of technologies introduced throughout history, Carr provides a well-developed and balanced introduction to the socio-cultural pros and cons of technological development. As Carr plods from Gutenberg's printing press to Nietzsche's typewriter, he adeptly intrigues the reader with evidence of how each new contraption spelled changes for the user. But Carr doesn't stop his treatise at the superficial observation of behavioral changes; he provides evidence of underlying physiological and anatomical changes accompanying the behaviors as he supports his arguments with scientific findings on neural plasticity. The book claims

that the Internet is adversely affecting the human brain rendering the brain incapable of contemplative and reflective thought processes and creating a distracted populace. Carr maintains that “It [the Internet] is so much our servant that it would seem churlish to notice that it is also our master” (p. 4). In *The Shallows*, Carr makes a convincing argument that the Internet is indeed fragmenting the human brain.

In order to provide support for a well-developed argument of the negative effects of the Net on users, Carr retreats into history to extract examples of inventions hailed as having a beneficial influence on lifestyle. Carr gives the reader background on the ways Nietzsche felt the typewriter ball changed his composition style, and the author provides illustrations regarding how map making helped individuals discover structures otherwise unknown. These examples are supplemented by Carr’s thorough treatment of other inventions that have happened over time and affected the culture of the time. For example, the author’s recounting of the progression of timekeeping takes the reader on a journey to discover how the timepiece changed from large pendulum-swinging mechanical clocks to smaller and less expensive regulators carried on persons as part of their daily clothing, ultimately dominating day to day living with regimen. The miniaturization and proliferation of timepieces have pushed people from the Middle Ages to the Renaissance to the Industrial Revolution continuing to the modern era. It is not merely by coincidence that this chronicle and others in this book reinforce the author’s position in an analogous storyline. Time and again the author narrates relevant accounts of inventions at work in the lives of users proliferating to play ever increasing obtrusive roles. With each subsequent example, Carr traces the resultant negative consequences of the innovation. While the author’s comprehensive discourse on the role of technology in defining civilization and the debates that have ensued with the introduction of each new gadget is substantive, readers may grow weary of the dialogue as they are unable to see the connection with the book title.

The merit of the book is discovered in the voluminous scientific evidence presented regarding the neurologic changes the human brain undergoes in response to environmental challenges. This scientific information underpins Carr’s claim and provides much needed credibility to the thesis of the book. Carr quotes Gary Small, director of UCLA’s Memory and Aging Center, who claims that “digital technology... is profoundly altering our brains.” Small goes on to support this claim with evidence that the use of these digital tools “stimulates neurotransmitter release, gradually strengthening new neural pathways in our brains while weakening old ones” (p. 120). Carr cites findings by Patricia Green

in her 2009 *Science* article that improved visual-spatial skills can be traced to the increased use of the Net and other screen-based technologies; however, this enhancement comes at a price, as abilities for deep analytical and critical thinking and reflective thought processing have diminished (p. 141).

Carr delivers a well-constructed discussion of the requirements for processing and storage of information by the human brain and continues to support his proposal by building upon existing and new-found knowledge of short and long-term memories. Carr explains that paying attention to a piece of information causes the frontal lobe to communicate with the midbrain provoking those neurons to release dopamine. When the hippocampus gets this dopamine, it consolidates explicit memory. Explicit memories are those thought of as being remembered; such as, facts, events, feelings, etc. However, the volume of competing information received by the human brain as it moves into an online environment exceeds working memory capacity. Consolidation of memory cannot occur because our frontal lobe cannot focus on one thing long enough to allow that process. As Internet use increases, it becomes more difficult to store information in memory; hence, the reliance on the Net's ubiquitous supply of artificial memory. It is a case well-made by the author. While many want to compare human memory to computer memory, Carr cautions the two are not the same. Human memories are ever changing, molded by contexts in which they are made and retrieved; computer memory is static, stored in bits. While memory making is an unconscious event, it can be directed by control over the supply of information the brain receives; in this case, by the user's choice in frequency of Internet consumption.

Carr provides evidence regarding changes in brain circuitry brought on by Internet use. He reports on numerous scientific studies which reveal a molecular basis for behavioral changes resulting from the increased use of digital technology. Reporting these findings, though they may be complex in nature to read and digest, lends credence to Carr's claims. Carr provides the findings of Eric Kandel's studies involving the cellular mechanisms at work in making memories. In the science underlying the assertions made by Carr, skeptics will find assurance that the author is not merely attacking digital technology (pp. 182–187).

An interesting inclusion in this book is the chapter entitled, "The Church of Google." The addition of the information found here is foundational in informing the reader how the Internet is typically used on a daily basis. The chapter moves from the creation of the giant among search engines to its current form and enlightens the reader. In expounding upon the Google philosophy, Carr flashes back to Frederick

Winslow Taylor's mantra of "maximum speed, maximum efficiency and maximum output," made known in the 1922 publication of *The Principle of Scientific Management*, to accentuate a lineage and enable the reader to grasp the significance of the mechanisms (conceived a century ago) at work behind the scenes of an Internet search. A recollection of the pilgrimage taken by Larry Page and Sergey Brin in the creation of Google will further transform the reader's future use of the engine to far more than a series of clicks.

The Shallows provides a walk down memory lane as it enumerates innovations throughout human history and comments on the roles played by technology in shaping civilization. For this alone, the book is a success. This historical foundation is appropriate, though cumbersome, as the reader moves in and out of the changes incurred by embracing technology. Though Carr relies heavily on this supporting framework, he is wise to firmly position his statements on the cornerstone of research-based, scientific evidence. Inclusion of authoritative reports on the ways the human brain reacts to changes in its environment is critical to Carr's claims. This book makes a valid case that the human brain is changing as a result of increased use of the Internet and other screen-based technologies. With its body of distractions presented under the guise of increased access to information, the Internet is succeeding at the use of linked content to whisk the user away from a rich and in-depth understanding found in reflective thinking toward superficial, albeit fast, chance encounters with information.

Carr adeptly notes that each technology introduced throughout history has had an effect on humankind. From the printing press, to the radio, to the computer, to the Internet, changes in technology have left their marks on an ever-changing landscape. While Carr comments on the implications of Internet use with regard to changes in the human brain, he is unable to know the ultimate cultural and societal outcomes of Internet use. The jury is still out as to whether the scanning and skimming type of thinking promoted and reinforced by the Internet will serve civilization for better or for worse in the long run.

For the reader who is interested in a discourse on the history of technology, *The Shallows* delivers. Furthermore, it is a good book for educators who are intent on contemplating the consequences Internet use may have on the educational system. According to Carr, the advent of the Internet has changed the way humans think and process information, behaviors directly related to human learning. Educators of today have a valid concern with regard to the learning habits of their students. These learners may have a different circuitry in place as teachers strive to help students acquire reading skills. Educators expecting students to

read a conventional textbook in order to learn content may be dismayed when that material is not retained; yet, it will not be for the reasons suspected by the teacher, who may assume the reading assignment was neglected. Instead, it will be due to the inability of the student to comprehend because his circuitry for that task simply no longer exists. In fact, it may never have been formed. Future educators will need to be innovative in the methods used to deliver information to learners who have grown up with Google and are used to the distracting reading environment of the Internet.

The Shallows is a thought-provoking read for anyone who uses the Internet on a daily basis. It is plausible that Internet use has resulted in adapted brain circuits that are not the same as those created for reading words printed on the page. What does this paradigm shift mean for education; indeed, where does society as a whole envision itself with this new standard? The human brain may need to evolve new cognitive strategies in order to retain and apply the abundance of information that is now so readily accessed via the Internet.

Reference

Carr, N. G. (2010). *The shallows: What the Internet is doing to our brains*. New York, NY: W.W. Norton.