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Critical Review the Superficial Generation: What the Internet is doing with our Brains

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Abstract- Nicholas Carr book, The superficial generation: what the internet is doing with our brains, raises the question of the relationship of the human being to the internet through the intellectual technological tools used to expand/assist the mental capacity. Nicholas Carr (2011, p. 70) affirms that the set of intellectual technologies

> include all the tools we use to extend or support our mental powers - finding and classifying information, formulating and articulating ideas, sharing know-how and experience, measuring and performing calculations, expanding the capacity of our memory.

Among other examples of technological technological tools are the book, the computer and the internet. Carr (2011) observes that the internet is the intellectual technological tool with greater power to absorb the individual to the virtual environment. With the decline of computers to portable formats (smartphones, for example), it has been coupled to the natural physical body, exercising an increasing control over it by keeping it dependent on it, and most amazingly, it is reconfiguring the human mind itself. In the work, there is a well-founded alert to the question of the influence of the internet either on the brain development of people exposed to this type[1] Three central ideas are identified that represent all the discussion promoted in the work reviewed and will be duly explained below: intellectual technological tools versus human body, which frames the Internet in the set of intellectual technological tools, discussing the interaction between technology and the human body, and announcing in a wellgrounded way the harmful effects of the massive use of these tools, specifically the Internet.

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Critical Review the Superficial Generation: What the Internet is doing with our Brains

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The dichotomy between what technology brings positive or not to the person or society that exposes itself to this artifact is what permeates much of the work. The great challenge brought by the author lies in the anguish of living offline while the internet offers numerous attractions, however, it promotes a certain form of alienation.

Three central ideas are identified that represent all the discussion promoted in the work reviewed and will be duly explained below: *intellectual technological tools versus human body,* which frames the Internet in the set of intellectual technological tools, discussing the interaction between technology and the human body, and announcing in a well-grounded way the harmful effects of the massive use of these tools, specifically the Internet. The second central idea is the *deep reading versus surface reading,* idea that supports the whole thesis defended by the author (and is present in all the discussions developed in the book) and explains the dissolution of the linear mind. The third central idea brings *the effects of the internet on the brain in the light of science,* which completes the purpose of the book by answering the key question raised by the author: "What is the internet doing with our brains?" based on Neuroscience, Neuroplasticity, Psychology.

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[1] Two-way technology where the interaction between person and artifact occurs in real time.

I. Intellectual Technological Tools Versus Human Body

The human - tool relationship is approached in order to alert readers to a critical attitude towards interactions with technology, since, according to the author, "[...] technology is not only a tool, inert until we take it, and inert again when we set it aside. "(CARR, 2011, p.14). It influences the thinking and action, above all, intellectual technologies, because "they are ... more intimate tools, the ones we use for self-expression, to shape our public and personal identity and to cultivate relationships with others. "(CARR, 2011, p.70). This influence is characteristic of intellectual technologies, which are imbricated with implications for the required functioning of the human mind (the mind is summoned to fit the parameters of each intellectual technology), a phenomenon that Carr (2011) calls intellectual ethics, commenting that this ethics is neglected by the inventors of such technologies, by not paying attention to the consequences of the technology they have developed, and by users, who see the benefits and disregard the potential or actual effects of using those tools.

a) Deep versus superficial reading

The relationship between deep reading versus superficial reading supports the whole thesis developed in the book The surface generation and is reiterated in all the themes dealt with in the book, that is, from these two forms of reading, the author conducts his thesis based on his own experience as a deep reader of printed books and, after suffering influence of the Internet intellectual technology in his way to read/think (and realize this problem) as a superficial reader in the online environment. Carr (2011) reveals what made him aware of the changes he had undergone after adhering to online reading by saying that he realized: "[...] something has been with my brain, remapping the neural circuits, reprogramming memory. My mind is

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changing. I feel more acutely when I am reading. "(CARR, 2011, p.17).

This idea explain show new habits - how to read online, in an environment prone to disperse the focus that would be dedicated to reading, once there exist in it, several other concomitant activities: reading a text and checking a new e-mail and redirect the attention to a hyperlink that displays an image and listen to the background music of the virtual page and respond to the message of a friend in a social network etc. - transform the mental models, because the author proves, by opposing the act of reading deeply and reading superficially, that the habit of reading texts in the internet environment is promoting the dissolution of the linear mind - concentrated in reading, active through reflections , generating knowledge - for a mental model that the Internet encourages: dispersed, that goes through everything and does not go deep into anything.

It is understood that with the printed book, we managed to circumvent the predisposition of the human mind to inattention[2], offering the possibility of focusing on what you are reading/having direct contact. This focus and concentration ensure immersion in the content of what is being read, leaving the surrounding environment to the individual who is reading in the background. Thus, the individual experiences the deep reading that allows the deep thought and confers to this individual the state of attentive and critical reader. With the transposition of the text of the printed page to the electronic page of the internet, the virtual/online environment in which the reading happens, is confused with the text itself, hindering in the sense of competing with the text for the attention of the reader, through various stimuli - sounds, flashing screens, various access points (hyperlinks), which interfere with/displace the attention of the reader. In addition to stimuli, the internet offers the of searching for information, further encouraging the reader not to delve into reading for ease of retrieval of that information later.

The book's understanding of what characterizes mind/linear thinking is the stillness, focus, and continuous flow of ideas, characteristic of deep reading, which is the ideal position for the reader in the face of texts. As a counterpoint, the mind that the internet form is, as written in the ear of the book (CARR, 2011):

"A new kind of mind that wants and needs to take and share information in short, disconnected, often overlapping outbreaks - the faster, the better."

In addition, in the online environment, from interruptions to linear thinking, the prone reading is not deepened. It is proven in the discussion developed throughout the book that the internet has stolen the attention of its users, who are drifting in their electronic environment, wrapped in resources that lead to distraction and passivity in front of what is read since they only wander through content without only processing data that is made available at high speed by electronic means. The author makes a rather illuminating analogy for the understanding of this shift from linear thinking to evasive thinking: he compares deeper reading of a printed text to the immersion of a diver in the water; while the superficiality of a surfer, who just glides on the water, to the online reading that is practiced in the environment of constant interruptions of the internet.

Thus, the loss of deepening dedicated to reading to the detriment of “surfing” is admitted on the web through the justification that this superficiality in which people devote hours of their free time can facilitate practical questions such as avoiding large queues, whether banks, supermarkets, among others. However, the author refers us to questions that go well beyond the simple practicality and benefits that the Internet can bring. These are serious ethical and cognitive issues in which people who use this tool seem to be unfamiliar or not very concerned about these aspects.

With this central idea, the author tries to arouse the readers' awareness, to be reflexive about the posture in the use of the intellectual technologies; make them more critical of the facilities offered by the Internet: it will gradually make them dependent on their wonderful features - applications that help manage social relationships, such as hundreds of virtual friends together on a (making the essentially social component of the physical person irrelevant); enable real-time communication (and real-time response is expected); allow ready access to information at any time (exempting the user from cognitively grasping such information), etc.

b) Effects of the internet on the brain in the light of science

To answer the crucial question of the discussion unleashed in Nicholas Carr book - What are the effects of using the Internet in the way our minds work? -, it uses scientific explanations from Neuroscience, Neuroplasticity and Psychology. All the scientific grounding that Nicholas Carr incorporates into the discussion seeks to better substantiate what he perceived with his shift from the deep reader to the superficial reader due to the consequences of the unreasonable and exaggerated use of the internet.

Online space encourages careless reading, rushed thinking, promotes superficial learning and disconnects the individual from the real world by leaving him busy essentially processing so many things without

[2] "The natural state of the human mind, like that of the brains of our kin of the animal kingdom, is one of inattention. Our predisposition is to shift our gaze, and thus our attention, from one object to another, be aware of the maximum possible that is happening around us "(CARR, 2011, pp. 93-94).

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necessarily taking care of aspects such as reliability, utility, accuracy, accuracy and contextualisation of information. "Our use of the internet involves many paradoxes, but the one that promises to have the greatest long-term influence on how we think is that it holds our attention only to break it." (CARR, 2011, 165).The individual has his attention absorbed into the virtual environment of the internet and, regardless of what has led him to this environment - reading a web page, searching for information, watching a video - the medium itself fragments the attention taken by the individual in several other activities - in the case of reading a text page on the web, the internet offers the reader so many other stimuli (visual and auditory): ads on the edges and between texts, links to related subjects by urging them to be clicked (links are often written in a different color than the rest of the text, highlighting them), complementary videos - which do not allow the user to concentrate, only respond to their stimuli, being pushed incessantly from link to link. The repetition of this behavior of letting go of internet users prevents the mind from thinking deeply and creatively. On the other hand, deep reading is the ideal condition to overcome this breach of attention that makes it impossible to immerse in what one reads. Carr (2011, p. 165) further states that "the slow procession of word through printed pages retreated our longing to be inundated with mental stimuli."

Neuroplasticity studies say that there is an interrelationship between technology and mind. The mind is subject to change by the use of technology, that is, remodeling of the physical structure and functioning of the human brain may occur. "As many neuroscientists have discovered, the brain - and the mind from which it originates - is constantly under construction." (CARR, 2011, 61). And in this process of continuous readaptation due to the plasticity of the brain, there is the weakening of what is not used and the strengthening of what is most repeated. The plasticity is explained as follows:

> every time we perform a task or experience a sensation, physical or mental, a set of neurons in our brain is activated. If they are close together, these neurons connect [...]. When the same experience is repeated, the synaptic bonds between the neurons become stronger and become more numerous, both through physiological and anatomical changes [...]. Synaptic linkages may also weaken in response to experiences [...]. What we learn as we live is embedded in the cellular connections in perpetual change within our heads. (CARR, 2011, page 47).

What the author wants to convey with this is that "bad habits get embedded in our neurons easily as good habits" (CARR, 2011, 57). And these changes due to plasticity can also trigger mental pathologies such as depression and obsessive compulsive disorder.

One of the significant points of this central idea of the book is the presentation of the theory of the Australian educational psychologist John Sweller, who developed a study on how the mind processes information to generate the learning - Instructional Design in Technical Areas, of 1999. According to Carr, is the Sweller's work that gives the clarifications on what the internet does with the thought to interfere in this so that it does not deepen. Carr (2011), reverberating Sweller's(1999) study, explains that the brain has two distinct types of memory: short-term memory and long-term memory.

> With short-term memory, we retain our immediate impressions, thoughts, and sensations that tend to last only a matter of seconds [yet] all things we learn about the world, whether consciously or unconsciously, are stored in long-term memory, which remains in our brain for a few days, a few years or even a lifetime. (CARR, 2011, p 171).

It occurs that a specific type of short-term memory, working memory, "plays an instrumental role in transferring information to long-term memory and thus in creating our personal stock of knowledge." (CARR, 2011, pp. 171-172). And for long-term memory storage to occur in what has been learned or experienced, so that it becomes conscious in thought, the brain has to retrieve that content and bring it into working memory. Carr (2011, p. 172) adds that neuroscientists have found that long-term memory is "the seat of understanding. It also stores [...] complex concepts, or 'schemes'. By organizing scattered pieces of information into patterns of knowledge, schemas give richness and depth to our thinking. "The individual, from these acquired concepts, understands new concepts by making associations between the two; In this regard, Sweller (1999, p. 172) proclaims: "Our intellectual performance stems largely from the schemes we have acquired over long periods of time."

The depth of the individual's intelligence is dependent on the brain's ability to transfer information from working memory to long-term memory and from the ability to engender the association of concepts. However, the transfer of working memory - which has the capacity to deal only with a small amount of information - to the long-term memory - which has vast capacity - is a task that requires concentration/attention (precisely what the Internet harms) because

> [...] we can process no more than two to four elements at a time [...]. Those elements, moreover, that we are able to retain in the working memory will quickly disappear "unless we are able to [sic] renew them by training." (SWELLER, 1999, apud CARR, 2011, p 173).

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This quote illustrates the need to obey the limit of the mind to the cognitive load, here meaning "information flowing into working memory" (CARR, 2011, p.174) and which enables the retention of information for the mind to do the connections with what is already known (which is already incorporated in long-term memory). By extrapolating this limit, "we can not translate the new information into schemas. Our learning ability is impaired, and our understanding remains superficial. "(CARR, 2011, p 174).

The discussion returns to the importance of attention/concentration, as the ability to maintain attention is dependent on working memory. Too much information in the working memory increases inattention and confuses the judgment of what is relevant or not: the overloaded mind does not think, does not make concatenations, does not understand, is only drawn. Working memory, in order to function effectively, needs depth and "the key to memory consolidation is to be attentive." (CARR, 2011, 263).

We come to the answer to the question raised in the book: The Internet is stealing the memory (and hence intelligence) of people who are inadvertently allowing it to replace the rich content of their natural stock of knowledge acquired through the labor of thought deep into virtual stocks - the databases/ information that are offered on the internet as a way to store knowledge beyond the mind/body, such as Google's information retrieval mechanism. The facilities and their promises instigate the adoption of what is artificial (the technological tools) to the detriment of what is natural and should be paramount. The final lesson that Carr (2011, p. 265) leaves is that "the more we use the web, the more we train our brains to be distracted" and the more we lose our mental abilities.

II. Critical Appreciation of the Researcher

Plato presents in his dialogues the concept of the world of ideas, through which it is intelligible or sensible. In other words, Plato writes about the cave myth to elucidate more clearly the intelligible world universe, or commonly called the world of ideas, in which things follow an idea of perfection and intangibility, where people are only imperfect copies of that world; this idea extends to the concept of everything. Bringing this platonic concept to the internet, in fact, one can observe that the internet is an appearance of relationships and social interactions, an appearance of life as a whole.

While it is believed that the tools widely offered on the Internet are exclusively helping people to save time, shorten distances, support memory, for example, it is acting uninterruptedly to entertain/occupy users in order to turn them into mere receivers, covering the path that allows the interlocution, the critical position: the thought, its natural faculties.

The symptoms of the fusion of the artificial with the natural are perceived when a source, which should be the memory of the individual, for example, is replaced by artificial memory redeemable at any time through the search engines spread over the internet. The individual sees the advantage of retrieving any information he needs through the world wide web and does not care whether his intelligence is being shredded; he thinks, "It's there, I do not have to learn, I just have access." There is clearly the transfer of thinking /learning/analyzing (typically human) to simply access (technological).

Carr warning (2011) is to raise awareness of what the internet is doing with the mind, but also to say that these new habits that are being adhered to with the use of the internet bring physiological consequences. The frequency with which they are repeated entails their incorporation into the natural functioning of the physical body. If a person, for example, who formerly enjoyed the privilege of being a profound reader, but who after regularly enjoying reading online, realizes that instead of using his ability to concentrate on reading, he looks through a text seeking to find only keywords, releasing itself from immersing in the content and, thus, generating the understanding; the resistance that your body (brain) will exert to deepen your reading is a result of the adaptation that your reading has undergone, by repetition, to the superficial reading mode. This is what neuroplasticity has revealed: the brain is constantly being built (and adapted) and bad habits can cause linear (focal, reflexive) mind dysfunction.

The internet is transforming people into their resemblance because, from the intensive work it undertakes in attempting to expropriate people from their (essentially) human capacity for attention - ability that ensures that the mind engenders concatenations with the information it receives and transform them into knowledge, the role of the thinking being alone -, the empty mind of intellectual learning ability glides aimlessly, without inferring, without apprehending, without contesting and generating knowledge; only processing data and responding to external stimulus requests. And so, the human being is a little different from his internet mentor. And the worst: he seems to like the approach and identity he had gained with the machine. Perhaps the hypothesis raised by Teixeira (2014) explains why this approach is not perceived as eminently dehumanizing:

> the internet is the most neuromorphic technology ever invented. That is, it is extremely similar to the human brain. Its architecture is similar to an immense neural network. [...] Without realizing it, when we surf the internet, we have the sensation of traveling within a large human brain, a complex

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> network of synapses linking the neurons to each other. The links, which always refer to other links in an endless process, are organized in the same way as the circuits in our brain. Moving from one link to another, and often even forgetting the original reason why we entered the network happens very often. [...] The internet, built as an immense neural network, is a giant imitation of the human brain. Nothing can be more comforting than, as we look everywhere, we will only find ourselves in the world. (TEIXEIRA, 2014, p.53).

Therefore, people's on-line interactions will depend significantly on their choices; if they choose to go online all their free time, they will probably sooner or later experience the cognitive lag when they come across someone who has more conscientiously managed this exposure to the virtual environment. It is critical to discern what is right for you to follow or not. This critical sense still exists in people. It can be said that there is still a possibility and when there is possibility, there is choice, where there is choice there is freedom.

It is important to understand that when reading a printed book, the ideal rhythm is obtained to capture/ apprehend the maximum and transfer (with the aid of working memory, which depends on the attention to execute the transfer) to the knowledge stock (for the long-term memory). On the internet, on the other hand, the large volume of information overloads the capacity of working memory (because it steals the attention, thus, it is not discerned), making it difficult to inhibit transference. With this, the internet steals the attention, essential for the memory to consolidate; memory can not be formed due to lack of attention; and intelligence embedded in long-term memory can not even be accessed or supplied without the attention of people. It seems that the internet is subverting its condition as belonging to the set of intellectual technological tools: instead of extending or supporting the mental powers, it is gradually substituting the thinking and creative mind for a shallow, shallow mind that reasons with difficulty and which evil reads, contemplating and inferring to generate new knowledge and subsequent knowledge.

In addition, the human mental adaptability to the intellectual ethics of the web whose base is the calculating/algorithmic thinking of technology, exceptional in following rules, but incapable of making judgments or demonstrating true empathy or compassion, must not lose sight of the fact that what essentially characterizes human nature is meditative thought, that is, the effort of understanding the world through refined perceptions, emotions, and concatenations - fruits of contemplation and reflection. Hence Carr final warning (2011: 305): "As we come to depend on computers to mediate our understanding of the world, then our intelligence will flatten into artificial intelligence." The question is: will we passively accept, without question and reaction, that the elements that define our human essence are outdated and therefore must be dispensed with ??

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