DIGITAL READING:
FROM THE REFLECTIVE SELF TO SOCIAL MACHINE

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what-is-a-literal-reading-lessons-from-gregory-of-nyssa-and-augustine

ABSTRACT. Using the form of dialogue, this paper analyzes reading in the digital age. The paper reveals the history of reading from Augustine to Wittgenstein as a changing and evolving set of practices such as the cultural invention of silent reading, mass reading, and rise of specialized reading publics. It analyzes various

changes to these practices in the age of digital technologies, and links digital reading practices to the bundle of related practices such as writing, viewing, listening, and surfing the Web. The paper shows that digital reading is a fundamental question in education at all levels. Situated within radical concordance of various media, digital reading expands human artificial memory and causes profound changes in human natural memory. The paper inquires these changes from various perspectives including neuroscience and psychology, and concludes that digital reading is predominantly a social phenomenon. It looks into the relationships between digital reading and cognitive capitalism, and shows that the theory of digital reading should recognize the topology and dynamics of the Web. It inquires this dynamics using the perspective of cultural studies, and analyses digital reading in the context of cybercultures, community cultures, and algorithmic cultures. Finally, it develops the view to digital reading as a cybercultural concept which understands reading as a cultural behavior that emphasizes an ecosystem of digital practices.

Prologue: The Augustinian Model of Reading

Michael Peters (MP): Chad Wellmon writing for the *Hedgehog Review* discusses Augustine's faith in the power of reading as a kind of ascent that is transformative. The divine gift of words is the basis of readerly conversion:

> Augustine's model of reading had a lasting impact in the West. In twelfth-century Paris, Hugh of Saint Victor wrote a manual for students of the Paris cathedral schools on the rules of proper learning. In it, he describes reading as both a technical method governed by rules and a teleological activity aimed at the restoration of the human's 'divine likeness.' Practiced properly, he writes, reading 'takes the soul away from the noise of earthly business' and offers in this life a 'foretaste of the sweetness of the eternal life.' Reading exercises the mind and prepares it for meditation, or what Hugh describes as concentrated and sustained thought 'upon the wonders of God.' (Wellmon, 2015)

Reading is divine; writing, by contrast, is dubious given the way that the author cannot control the meanings generated by the text or the way meaning is disseminated. The rise of modern humanism fixed the critical scholarly

practices that objectified the text as material objects and offer itself for interpretation outside the sphere of divine intentions.

Wittgenstein famously begins the *Philosophical Investigations* with a quote from Augustine's *Confessions:* "When grown-ups named some object and at the same time turned towards it, I perceived this, and I grasped that the thing was signified by the sound they uttered, since they meant to point *it* out." (Augustine, 1.8, in Wittgenstein, 1986: 2) Wittgenstein responds:

> These words, it seems to me, give us a particular picture of the essence of human language. It is this: the words in language name objects – sentences are combinations of such names. – In this picture of language we find the roots of the following idea: Every word has a meaning. This meaning is correlated with the word. It is the object for which the word stands. (Wittgenstein, 1986: 2)

Burnyeat exhibits "the passage Wittgenstein has made famous as the precipitate of some 800 years of Platonist philosophizing" (1987: 3) and corrects the common misunderstanding revealed in the preceding paragraph from the *Confessions* that Wittgenstein does not quote:

> Augustine claims that his elders did not teach him to speak. He taught himself. Fewer still, I imagine, will be aware that on this point the adult Augustine's account of his childhood derives from a quite general philosophical thesis to the effect that no man ever does or can teach another anything. (ibid: 1)

Of course, learning to speak and learning to read are different but related and overlapping practices of developing understanding as a human being in our increasingly complex form of life. Increasingly, it is clear that we are entering a digital form of life where both reading and writing are transformed, as is speaking.

"Reading" in "reading literature" is no longer and less and less so, an induction or socialization or initiation into a form of life with its own rules and practices. Computational reading, scanning, "distance reading," "texting," "machine reading," "browsing" etc. shed the ritual sacralization and reveal a new instrumental relationship to the text and to the machine. Sven Birkerts writes of "Reading in a Digital Age:"

> The nature of transition, how change works its way through a system, how people acclimate to the new – all these questions. So much of the change is driven by technologies that are elusive if not altogether invisible in their operation. Signals, data, networks. New habits and reflexes. Watch older people as they try to retool; watch the ease with which kids who have nothing to unlearn go swimming forward. Study their movements, their aptitudes, their

weaknesses. I wonder if any population in history has had a bigger
gulf between its youngest and oldest members. (Birkerts, 2010)

Later he describes the virtually paperless laptop world of his students – no
longer dependent on print-on-paper, but on screen-on-screen and face-to-face
– as the world of instant information that erodes certain ways of thinking and
reading. How exactly do the new digital technologies change the way we
read and how does reading on screens differ from reading on paper? As
screens become ubiquitous and mobile, and reading on screen gains popu-
larity through e-readers and increasingly on computers, tablets and smart-
phones, how are the conditions for reading and for learning transformed?
(Jabr, 2013)

The history of reading reveals a changing and evolving set of practices –
from reading aloud to the cultural invention of silent reading (Manguel,
1996), from academic close pedagogical reading to mass reading and the rise
of specialized reading publics. Augustine developed a theory of reading that
has had a deep and ongoing effect on the Western letters. He theorized that
words and images not only mediate our sense of reality but through the
meditative act (and with faith) the reader emerges as the model of the
reflective self that dominates Western philosophy of mind and epistemology.
The *explication de texte* recalls the "pedagogy of the text" that the mature
Augustine develops where attention is directed toward what others consider
essential in the text. Stock offers the following explanation:

> Encouraged by the allegories of Ambrose, he came to understand
> that the reader could distinguish between what Paul called the
> 'spirit' and the 'letter' as a parallel to the 'inner' and 'outer' self.
> Texts and selves interpenetrated: it became possible to look upon
> the building of a new self as an exegetical and interpretive process.
> (Stock, 1999: 54)

Reading the Web?

MP: As the text has changed, and the technologies for producing the text
have changed, writing and composition have also changed to contemporary
forms shaped by Web technologies. With these changes, reading practices
and habits have become part and parcel of a bundle of other practices such as
writing, viewing, listening, comprehension, and speaking. The radical con-
cordance of media that now casts these practices, previously seen and taught
as separate school subjects, as interrelated and overlapping "universal"
behaviors increasingly demanded as an entry point to participation on the
Internet. It is now commonplace to claim that we are at the historical moment
of a great digital transformation at least as significant or even more impor-

tant than the changes ushered in with so-called Gutenberg era circa 1439 (McLuhan, 1962; Ong, 1982; Eisenstein, 1993 & 1997; Febvre & Martin, 1997).

The invention and global spread of the printing press revolutionized the production of texts and mechanized bookmaking.[1] Typographical printing – the Gutenberg Galaxy – led to a "democratizing of knowledge" or at least of the conditions of access to knowledge and created the material basis for knowledge society based on the institutions of the press. The invention of *one* industrial technology, that of print – which superseded clay stamps, woodblocks, and stencils leading to the development of metal movable type and the printing press – created an era of mass communication based on reading rather than face-to-face oral communication. As an industrial technology, the printing press standardized spelling, grammar and punctuation. It slowly advanced mass literacy shifting the focus from orality to literacy – from a culture of reading aloud to one of silent and private reading – spreading the humanism of Renaissance on the threshold of modernity.

Petar Jandrić (PJ): The radical concordance of digital media (re-)opens questions old and new – and one of these questions is how to situate reading in relation to other forms of acquisition of information and knowledge. Famously, Socrates believed that reading is inferior to live conversation, so his works have been preserved through writings of his disciple Plato. In the Gutenberg era, reading has clearly dominated all other forms of acquisition of information and knowledge – at the very end of this era, Paul Levinson argues that text-based media are superior to "literal audio-visual media that replicate the content of human communications", because they allow readers to have "contact with any idea ever thought, any person anywhere, and at any time (Levinson, 1989: 45–48). These days, however, the Internet has become a fully audio-visual medium which supports Socratic conversation, and traditional Gutenberg-style linear reading, and interactive hypertext, and various forms of audio and video communications that allow contact with all ideas and persons anywhere and at any time. In this context, an audiobook or a videobook provides basically the same service as a textbook – in own, distinctive ways, all these books can all be stored, shared, read, and re-read.

So we can understand text in various ways: text as a set of visual signs (i.e. this sentence), text as a (visual or non-visual) object that can be read by humans (i.e. Braille's alphabet), text as a series of digital bits and bytes (this would obviously include image, audio and video)… Furthermore, we can also turn to non-material descriptions – text as a materialization of an idea, text as a sign, text as a message (should this include DNA?). Intimately, I am not ready to reject the distinctions between an article, a song, and a film; yet, the traditional definition of text is obviously insufficient…

MP: Text takes different forms as you point out and each requires a different form of reading. The radical concordance you speak of means that with a "text" that is simultaneously music-text-image a range of different literacies come into play. We have to be careful in my view with ideological positioning for and against new media – this is something that we will no doubt come back to – because it is easy to see how nostalgic for old industrial media some critics are and for the classical model of reading. If the Augustinian model of reading is the meditative self then it is interesting to ask what form the reading self takes with new media today that is 'immediate' and 'ready-to-hand' as well as mostly intertextual and multimedia.

How people read web content or the digital text is a fundamental question in education at all levels yet we know little about it or its consequences for learning in a digital age. Given the rise of digital media, the transition to on-demand content with mobiles driving digital consumption (Deloitte, 2015), and the corresponding decline of print media – the death of newspapers and magazines (Holohan, 2014) – we need to understand the origins and the "triumph of digital culture."[2] While the first e-book dates from the early 1970s it was not until Sony released its reader in 2006 and Amazon released its Kindle the following year that e-books, e-readers and e-reading took off. The Pew Research Center reports that while the proportion of adult Americans reading e-books has grown to some 28% in 2014, print still remains the foundation of Americans' reading habits (Zickuhr and Rainie, 2014). Over 6 million e-books are available free in the public domain in the Internet Archive's Open Library alone (The Internet Archive, 2016). A Springer white paper, "eBooks – Costs and Benefits to Academic and Research Libraries" reports that academic and research libraries are beginning to grow their electronic publications, not only scientific periodicals but increasingly e-books and for good reason:

> eBooks provide substantial advantages to libraries and their users. Both parties gain from 24/7 access, simultaneous user access, wider selection, and immediate updates, while libraries also benefit from back-end efficiencies, such as a lack of storage requirements, reduced maintenance costs, and reduced staffing time for physical handling and processing of print books. (Renner, 2009: 2)

One thing is clear the shift from reading printed text to reading screens online is very different. Highlighting key words, clicking on hyperlinks, instant messaging on Twitter economies, interactive conversations, blogging, and text processing demonstrates the edit and paste culture which indicates the global pervasiveness of the QWERTY keyboard mechanization, the network effect of standard layouts, and the development of other keyboard input systems, touch-screen tablets, and multimedia writing. This culture

suggests a bundle of related practices and skills, where digital reading and writing become parts of the dramatic transformation from standard industrialized academic forms of the printed text to reading online.

Reading in the Age of Cognitive Capitalism

PJ: Sanders and Illich show that the emergence of text divides human memory in two parts: "the natural – that which was born simultaneously with thought – and the artificial – that which could be improved, through precise techniques, or devices, or exercises." (Sanders and Illich, 1989: 26) Human learning – in a wide variety of contexts from targeted school education to almost involuntary reading of street signs – constantly (re)shapes and (re)defines the relationships between the natural memory and the artificial memory. During the past decades, however, analog artificial memory based on ink and paper has transformed into digital artificial memory based on bits and bytes of information. Consequently, our natural memory has also changed – as you intimate in your earlier response, with important but largely unknown consequences in various fields including but far from limited to education.

Some parts of this transformation are well-known. Contemporary curriculum studies are slowly but surely moving away from traditional pedagogical paradigms based on memorization of facts towards one or another concept of "understanding" and "critique." For instance, today it seems generally accepted that it is more important to understand social, economic and political causes of World War II than to memorize sites and dates of important battles. Utilizing this principle, Barbrook's *Class Wargames* (2014) re-enact important historical battles in order to develop new strategies for contemporary social and political struggles. Yet, some elements of the artificial memory still require their place in the natural memory: those who did not memorize the date of the Battle of Stalingrad still need to remember how to find the date of the Battle of Stalingrad. In regards to (retrieval of) memory, this brings about a radical reduction that inspired Nicholas Carr to ask "Is Google making us stupid?" (Carr, 2011). In regards to other areas of human thinking, the new relationships between the natural memory and the artificial memory are often praised as the paths to deeper understanding and critique.

In his research, Carr enters directly into the field of neuroscience. According to Small and Vorgan, there is no doubt that human brain evolves in order to accommodate the advent of the digital. However, they continue,

> it's taken millions of years for the brain to evolve to this point. The fact that it has taken so long for the human brain to evolve such complexity makes the current single-generation, high-tech

> brain evolution so phenomenal. We're talking about significant brain changes happening over mere decades rather than over millennia. (Small and Vorgan, 2008: 5)

Obviously, physiological changes related to digital reading cannot be accounted for in mere few decades of ubiquitous digital media. By and large, therefore, Carr's question whether digital artificial memory makes us stupid is still by and large undecided.

In the context of human learning, neuroscience of digital reading is at least just as interesting as its psychology. In the subtitle to *Alone Together* (2011), Sherry Turkle asks an important question: "Why we expect more from technology and less from each other?" As we increasingly rely on digital technology to mediate human relations, consequences of such mediation seem to result in various pathologies and neurosis associated with using digital communication devices. Still, Turkle's views are far from technological determinism – however vulnerable, human beings are still in charge of own relationships to technology. Thus, she concludes:

> We have agreed to an experiment in which we are the human subjects. Actually, we have agreed to a series of experiments: robots for children and the elderly, technologies that denigrate and deny privacy, seductive simulations that propose themselves as places to live.
>
> We deserve better. When we remind ourselves that it is we who decide how to keep technology busy, we shall have better. (Turkle, 2011: 296)

Neuroscience, psychology, and other related areas, provide instrumental understanding of reading the digital text. Our brains evolve in order to accommodate inter-textuality, new links between text, sound, and (moving) images, and new relationships between the natural memory and the artificial memory. Digital readers are simultaneously alone and digitally tethered. As individuals, we are somewhat in control of our relationships to digital communications. For instance, I can decide to ignore student e-mails outside working hours. However, I am also an intrinsic part of the larger cognitive, technological, and social superstructure of the university. If all teachers at my institution answer student e-mails outside working hours, my decision will not be very productive. Therefore, the burning question of digital reading does not lie merely in neuroscience or psychology – its crucial aspects are collective social decisions such as the culture of 24/7 digital availability. Furthermore, digital reading creates clicks – which create money – and closely relates to the (political) economy of the Internet. This is why, I think, we need to look into digital reading as a social phenomenon – and develop a humanist politics of digital reading in and for the age of cognitive capitalism.

I assume, Michael, that this idea could be easily linked to your ideas represented in *Cognitive Capitalism, Education and Digital Labor* (Peters and Bulut, 2011)…

MP: This is a great lead in question concerning the new political economy of digital reading. Thanks for the heads up on my book with Ergin Bulut on cognitive capitalism, although I also want to get back to your earlier comments on neuroscience. Cognitive capitalism is now a huge new development that has grown rapidly concerning the cultural-cognitive sectors of high-tech, finance, media, education, and the cultural industries characterized by digital technologies and associated with the "knowledge economy," the "learning economy," "post-Fordism" and the increasing flexibility of labor markets. The hypothesis of cognitive capitalism (CC) suggests we are entering a third phase of capitalism, following mercantile and industrial phases, where the accumulation is centered on immaterial assets. CC emphasizes the accumulation of immaterial information-based assets protected through the global regime of intellectual property rights to ensure the conditions for a digital scalability that appropriates and profits from the information commons allowing the creation of surplus value from monopolistic rents. Digital reading, along with digital learning, is absolutely core to the knowledge economy – these skills are its necessary points of entry. Labor flexibilization ensures 24/7 Net activity that is put in the service of a new kind of reading. This is not meditative or immersive reading for the pleasure of the text. Rather, it is a kind of pervasive industriousness attuned to forms of net*working* and brain activity that requires continuous training, skills and attention. The connection here between digital knowledge economy, neuroscience, and the psychology of learning is very close as labor processes are moved from traditional hierarchical Tayloristic forms to new network forms that exploit relational, affective and cognitive faculties.

Cognitive capitalism is an increasingly significant theory, given its focus on the socio-economic changes caused by Internet and Web 2.0 technologies that have transformed the mode of production and the nature of labor. It is closely linked to the concept of collective intelligence based on Internet as platform and new applications that demand digital reading as the initial entry point to any kind of employment in the digital economy and especially those forms not so susceptible to technology. The emergence of digital economy based on the increasing informatization and digitization of production leads to an increasing formalization, mathematicization and digitization of language, communication, and knowledge systems as well as new forms of social media, social networking and the social mode of production enhanced by Web 2.0 technologies. Networks and flows of immaterial labor are based on mass participation and collaboration rather than traditional Smithian division of labor. They encourage a shift towards non-linear and dynamical systems of

labor, reinforcing collective intelligence as the main source of value in the market with emphasis on codification and contextualization of practical and implicit knowledge. Creative learning economies emphasize "right brain" ascendancy with an accent on a psychology of openness, meta-cognition and "learning by doing." There is an infinite substitution of capital for labor for "left brain" logical and sequential tasks releasing creative energies, and an emergence of teams or networks as fundamental labor units developed as part of digital ecologies.

In this new political economy we see the eventual displacement of material production as core of the system with corresponding emphasis on interactive and dynamical relations between material and immaterial sectors (with former the brain and the latter muscle power), and with the digitization and systematization of value (rather than value chains). The private appropriation of global public knowledge can only be achieved through enforcement of arbitrary social conventions (patents, copyright, trademark) and are not reproduced spontaneously by market mechanisms. The growing capacity of computing, copying, file-sharing and storage of information removes the technical fences to property rights that used to help enforcement of intellectual property rights. The expansion of indivisibility and interactions in complex systems leads to a radical reappraisal of the role of positive and negatives externalities. These trends cannot be considered as exceptions or marginal phenomena.

We have decisively moved away from the Augustinian model of reading of the reflective self to the one that emphasizes the "social machine," a term that I take from Tim Berners-Lee when he attempts to describe Web science (Berners-Lee et al., 2006). Speaking of web science, Shadbolt et al. (2013) put the following argument: "During the past 20 years, humans have built the largest information fabric in history. The World Wide Web has been transformational ... Although most people are not formally trained in its use, yet it has assumed a central role in their lives." Web science studies, experiments and analyses are closely related to the form and structure of the Web. Therefore, Shadbolt at al. (2013) argue that we need more research on the topology and dynamics of the Web if we are to understand its form and its properties. They note that one of the difficulties is that large amounts of the Web's content and structure are created dynamically at the points at which users link to websites. They also suggest the need for new research that looks to the future evolution of the Web as an engineered platform and as a generic computational architecture, including issues of scalability, guaranteeing high levels of performance, security, real-time adaptability, resilience and mobile communications. Web science must also take account of the Web as a social construct and here is where there is much educational promise:

> The use of Web-based applications such as social media, online social networking and wikis, for example, has facilitated peer production, crowd-sourcing, widespread network effects, new organizational forms and a general 'deformalization' of organizations. These developments blur state–societal boundaries. They support a move towards 'open-book' governance, transparency and open data initiatives. These hold the promise of co-production and co- creation of government services. (Shadbolt at al., 2013)

The approach from Web science is to understand that the Web ecosystem is a composite open and dynamic system of humans and machines – referred to by Tim Berners-Lee as "social machines" – that signals collective intelligence and motivates web users to collaboratively use and develop collective resources (Hendler and Berners-Lee, 2010).

Under these emergent conditions we need a new concept and theory of reading that recognizes the topology and dynamics of the Web and the forms of reading that are demanded by its users. The new theory needs to recognize the convergence of Web science with the study of cognition focusing on the problem of intersubjectivity or the distribution between multiple minds, and automated cognition with a focus on distribution between minds and media. There is a direct link to education and pedagogy through the concept of the so-called "extended mind" which investigates collective memory, extended cognition, open thinking, social informatics and learning with others. The extended mind is based on the view that human cognition literally comprises states, properties, instances, and processes beyond the boundary of the learner. Variations of this hypothesis talk of "embedded cognition" or "embodied cognition" and even of "socially extended cognition (see Wilson and Foglia, 2016).

The new view is a philosophical argument about active externalism suggesting that the environment plays an active role in driving cognitive processes. According to Clark and Chalmers (1998), "the human organism is linked with an external entity in a two-way interaction, creating a coupled system that can be seen as a cognitive system in its own right." Beyond the outer limits of this thesis we can talk of a socially extended cognition (where my mental states are partly constituted by the states of other thinkers), and also of an "extended self" (where the self outstrips the boundaries of consciousness).

The (Cyber)culture of Reading

PJ: Your understanding of the Web ecosystem as "a composite open and dynamic system of humans and machines" fascinates me. For worse or for better, I will try to approach it from the position of cultural studies. For worse,

such an approach can easily be challenged from the engineer's viewpoint – after all, the Web is a technical system which cannot be understood in purely cultural terms. For better, because Knox shows that cultural studies approaches

> offer two principal and interrelated ways of thinking differently about education: the diversity, nuance, and strangeness of culture, as opposed to the rational universalism of education, combined with useful perspectives from the philosophy and theory of technology, which are able to account for more complex notions of our relationships with the digital. (Knox, 2005: 1)

Knox classifies digital cultures in education in three distinct, yet interrelated phases – cybercultures, community cultures, and algorithmic cultures – and each of these phases sets a different set of issues in regards to digital reading.[3]

Cybercultures are predominantly interested in basic concepts such as identity, space and place. At the dawn of the age of information, such interest was equally reflected in seminal works of science-fiction such as William Gibson's *Neuromancer (*1984) and Phillip K. Dick's *Do Androids Dream of Electric Sheep?* (1968), and in seminal works of social science such as Donna Haraway's *A Cyborg Manifesto* (1985[1991]). In regards to identity, reading digital texts is a transformative act which, by changing the relationships between the natural memory and the artificial memory, also changes what it means to be human. In regards to space and place, the notion of cybercultures is linked with new physical and non-physical geographies. In words of McKenzie Wark,

> There is a sense in which information creates a whole different geopolitics. Information can get from anywhere to anywhere, but it does so often through quite specific pipelines – one needs to map them to see this as a new geopolitics. And this geopolitics is independent of the state system, or sea lanes, or the other traditional maps. (Wark and Jandrić, forthcoming, 2016)

In various ways, the new geopolitics reflects to all aspects of production and consummation of digital content – including, but obviously not limited to, digital reading.

Community cultures have arisen with the advent of the interactive Web 2.0., which slowly but surely replaces the abstract notion of virtuality by the physical and the conceptual notion of the network. Seminal works in this field are predominantly interested in the dynamics of participation within virtual communities, new opportunities for collaboration, collective intelligence, and similar (Rheingold, 1995; see also Rheingold and Jandrić, 2015). In the age when everyone can produce and publish online content, digital technologies (again) take the somewhat instrumentalized role as tools

for communication and mind amplification (exemplary work in this context is Rheingold's *Tools for Thought: The History and Future of Mind-Expanding Technology* (1985)). The community perspective is also interested in the questions of unequal access to digital resources (the digital divide), which bridges the traditional geopolitics of space with the new geopolitics of information. (Recently, Ana Kuzmanić and I (2015) explored these relationships by developing the idea of digital colonialism.) In the community perspective, reading digital texts is an act of communication and collaboration, which simultaneously opens new opportunities such as collective intelligence, reflects the existing power dynamics, and also creates new opportunities for social change.

The most recent cultural viewpoint concerns algorithmic cultures, which are focused to the social and educational roles of automated data processing. Today, our online activities are shaped by automated systems such as Google Search and Amazon Recommender, which strongly influence our reading and buying habits. If my webpage does not appear in major search engines, and if my profile gets banned from social networks such as Facebook or Twitter, this effectively makes me invisible – and, these days, the decisions regarding my online visibility are mostly automated. (Of course, this is just a very rough example of a much more complex issue.) In this way, algorithms shape our virtual (reading) experiences – thus shaping our online and offline realities. Algorithmic cultures introduce radical equality between human and non-human actors – few decades after works of Gibson and Haraway, questions of identity that marked the phase of cybercultures have returned with a vengeance.

From the viewpoint of engineering, algorithms are simple mathematical relationships that are clearly defined by humans. However, algorithms are often hidden from the user, and the interaction between multiple algorithms may often yield unexpected results. Set up by humans, algorithmic actors act fairly independently and unexpectedly. This calls for a conceptual analysis: how (non-)human are algorithmic actors? However, questions pertaining to identity are just a tip of a much larger iceberg. Algorithmic cultures are instrumental in building "the digitally saturated and connected world" (Bell, 2011: 100), where issues of identity are intertwined with issues of community and issues of technology. In the context of algorithmic cultures, therefore, the experience of digital reading is closely related to the nebulous, often illicit interplay between human and non-human actors at various scales from individual reading experience to a wide technical and social construction of reading.

A typical example of algorithmic cultures can be found in bombastic media announcements of robo-journalism – "the process of automatically writing complete and complex news stories without any human intervention"

(Beckett, 2015; see also Adams, 2015). Robo-journalism follows the simple market logic of cost-reduction through replacing human journalists with automated algorithmic systems. Here, the experience of human reading seems at least as interesting as the act of automated writing. Let us engage in a small though experiment. If the majority of people cannot tell the difference between a human reporter and an automated "reporter," then our opinion-makers become machines and those who program machines. Obviously, this reduces the role of journalism as a social critic to various (mostly corporate) interests. In order to restore the traditional social role of journalism, a team of researchers from Stanford led by James Hamilton have "taken the lead in trying to solve this problem using the technologies that are in fact driving it" by developing the approach of computational journalism, "in which computer scientists and journalists are working together to develop new tools for exploiting the rapidly growing databases of publicly available information – and some not so publicly available databases – in order to hold our leaders accountable" (Turner and Jandrić, 2015: 175, see also Cohen, Hamilton & Turner, 2011).

With computational journalism, our discussion of digital reading reaches quite deeply into digital writing. If we remain a bit longer in the realm of reading, however, robo-journalism and computational journalism seem to bring about own versions of another fundamental question asked by Turkle (2011: 296): Are technologies here to entertain humans, or humans are here to serve technologies? Machine-written articles are browsed and read by humans, whose views and clicks and purchases contribute to digital economy – and the acquired profit definitely goes to other human beings. In this context, Turkle's question seems a bit reductionist and/or misplaced. Algorithmic cultures do not represent a digital dystopia where people serve machines – instead, they create a system where some people use machines to push other people into profit-making activities. This pushes the traditional definition of labor to pastures new and unexplored. Factory work from the industrial society was demeaning, but workers were at least aware of the stupefying conditions at their workplaces… In contrast, having people respond to machine-created content – especially if/when they do not know that the content has been created by algorithms – definitely brings cognitive capitalism up to the new levels of dehumanization. However, as Andrew Feenberg says in one of my favorite quotes, "technology is not a destiny but a scene of struggle" (Feenberg, 2002: 15). At this moment, therefore, algorithmic cultures represent an important cutting end of the contemporary social struggle. Thus, our discussion has (again) slipped from issues pertaining to technology, neuroscience and psychology towards issues pertaining to society and social relations.

The perspective of digital cultures offers important insights into digital reading. It asks what it means to be human in the age of the digital text, inquires opportunities for collaboration and new forms of acquiring knowledge (such as collective intelligence), and explores the interplay between human and non-human actors – and all these themes are soaked into questions pertaining to ideology, power relationships, and justice. The phases of cybercultures, community cultures, and algorithmic cultures are dialectically intertwined, because they ask fundamental questions about what it means to be human. Yet, as can easily be seen from the example of computational journalism, algorithmic cultures seem to provide the most complete (and currently cutting edge) approach to digital reading. However, digital reading cannot be thought of (at least) without digital writing – and this brings my analysis of the Web ecosystem through the lens of cultural studies to a (temporary) halt.

MP: I think the approach from cultural studies is legitimate and valid and I have written about algorithmic capitalism and its construction of education through big data and learning analytics. What emerges from this discussion is a notion of reading as a cybernetic concept or cybercultural concept that in the first place investigates "reading" as a cultural behavior that emphasizes an ecosystem of practices including searching, viewing, networking, word processing and the like. In this system, digital reading and writing are nothing like what they used to be in the age of print – although there are significant continuities. The difficulty is that when we come to talk about digital reading or for that matter digital learning we are not talking about one universe of meaning – not simply the book or its replacement the e-book. Instead, we are talking of a range of new social media skills and behaviors that *resocialise* reading including building personal relationships, generating user-content and meta-skills associated with visualization, pattern recognition, improvisation and creativity. Great to work with you again, Petar. This conversation has raised some important issues not least about the theoretical framework to be adopted.

PJ: The pleasure is mine, Michael – thank you for initiating this important conversation!

NOTES

1. Printing presses had produced 20 million volumes by 1500 and 200 million a century later (Fevbre and Martin, 1976) .

2. The phrase is from Heffernan (2011). Heffernan writes: "The Internet is the great masterpiece of human civilization…As an idea it rivals monotheism."

3. This analysis is reworked and expanded from: Jandrić, P. (2016), "The Challenge of the Internationalist Critical Pedagogue," *The Radical Imagine-Nation: Journal of Public Pedagogy. Forthcoming*

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