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Tweet Me Your Talk: Geographical Learning and Knowledge Production 2.0

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We are in a Gutenberg moment in which we are migrating from book reading to Internet browsing. We are subtly shifting to more ephemeral, summary methods of learning and producing knowledge, shaped by how we consume information on the Web. Thus, a strong determinant of learning might be the very technology that hosts the information, such that technology is both the arbiter of our understanding of the world and how we come to gain that understanding. Based on recent evidence that the Internet is reshaping our learning processes, I argue that geographical knowledge production and translation are not so much products of individualism but rather shaped by rapidly changing work styles that favor concise and highly accessible methods of academic production. I offer examples of changes in journal formats, academic social networking, and academic reviewing to reveal that we are catering to shorter attention spans that prefer to browse. Key Words: geography, Internet browsing, learning, technology, World Wide Web.

Nos encontramos en una suerte de momento Gutenberg en el que estamos migrando de la lectura de libros a las búsquedas de Internet. Sutilmente nos desplazamos a métodos más efímeros y resumidos de aprendizaje y producción de conocimiento, configurados según la manera como consumimos información de la web. Por eso, un fuerte determinador del aprendizaje podría ser ahora la propia tecnología que ofrece la información, de modo que aquella es a la vez el árbitro de nuestro entendimiento del mundo y el modo llegamos a alcanzarlo. Basándome en evidencia reciente indicativa de que Internet está reformando nuestros procesos de aprendizaje, sostengo que la producción y transmisión del conocimiento geográfico no son tanto productos del individualismo sino que más bien se moldean por estilos de trabajo rápidamente cambiantes que favorecen métodos concisos y altamente accesibles de producción académica. Presento ejemplos de cambios ocurridos en los formatos de las revistas, en la construcción de redes sociales académicas y en la revisión académica para mostrar que estamos acomodándonos a lapsos de atención más cortos que prefieren lo que los vistazos en la web ofrecen. Palabras clave: geografía, exploración de Internet, aprendizaje, tecnología, Red Informática Global, web.

My brain is plastic and is in the process of being transformed by my tendency to browse and read online. Your brain is plastic, too, and how you read and gather information shapes its abilities in an iterative, self-reinforcing loop. Neurological research is increasingly changing how we think of the human brain. Rather than a hard-wired mechanism, the brain’s patterns of information collection and processing are soft-wired and profoundly affected by the technologies we use (Duffau 2006). Indeed, depending on the technologies that we use to gather and store information, our brains are reorganized and the
neural pathways rewired (Lanier 2010). In other words, our brains are flexible and their structure can be modified at the cellular level depending on exposure and usage (Nudo et al. 1996). A classic example of this is provided by the study of London taxi drivers, whose hippocampi were found to be enlarged compared to those of control subjects (Maguire 2000). These changes were attributed to their accumulated spatial knowledge. The way that the taxi drivers used their brains had in fact changed their anatomy.

Alvaro Pascual-Leone, a neurology researcher at Harvard Medical School, makes the point that brain plasticity is normal (Carr 2010). The challenge with brain plasticity is that once we have wired ourselves into a new state, we are keen to stay in that state. So if we become accustomed to checking our e-mail every five minutes or so (with an attendant loss of concentration), this is the state our brain will seek to remain in—making it harder to settle down to read or write a complex research paper. Every time we scan multiple pieces of information on the Web, we reinforce a neurological pattern of distraction. As Carr (2010) pronounced, “neurons that fire together, wire together” (120). The old neural patterns that supported the deep concentration needed for reading and writing are being weakened. Stone (2011) described this as a state of “continuous partial attention,” in which we are constantly scanning but seldom focusing in depth.

**Our Changing Learning Patterns**

We can look anything up at any time on the Web; as a result, we are in a new normal of understimulating long-term memory. Thus, we are less able to retrieve complex cognitive links from long-term memory and in turn link them to new information to create a synthesis of new knowledge (Jackson 2008). Our attention skills are being attenuated by our lifestyle of interrupted, fragmented learning. This lifestyle of infinite distraction is chipping away at our ability to concentrate and focus—a reality with implications for society as a whole.

A caveat is necessary. Internet use is far more prevalent in the richest countries of the world. A *New York Times* article summarized these differences with a map illustrating close to 100 percent Internet penetration in rich Northern countries, with Internet use as low as 5 percent in parts of Africa (Barboza and Markoff 2011). Even large medium-income countries like Russia show Internet penetration hovering under 50 percent. Distraction is a rich country’s problem.

**Why Memorize? Google It**

Many students believe that memorization is no longer necessary. After all, they can always Google information. But memorization is an aid to a process of synthesizing information into what we call knowledge (Jackson 2008). For many young adults, books are often for skimming, not for deep immersion. Reading is seen as time out from the very important social network. From 1982 to 2002, reading rates plummeted. A report from the Survey of Public Participation in the Arts found that the greatest drop in reading occurred among eighteen- to twenty-four-year-olds. The bar for reading was extremely low. Respondents only had to scan a poem, play, novel, or short story in the last twelve months outside of school or work. Yet only 42.8 percent of respondents aged eighteen to twenty-four had done this (Bauerlein 2009). Another study in 2005 found that among high school students, 77 percent spent three hours or less on personal reading per week (Bauerlein 2009). And even when reading on the screen, students might not be acquiring the same skills that paper reading instills.

Screen-based reading focuses on keyword spotting with nonlinear patterns and does not develop skills related to critical thinking and analysis (Greenfield 2009). The Nielsen Group has done a number of studies on Web site readability and navigability, as well as user habits. One finding was that only 16 percent of Web users read text linearly on a page. Using an eye tracker, the Nielsen Group demonstrated that users jump all over sites, scanning keywords (Bauerlein 2009). Moreover, a 2003 Nielsen report found that the more that a Web page looks like a written book page, the less it is read—or even scanned (think of a PDF; Bauerlein 2009).

**Distracted Learning**

Typically, readers spend between nineteen and twenty-one seconds on a Web page—people do not tend to browse in a leisurely way (Carr 2010). Nor is power browsing as effective as we might hope. After an Internet search, only 25 percent of searchers actually collected the
necessary evidence to support an argument (Jackson 2008). David Lavenda, vice president of marketing and product strategy at harmon.ie, is studying the impact of digital gadgets on workplace productivity (Hansen 2011). Workers change their activity every three to four minutes and traverse an average of thirty-seven online screens per hour. The problem is that our recovery time (time to return to predistraction levels of concentration) is ten to twenty times longer than the distraction itself (Hansen 2011). Distraction is the hallmark of our new reading and learning patterns.

Our neurological reorganization is affected by this radical shift to accessing online information. Hilbert and López (2011) demonstrated the growth of available online information through a calculation of increases in digital storage capacity from 1986 to 2007. Simple digital storage has increased on average 23 percent every year since 1986, but processor speed as measured by millions of instructions per second has jumped by 58 percent per year between 1986 and 2007 (Hilbert and López 2011). Although there is exponentially more information available than in the past, each individual piece of information is being consumed by fewer people than in the past (Bialik 2011). What we can clearly see is that many of us are changing our patterns of attention (Bauerlein 2009; “Editorial: Challenges and Opportunities” 2011).

**Distracted Decision Making**

Angelika Dimoka, director of the Center for Neural Decision Making at Temple University, designed a study to see what happens to decision-making capacity when people’s minds are overloaded with information. Using functional magnetic resonance imaging, she found that decisions became less rational as the amount of information increased (Dimoka 2011). The problem lies in the amount of working memory our brains have (think random access memory). Cartographers have long limited map legends to five to seven items as cognitive researchers identified this range as the maximum number of categories that people can retain (Robinson and Petchenik 1976). Recently during the BP oil spill in the Gulf of Mexico in 2010, Coast Guard Admiral Thad Allen reported that he received 300 to 400 pages of information reported every day and that this deluge might have contributed to poor decisions about capping the well (Begley 2011). Gawande (2010) reported a similar problem sorting information during Hurricane Katrina. Recent research has shown that a fivefold increase in choices leads to poorer, less rational decision making (Jackson 2008).

Ironically, in an era of information overload, our loss of critical thinking skills renders our decision making less effective (Schuurman and Balka 2009). The trauma program manager at Vancouver General Hospital recounts how during a Code Orange during the recent Vancouver riots on 15 June 2001, making critical decisions as leader of the Emergency Operations Centre became intensely difficult in the face of so much incoming information in the form of texts, e-mails, tweets, and so on (Tracy Taulu, Trauma Program Manager, Trauma Services, Vancouver General Hospital, conversation 4 October 2011). At one point, incoming texts stated that the Centre in Vancouver for Performing Arts (a local theater) was burning, but it was not. This is an example in which data and information were not congruent; in fact, the data were incorrect. Making decisions became a game of snakes and ladders.

The brain is becoming better at recognizing status changes rather than discerning continuity over the course of a continuous narrative. What does that mean? You will take better note of an incoming e-mail alert than following a complex multidimensional academic argument in a dense paper. Even recent messages in your inbox will have more impact on your decisions than older ones lingering in the depths. In effect, urgency (or recency) has a greater effect than objective importance (Begley 2011). All the time that we are bathing in information overload, we are neglecting the downtime necessary for our unconscious (creative) brain to help us with the decision-making process (Jackson 2008).

**Our Gutenberg Moment**

The shift from deeply immersive reading to power browsing, and its attendant neurological changes, are the sentinels of changing modes of learning (see also Le Heron this issue). Marshall McLuhan argued that media do not just serve up information; they shape our process of information integration (McLuhan and Flores 1967). Before the printing press, people memorized stories and could recount them with
enormous precision. When reading became common, there was concern that people would no longer “know the stories in their souls” (Carr 2010). We therefore have a juxtaposition between yesterday’s mind, which was characterized by long periods of calm, focused, undistracted reading, and today’s mind, with choppy reading of one-liners, flitting from topic to topic, and skipping among content providers.

Don’t Watch It All; Too Boring: Use Thuuz to Alert You

Increasingly, people don’t watch whole basketball games anymore, or football—or any ball. The National Football League and ESPN both have channels that show only the significant moments of a game, like touchdowns or goals. A new Web site called Thuuz alerts potential viewers that a game is heating up and that they should start watching. Thuuz is based on an algorithm that analyzes sports action to come to these time-saving conclusions (Brustein 2011). Not only sports but all media are shifting toward aggregation. The trend in media is not to hit the streets trolling for novel content to be shaped into impressive journalism; rather, it is to aggregate existing writing into new packages and post them on a site (Keller 2011).

Academics Are No Exception

Likewise, many academics do not read as much and as thoroughly as they used to; they power browse like so many others. A five-year study documented behavior at two research sites operated by the British Library and by a United Kingdom educational consortium (Carr 2010). Both sites reported consistent styles of academic skimming in which scholars jumped quickly from page to page with few revisits to previous pages, articles, or books (UCL Centre for Information Behaviour & the Evaluation of Research 2008). Academic digital libraries are catering to these shifts. The Association for Computing Machinery (ACM), a powerful lobby group and organizational umbrella for computing professionals, has launched a new digital library with bibliometrics for each journal (Anthes 2011). These metrics indicate the impact factor, citation count, downloads in the past six weeks, downloads over the past twelve months, and several other numerical indicators of a journal’s prominence. This reinforces a competitive, number-centric approach to judging the worth of an article and the journal within which it is published. It is also designed to assist academics in making the leap between articles and links. Thus, the ACM is responding to what academics want: to power browse what other people are browsing.

For geographers, the problem is that distraction makes learning less geographically specific and more homogeneous across space. With some major exceptions like China, most of us access the same Internet and can download the same references. In the process, we are equally distracted.

Changes in Academic Knowledge Production

Evidence of this shift in how we learn is reflected in the evolution in academic knowledge production (see also Le Heron this issue). Our journals, PowerPoint lectures, and flash videos reflect the new priorities in our quest to learn—a reluctance to read at length with a commensurate focus on brevity and digestibility. Major shifts include (1) the end of static content, (2) simplification of content, and (3) fewer citations of books. In effect, these changes in our processes of knowledge acquisition and comprehension, and the attendant changes in our neural wiring, have prompted academics to modify their output knowledge and information accordingly.

Journals are shifting to accommodate our collective lack of attention and craving for social media and interaction. A movement away from static content is illustrated by PLOS One. As demonstrated in Figure 1, this open access journal allows users to comment, rate, share, and otherwise interact with scientific papers much like they would with their friends’ wedding photos or an Amazon.com DVD. PLOS facilitates interaction by posting reader guidelines (see http://www.plosone.org/static/commentGuidelines.action [last accessed 8 January 2012]).

The potential for dynamic content in journals has been accompanied by a trend toward simplification of content, including structured abstracts, shorter articles (as the articles...
making up this symposium illustrate), and cut-out boxes with main messages. In the example in Figure 2 from Science, there are links including HTML and PDF files, abstract, supporting material, and podcast interviews. Podcasts, and increasingly slide casts, are a form of summary.

The discipline of geography offers further evidence of a trend toward simplification of content and ease of use. A visit to
Progress in Human Geography (Figure 3) illustrates that browsing articles is now made easier as the abstract conveniently pops up as the user’s mouse passes a section of the table of contents—demonstrating an awareness on the part of journal that readers’ habits, and requirements, are changing.

The International Journal of Health Geographics, a GIScience journal published by BioMed Central, uses crowd-sourcing to recommend articles to casual browsers. As illustrated in Figure 4, readers can select from the most viewed and most forwarded articles—one way to guide readers to primary content. This guidance, however, runs the risk of encouraging a collective passivity in readers—and elevates the risk that a reader might not take the necessary extra steps to source the literature most appropriate for their task at hand.

Clearly, popularity of sites has become a major driver of academic learning and consumption, and journals and funding agencies are cognizant of these trends and are indeed eager to follow.

One Line Is Enuf

Journals are reporting findings on Twitter, as are self-promoting scientists. As you can see from Figure 5, it is possible to report the gist of a study in 140 characters, and it suits our evolving style of learning and comprehension.

Give Me a Status Update

This suits us as researchers—many scholars feel that they don’t have time to digest detailed research briefs—and a lack of deep focus forbids it. Instead, we want the equivalent of status updates: frequent brief communication. National media (who survive) understand this. Note the coverage of radiation at the Fukushima Daiichi power plant by the New York Times in the spring of 2011 (“Status of the Nuclear Reactors” 2011). As shown in Figure 6, one need only click on the reactor update icon to find brief status reports on each of six reactors. This contributes to a style of information gathering that involves frequent, quick peeps at sites, requiring no detailed reading.

Why Should We Care?

Why should we care that journals and their readers want quick, easily digestible word bites and sound bites? Part of the answer to that question relates to our increasing preoccupation with presentation (Jackson 2008). Indeed, presentation has become an end itself. An example of this trend is exemplified by PowerPoint, which allows us to handily simplify a complex issue while also exuding professionalism. There has been a trend over the past decade to use PowerPoint exclusively for conference presentations in the discipline of geography, but its emphasis on presentation over content has profoundly shifted the form of the
academic talk. There is real reluctance to delve deeper than the lines and accompanying graphics on the screen. Our rapid uptake of PowerPoint is just one signifier of a sea change in knowledge dissemination; as evidenced earlier, journals have followed suit in adopting means of production that result in simplified, more accessible content.

How Does It End?

The problem of geographical learning, as Simandan explains in his introduction, is exceedingly heterodox and as a specific subset of learning in general has largely been eschewed by geographers. We find ourselves now in a situation in which academics are being constructed by social media, devices, and the hegemony of the Internet as a source of information. We are distracted, lack deep focus, and concentrate on little emergencies rather than the big picture. In this way, we are like everyone else. There is little doubt, however, that in the process of being reconstructed, we have altered geographical learning. There might be a geographical concentration of these changes in North America and Europe, but it is unlikely that the rest of the Web-using world will be resistant.

Does it matter that we cannot pay attention as geographers—or as human beings? What are the consequences for long-term planning, coherent design, and capacity for deep reflection?
Figure 5  Journals are tweeting paper messages. I don’t know about you, but one line is enough for me to understand a neuroscience paper. I don’t think I will bother to read the paper. Source: http://twitter.com/thefpr.org/academic-journals (last accessed 13 April 2011). (Color figure available online.)

(see also Godlewska this issue; Le Heron this issue)? I am not suggesting intellectual cataclysm, only that we pay attention as we slip away from immersion in information in favor of a rapid, fragmented, distracted style of learning. In Distracted, Jackson (2008) emphasized that “twilight cultures” prefer form and superficiality over substance and depth (26). All media develop some cognitive and neurological skills at the expense of others. All shifts in how we learn result in transformation of our neurological capacities and cognitive skills, and this transformation inevitably exacts a price. As we embrace a more rapid-fire, concise process of knowledge acquisition at the expense of our capacity for profound concentration, perhaps

Figure 6  Click for reactor update. Source: http://www.nytimes.com/interactive/2011/03/16/world/asia/reactors-status.html (last accessed 8 January 2012). (Color figure available online.)
the most we can hope for is that we are attentive to how we are evolving and at what cost.

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