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Digital Literacies

Web 3.0, Litbots, and TPWSGWTAU

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Most scholars and educators agree that digital technologies are changing literacy. One perspective emphasizes differences in the content of traditional and digital literacies. From this perspective, traditional literacy defines the "what" of reading as being about written language, while digital literacies view text as a more dynamic whole that weaves together text, video, image, and sound (e.g., Larson, 2009). Other perspectives emphasize the "how" of reading, by focusing on differences in what readers do in digital environments: choosing links, searching databases, and other activities distinct from what we do in print (e.g., Coiro & Dobler, 2007). My goal in this column is to focus on a perspective that emphasizes the "who" of reading—how digital literacies are changing what it means to be a reader.

The first point I would make is that digital literacies have clear traditional precedents. Focusing on ever-changing technologies (e.g., CD-ROM storybooks) and practices (e.g., text messaging) may obscure both the commonalities between digital and print literacies and the genuine departures from traditional assumptions about readers and text (McEneaney, 2006). Visual literacies, after all, predate written language, and there isn't anything particularly revolutionary about animations, films, or live performances. I would also argue that social media (e.g., Twitter, Facebook, texting) differ more in degree than in kind from their historical predecessors (e.g., conversation, letter writing, passing notes in class); social technologies are popular precisely because they are *not* particularly revolutionary.

Instead, I would argue that the real revolution is about *who counts as a reader.* One clue that points in this direction is that the text we read online is only the tip of a much larger iceberg of "hidden" text (e.g., scripts, HTML) unique to digital environments. In fact, digital text is written for two distinct types of readers: humans and machines. Typically, however, the capacity of machines as meaning makers is underestimated or dismissed entirely.

According to the classic "creativity argument" (Turing, 1950), machines can only do what we tell them to do. Computers, therefore, can't make meaning; they simply express meanings already embedded in their programming. However, the creative potential of machines to paint, make music, and play world-class chess is well documented. AARON, for example, is software that paints (see Clancey, 1997). AARON was developed by an artist, but its creator says he is surprised at the subtlety and complexity that emerge from the programming that guides AARON's work.

Another piece of software, Emily Howell, is to music what AARON is to painting: Emily Howell composes original music that leaves listeners genuinely moved and then, when they learn she is a computer program, angry at her "deception" (see Blitstein, 2010). And then there is Deep Blue, the program that beat Gary Kasparov, the reigning world chess champion, in 1997 (see Saletan, 2007). Kasparov suspected cheating (i.e., human intervention), citing the intelligence and creativity of the game play that had defeated him.

There are also other less admirable "achievements." Do you recall the dramatic stock market drop in May 2010 attributed to a computer "glitch" (Schwartz & Story, 2010)? Did you know that *most* of the trades that take place on Wall Street are planned and executed without any human intervention? I can also share a more personal story. Last summer, I got an anxious phone call from my 16-year-old daughter. She had been surfing the Web and now had an urgent pop-up message indicating her computer was infected with a virus and she should click a button to download software that would clean her computer and prevent future infections. Sound familiar? In fact, the "antivirus" software itself was the virus.

The point in these stories and examples is this: for good or ill, it no longer makes much sense to insist that machines are simply inert tools.

Digital environments have made the metaphor of "interactive reading" a literal reality. Digital text exerts control over readers and reading environments in ways that have never existed in print. Perhaps most important of all, the next version of the Web will be about programs that read the Web like we do (Giles, 2010).

Evolution of the Web

In the beginning, the Web was not much more than a high-tech bulletin board that most of us couldn't reach. In Web 1.0, reader and writer roles were distinct. To be a writer, a person had to know something about HTML and Web servers. As a result, most of the people online weren't fully Web-literate because they couldn't write using the technologies that the Web required. Web 1.0 reflected the interests of a select few.

In the next phase of evolution, the Web became social. A big part of that change was the development of tools that simplified posting content. In Web 2.0 we are *all* writers (and readers, too) and that is how we managed to create a social Web. The egalitarian spirit behind Web 2.0, however, is limited to *human* readers and writers, with machines still operating in the background. The next phase of development, Web 3.0, will focus on *machine* readers and writers, and we will need to get used to the idea that litbots (i.e., *lit*eracy ro*bots*) are meaning makers.

Central to the emergence of litbots are two long-standing and currently very active research programs in computer science: agent-based computing (Jennings, 1999) and the Semantic Web (Feigenbaum, Herman, Hongsermeier, Neumann, & Stephens, 2007). Agent-based computing is about using large numbers of simple programs to do what usually requires a single, big, complicated program. It turns out that collections of small autonomous bots can solve surprisingly difficult problems. The Semantic Web is about making the Web machine readable, so that computers can read the Web content that interests *us*. In other words, the Semantic Web involves creating litbots that read and write *our* tip of the iceberg. Web 3.0 will be about developing software that makes meaning!

Think about the impact of Google on digital literacies over the past 10 years. Now imagine what happens when Google starts using Web crawlers that read and remember what *we* think of as Web content. Web searches won't rely on search terms; we'll be able to ask for a 10-page brief based on the most recent research posted to the Web on any topic we desire. Moreover, as our litbots get to know us better they will adjust vocabulary, embed links, and otherwise tailor content to each person's unique background and interests.

If you shop on Amazon.com, consider the last time you visited and clicked on "recommendations for you." How is it that Amazon seems to know what interests you? The answer is that as you read Amazon .com, *it is also reading you*. Ask a teenager about Pandora, the "Internet radio station" that learns about listener preferences. If she has an iPod, ask her about the iTunes Genius—it learns her musical tastes to generate playlists and mixes. If you have a touch-screen texting addict in the house, ask him about the way Swype learns to translate simple gestures into words and sentences.

Readers: Human and Machine

The point in this litany of technologies is that, despite their limitations, computers are achieving functional levels of creativity and intelligence in specific domains that now rival or exceed our own, and these technologies are beginning to make their way into everyday life. Furthermore, a big part of the next version of the Web will focus on software that automates what we do as readers and writers, creating a new kind of "who" in reading and literacy—that is, *machines* that read.

Like the music lovers troubled by Emily Howell, we may be uncomfortable with the idea of machine readers. It may be hard to let go of the idea that making meaning is a uniquely human act. I think, however, our understanding of human meaning making continues to rely on the kind of "magic" that highlights both the honesty and the humor of Phil Gough's (1972) classic "one second of reading" model, which included modules named Merlin and TPWSGWTAU (The Place Where Sentences Go When They Are Understood). If we want to be students of meaning making in Web 3.0, I think we'll need to get used to the idea that machines are readers, too, and that may require making some room for litbots in TPWSGWTAU.

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