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On the Trail of the Memex: Vannevar Bush, Weblogs and the Google Galaxy

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Abstract

Hypertext as mediated by the Web browser has not proved to embody the qualities of the ideal post-structural text longed for by literary theorists such as George Landow; neither has the World Wide Web fulfilled the document-association function of the memex, the hypothetical research tool Vannevar Bush described in his 1945 essay, *As We May Think*. Bush's memex was not merely a form of photo-mechanical hypertext, but also a means for the full-scale transfer of complex collaborative thought processes, as encoded by individual researchers via their own personal document association schemas. While weblogs, the most influential textual genre truly native to the World Wide Web, do facilitate the exchange of information across the Internet, that information must be carefully filtered in order to be useful. Google's February 2003 purchase of the popular weblogging platform Blogger signals a shift towards content production that may create a conflict of interest; nevertheless, Google's proven ability to mine the data encoded in annotated trails of linked documents may create the synergy necessary to fulfill Vannevar Bush's vision.

1. Weblogs

A weblog is a textual genre native to the World Wide Web, comprising a regularly-updated collection of links to other documents, together with commentary that evaluates, amplifies, or rebuts the off-site information. A cross between an online diary and a newspaper clipping service, a weblog is important factor in the ongoing democratization of hypertext – that is, a means by which ordinary people who do not think of themselves as programmers or designers can efficiently harness the power of hypertext, and thereby add their voices to the community of global villagers.

On Saturday, Feb. 15, 2003, the close-knit blogging community was rocked with news that Google, the favorite search engine of geeks everywhere, was purchasing Pyra Labs, developers of the popular weblogging service Blogger (Gillmor). Google is already beloved by many netizens chiefly because it effectively uses the existing link structure of the Internet to filter search results. By reading the network of links and inferring the relative value of pages linked to by human webmasters (that is, by rating higher those pages that other webmasters have recommended), Google's PageRank formula greatly increases the chances that the best search results will float to the top. Further, its minimalist interface does not bog down the user with periphery features such as the mail, shopping, and community services that clutter up the Yahoo! portal. Supported by licensing deals as well as unobtrusive, all-text advertisements (AdWords) which are served up in a clearly marked column separate from the search results, Google is even confident enough to let users skip advertisements altogether by clicking the "I'm Feeling Lucky" button (which bypasses Google advertisements and takes the user directly to the top search hit).

Recent rumors that AOL may be planning to provide blogging services available to its huge customer base caused grumbles among cyber-elders who recall with bitterness how Usenet forums [1] changed when naïve "newbie" chatter from legions of AOL users put an end to the geek utopia that dominated the Internet's Golden Age. The Internet intelligentsia has so far responded with a disdainful snort to the clumsy efforts of AOLCNNTimeWarner to create an old media empire in cyberspace, such as the notorious failure of Pathfinder.

Salon, an ambitious general-interest magazine that has burned through millions of dollars of venture capital, jumped on the blogging bandwagon in July of 2002. Its strategy included morphing its discussion groups into a network of blogs, headed by star columnists, and offering special tools to customers who subscribe to Salon's blogging services. Little in the blogging package appears attractive to customers who aren't already *Salon* junkies; the resulting subculture that developed around *Salon* has an almost uniformly hip, bohemian feel, appropriate for a magazine whose editorial perspective is somewhere to the left of radical, but not nearly as interesting as blogging culture at large. For example, Scott Rosenberg's Links & Comment, Salon's flagship blog, has the narcissistic tagline "*News of Salon, Salon blogs, and the world*." Catering to bloggers has apparently done little to boost the magazine's financial health; indeed, the day before Google's purchase of Blogger was announced, the Associated Press reported that *Salon* will likely run out of money and cease operations in a matter of weeks.

Salon has been limping along for year; by contrast, Google's track record invokes confidence. If anybody can make money off of weblogging—without destroying the freedom and flexibility that makes weblogging so attractive—perhaps Google can. After all, GoogleGroups succeeded where DejaNews failed – offering advertiser-supported searches of more than 20 years of Usenet archives. DejaNews had its

own intensely loyal following before it tried, in (date), to turn itself into an e-commerce portal. Unlike DejaNews, however, Google's advertisements are subtle; Google also permits netizens without access to news readers to post messages to any group in the Usenet hierarchy.

In the world of hacker culture, where Microsoft generally stands for everything evil, Google earns serious geek credibility by running huge arrays of cheap computers that run an ugly but powerful alternative to Windows. The result is a uniformly powerful, unnervingly effective collection of utilities that operate essentially independently from the Microsoft chokehold. Like Henry Ford, who did not invent the assembly line but did master its implementation, Google did not invent the search engine; yet the company's name is nearly synonymous with the service it provides. Consider the recent formation of the verb "to google," meaning "to search the internet for information on a person," when considering that person for a job or as a romantic prospect.

I hope my students will forgive me for letting unanswered rhetorical questions drive my argument, but I cannot help but wonder… does GoogleBlogs somehow cross the line? Searching the WWW and Usenet archives is one thing, but now that the company is moving into hosting user-created content, can it possibly be fair to its competitors? Or, as a recent link popular with weblogs recently put it, is Goggle Big Brother? http://www.google-watch.org/bigbro.html

2. Of Memex, Meme, and Machine

In his 1945 essay "As We May Think," Vannevar Bush proposed the memex – a hypothetical document storage and retrieval system. X is a variable, an unknown quantity, the undiscovered country; it differentiates memex from meme – a discrete bit of cultural information, such as a folktale or an advertising jingle, that perpetuates itself by jumping from mind to mind. The design of the memex imitated the workings of the human memory on a scale that promised to make the user utterly dependent upon its workings (as most professionals of today are, practically speaking, utterly dependent upon their personal computers).

The term "meme" was coined by Richard Dawkins in 1976, and was intended to echo "gene." Dawkins sees individual human beings as "survival machines" optimized for self-perpetuation; he struggles to find evolutionary explanations for the development of sacrificial altruism, and admits that his own psychological explanations for the development of moral reasoning beg too many questions. N. K. Humphrey amplifies Dawkins: "memes should be regarded as living structures, not just metaphorically but technically. When you plant a fertile meme in my mind

you literally parasitize my brain, turning it into a vehicle for the meme's propagation in just the way that a virus may parasitize the genetic mechanism of a host cell" (qtd. in Dawkins 206-7).   The idea that web page designs should shock and amaze the viewer was a meme that destroyed countless dot-com startups.

Rather than a helpful tool to increase communication, design became an all-consuming machine. Marshal McLuhan offers the following parable querying the relationship between helpful tools and depersonalizing machines:

> As Tzu-Gung was traveling through the regions north of the river Han, he saw an old man working in his vegetable garden. He had dug an irrigation ditch. The man would descend into the well, fetch up a vessel of water in his arms and pour it into the ditch. While his efforts were tremendous the results appeared to be very meager.

> Tzu-Gung said, "There is a way whereby you can irrigate a hundred ditches in one day, and whereby you can do much with little effort …. You take a wooden lever, weighted at the back and light in front. In this way you can bring up water so quickly that it just gushes out. This is called a draw-well."

> Then anger rose up in the old man's face, and he said, "I have heard my teacher say that whoever uses machines does all his work like a machine. He who does his work like a machine grows a heart like a machine, and he who carries the heart of a machine in his breast loses his simplicity. He who has lost his simplicity becomes unsure in the strivings of his soul. Uncertainty in the strivings of the soul is something which does not agree with honest sense. It is not that I do not know of such things; I am ashamed to use them." (63)

The gardener in the parable seems to have no problem using *tools* (such as the shovel, with which he presumably dug the ditch, or the water vessel, both of which mimic the human action of cupping the hands). Yet the old man is "ashamed to use" a *machine* (a word that comes ultimately from the Greek word for "expedience") that would allow him to "do much with little effort." McLuhan's source for this passage is the memoirs of Werner Heisenberg, who had good reason to hold technology up for scrutiny. Drafted into the German army at the outbreak of World War II, Heisenberg was at the forefront of Hitler's efforts to create a nuclear bomb—a single-mindedly grotesque exaggeration of the clenched fist. While blogs are creative and often charming tools in the hands of individual bloggers, by harvesting the collective power of armies of bloggers, the power Google stands to wield in online publishing begins to stagger the imagination.

Published during the last few months of the Second World War, "As We May Think" observes that, as scientists returned to civilian pursuits, the production of articles for scholarly journals accelerated. Keeping up with the latest literature was in itself

a Sisyphean challenge; yet Bush noticed that even *finding* the information in the first place required ever more time. His chief complaint was that libraries sorted information according to an externally enforced, inflexible alphanumerical structure. After finding one item the user had to exit the system and start all over again from the beginning. As an alternative to the artificially rigid "index," he proposed "memex" as a means of filing documents by association, linking them through annotated user-defined "trails."

Seeing the memex as the direct precursor to the WWW is attractive, but problematic for several reasons. First, and most obviously, the memex (had it ever been built) would have operated on photo-mechanical, rather than digital, technology. Second, the operation of the memex is tied to the physical presence of texts – a stack of densely-printed microfilms, which can be sorted and displayed quickly, but which must first be printed and distributed to a paying researcher. Third, the memex is only additive – the scholar can duplicate pages, but cannot synthesize (by copying and pasting chunks) or inserting or rearranging words in a stream. In fact, the smallest unit Bush works with is a facsimile of a page; thus the medium Bush described was not hypertext, but hyperbinding. Finally, the term "memex" reveals its retrogressive gaze. Bush's proposal was a tool for accessing those documents a researcher has already decided are worthy of purchasing and adding to his or her personal library, not for identifying texts which have not yet been connected to the user's personal matrix of intellectually associations.

But even here, Google's origins are strikingly similar to the memex. Google initially began as a tool for rating annotations, according to Larry Page (inventor of Google's eponymous PageRank):

> We wanted to annotate the web--build a system so that after you'd viewed a page you could click and see what smart comments other people had about it…. We needed to figure out how to choose which annotations people should look at, which meant that we needed to figure out which other sites contained comments we should classify as authoritative. Hence PageRank. Only later did we realize that PageRank was much more useful for search than for annotation… (qtd. in Delong).

Bush designed a hypothetical document-manipulation system that would permit him to be a *better researcher*, by managing the annotated links he established between documents. The desire to connect and access was also an important motivator for Theodore Nelson, the inventor of hypertext, and Tim Berners-Lee, the inventor of the World Wide Web. Where these three scientists chiefly saw an information storage and retrieval system, in *Hypertext: The Convergence of Contemporary Critical Theory and Technology,* George Landow, a literary scholar, advocates hypertext as a tool for improving textual scholarship, presenting it as a real-world manifestation of the "ideal text" as initially posited by post-structuralists

and postmodernists. This ideal text, freed from the physical restrictions of the printed page, eroding the barrier between author and reader, is, according to hypertext theory, infinitely expandable; it can be infinitely explored by a reader with infinite interest in the subject matter.

Over the years Landow has, of course, continued to produce scholarship that addresses current and emerging hypertext issues; but it is through his original book (or indirectly, through sources influenced by it) that humanist "early adopters" were first introduced to hypertext, at a time when tools for reading and creating hypertext were accessible only to the elite. In fact, hypertext theory developed over a period when computers were rare, isolated, stand-alone workstations, and most humanists were far more comfortable with hypertext theory (as mediated by the scholarly essay) than with hypertext itself. Even in the 1997 edition of *Hypertext*, the index entry for the word "internet" takes up barely more than one line, while entries for the outdated commercial hypertext authorship products "StorySpace" and "Intermedia" each take up two or three inches.

As a result, humanists who at one time had greater access to Landow's hypertext theories than they had direct access to hypertext tended to articulate the benefits of creating scholarly hypertext editions of canonical literary texts (such as U.Va.'s Rossetti Archive), or to present self-consciously postmodern readings of the canonical works of literary hyperfiction (such as Shelly Jackson's *The Patchwork Girl* or Michael Joyce's "Afternoon, a Story"). Indeed, designers of canonical literary hypertext created deliberately labyrinthine structures and manufactured fractured narrative experiences, which afforded critics with ample opportunity to examine the particular rhetorical strengths and creative potential of hypertext. Creative hypertext intentionally disrupts the reader's linear expectations, arresting thought processes and generating a kind of intellectual vertigo. It is little wonder that hypertext theorists find in these traditional scholarly activities and canonical hypertext authors (who are themselves well-schooled in hypertext theory) so many comfortably affirming examples for critical study. For Landow's ideal reader, who has infinite interest and infinite time, the convention-breaking, nonlinear organizational patterns of hypertext is liberating.

Sociological studies of Internet users, such as Sherry Turkle's memorable *Life on the Screen*, and speculative musings such as Janet Murray's *Hamlet on the Holodeck*, tend to accept as "givens" the technological structures that define online culture; humanists who are not themselves computer programmers tend not to consider the textual qualities of the software that defines cyberspace. For instance, Murray's bibliography separates her electronic primary sources from her print sources, arranging the print sources alphabetically by author, but arranging the electronic media alphabetically by title – thereby concealing the identity of the authors (designers, programmers) of the very texts that are most central to her subject matter.

While access to computers and the Internet is far from universal, reading and writing hypertext is no longer, as it once was, an elitist literary and/or scientific pursuit. Our encounters with hypertext are not normally sublime or precisely metered, but increasingly mundane: checking a weather report, scanning a movie review, purchasing an airline ticket, finding an old friend's e-mail address. While literary hypertext depends for its psychological impact on the reader's disorientation in cyberspace, the surfer of the work-a-day web who faces a unique non-linear navigation pattern on each and every website soon suffers from sensory overload. Jakob Nielsen observes that increasing conservativeness of the average web user means that, no matter how useful the designers may feel a new feature could be, the growing Internet population of non-experts will not spend time learning how to use it. Nielsen is widely reviled by designers for what is perceived as an unimaginative and reductionist approach to design; as an engineer, he values efficiency and utility over aesthetics, and warns, "anything that is a convention and used on the majority of other sites will be burned into the users' brains and you can only deviate from it on pain of major usability problems" (Nielsen).

This minimalistic approach flies in the face of hypermedia theory, which celebrates the de-familiarization of textual spaces. In *Remediation: Understanding New Media*, Bolter and Grusin present a screen shot of a graphic-heavy home page (a content-free "splash page" that serves no purpose other than prepare the visitor to enter the site), and favorably observe that the web site "refashion[s] traditional, printed graphic design for the web" (Plate 16). The web site in question is for the 1998 edition of David Siegel's *Killer Web Sites*, a valentine to the design excesses of Silicon Valley in the pre-bust era. But by 1998, Siegel, whom David Walker calls "the father of Web design," had learned to question the premise of his book. "I am not trying to win any design awards for my clients any more," Siegel announced, presumably because he had observed that people in the real world do not, as a rule, enjoy being "killed" by over-designed websites.

3. Hypertext Escapes from the Laboratory

Fed and nurtured under ideal conditions, hypertext quickly grew strong enough to escape into the wild. There, practically unnoticed by textual theorists, it has been breeding indiscriminately with the texts produced by marketers, journalists, technical writers, and diarists. These hybrids, native to the World Wide Web, are valuable not for their decentering/disorienting/disruptive qualities, but rather for their ability to stitch together disparate texts, creating communal spaces.

In the 1970s, when Dawkins introduced the meme, when the Internet was very young, and the sociological ramifications of networked computing were apparent

to few outside the computer science field. Computer memory and processing time are today so cheap that, rather than competing for limited time on centralized machines, computer scientists – and even English professors, and most undergraduates – have their own personal computers. Even if these computers are used 40 hours a week, they sit idle the rest of the time. The limiting factor, the precious resource for which memes now compete, is no longer storage capacity or processing time, but the ability to filter out the "noise." Whereas academic peer review screens out unworthy memes in advance, before perpetuating them via publication, the equivalent process that happens online operates on a different principle. After the million monkeys have pounded away on their million keyboards, the de-facto online peer review process (a role currently held by weblogs) compiles all the scattered excerpts from Shakespeare the monkeys have happened to produce.

4. History of Weblogs

Weblogs are changing the rhetoric of hyperlinks, challenging the dominant models of mass communication (in which professionals determine what news is worth reporting and what is worth ignoring), and exposing hundreds of thousands of non-programmers to the experience of publishing online. In December of 1997, Jørn Barger, an amateur James Joyce scholar and interactive fiction theorist, announced in a message posted to several Usenet discussion groups, that he was going to start a log of his web -surfing experiences, posting brief comments about the pages that he came across. He rather brazenly predicted that his method of organizing the Internet would catch on and spread across the Internet. He ended his message by posting a web address, which ended with "weblog.html."

My search of the Usenet archives for "weblog" reveals that, before Barger's posting, the word invariably referred to an automatically generated record – a log – of web server activity. While the public response of the Usenet community to Barger's announcement was lukewarm at best, almost immediately, the whole community of computer experts ceased using the term "weblog" to refer to "the automatically generated log of web server activity," and instead adopted the term "server log". Even if weblogs themselves spread more slowly, the "weblog" meme was firmly implanted in the online community.

Blood's concise but comprehensive history of the weblog phenomenon (2-4) notes that the form of the weblog had been around for some time before. (Indeed, the first website was essentially a list of all the other sites as they came online.) Steve Bogart, Dave Winer and Michael Sippey began logging their surfing activities before Barger, and that Cameron Barrett borrowed Barger's term in his January, 1999

essay <u>Anatomy of a Weblog</u>, after which the movement gained considerable momentum. By early 1999, a growing number of websites were either explicitly calling themselves weblogs, or were otherwise functioning as such. In August of 1999 that Pyra Labs released Blogger, thereby creating a large, relatively standardized corpus of blogging texts, and supplying the critical mass which solidified the blogging community.[2]

While individual blogs come and go, recent years have seen exponential growth in the number of blogs. By the middle of 2002, Blogger boasted a half a million registered users, and now claims over a million. The site weblogs.com keeps a running list of weblogs that have been updated in the last three hours. A few years ago, that list was occasionally as short as 50; today, it is typically over 1000 sites long. In terms of hypertext theory, what this means is not simply that more people are writing weblogs. More significant is the fact that hypertext is becoming more accessible for people who aren't interested in fiddling with layout or tinkering directly with HTML, who don't think of themselves as designers, who have a love of words. The technorati may turn their noses up at the great influx of newcomers – "newbies" – whose template-driven weblogs spring up in cyberspace like the mass produced dwellings in suburban Levittown. But weblogs are part of the great paradigm shift in textual culture, which eradicates restrictive print-based terms such as center and margin, and advances post-structuralist concepts such as network and connection. Weblogs are making the Internet more interactive, more "writerly."

If Bush's vision of the memex extended no further than simply envisioning a tool with which to join two separate pages, we might ask ourselves what the memex promised that the monastic scriptoria could not already offer via made-to-order codices, even centuries before the printing press. In the past, the role of the publisher has chiefly been to filter out the inferior manuscripts and make reproductions of the superior manuscripts available to a public willing to pay for access. This model depends upon the economy of scarcity – limited resources that must be allocated efficiently, so that he limited purchasing funds may be spent wisely. But dwindling library funds for monographs leads to smaller print runs, which lead to higher prices, which creates a negative feedback loop that, according to the MLA ad hoc committee, threatens the very basis of the academic tenure process.

If Google's PageRank algorithm is the shimmering star of the cyberspace firmament, it presides over a vast array of fellow travelers and hangers-on. For all intents and purposes, Google owns the Web, by virtue of its superior and highly popular search engine. It owns the history of the Internet, thanks to GoogleGroups, which searches over 20 years of Usenet archives. It owns the present, thanks to GoogleNews, which constantly scans the front pages of thousands of online newspapers, deduces which stories editors around the world consider the most important, and snags the headlines and lead paragraphs from those sentences to

assemble a patchwork quilt that exposes news readers to a wide variety of editorial and political opinions. Will GoogleBlogs somehow cross the line? Can Google be fair to blogs hosted by its competitors? Will the Google Galaxy bring an end to the Golden Age of blogging? The extended Google Galaxy includes independent websites, with derivative names like GooFresh, GoogleVillage and Google Watch. Some are weblogs that offer cultural criticism and commentary; others are utilities that expand upon Google's features. All hint that, for the moment, cyberspace is full of entrepreneurs and intellectuals who want to be part of the Google magic.[3]

The future of intellectual life, as mediated by hypertext, may well be defined by collaborative, member-driven "writerly" communities such as Slashdot (where extremely brief "articles" are drowned out by hundreds posts, which are then sorted and rated by volunteer moderators who separate the wheat from the chaff) or Wikipedia (a user-created encyclopedia, created two years ago and recently collecting its 100,000[th] user-authored article).

Jorn Barger has attempted to launch many memes, and they weren't all as successful as the weblog. In August of 2001, he posted a message titled "Theory: Write a web-book in a day," in which he proposed that anyone with a moderate amount of knowledge could assemble a few dozen links, and write connective material to string them together, and produce the web equivalent of a book. Had I not posted a follow-up in which I defined that activity as assembling an anthology rather than creating a new book anything, I think Barger's meme would have died on its own; but in dismissing my objection, Barger got in the following parting shot: "This is a specialized concern – I think netnews would better off if we ghetto-ized you guys in an 'academia.*' hierarchy, so you wouldn't distract discussions of knowledge and insight with discussions of status and careerism."

As an outsider who has nothing to lose, Barger raises a good point, one which Bush foreshadowed. According to Lesk, Bush "envisaged a community of scholars, all helping each other by indexing and relating all the different items published in a library. We have much better technology that he heads; we did not have the community he wanted until the rise of the Web." While our intellectual life has, for generations, been closely tied to the printed line, the prose paragraph, the scholarly essay, such was not always the case. The intellectual life in Greece was chiefly oral, and Eisenstein's history of the printing press convincingly catalogues the technological genius of early Christians who quickly adopted the codex as a means for collecting and preserving the precious textual inscriptions of religious truths. Yet the Internet does not operate according to the economy of scarcity. Computers themselves, the cables connecting them, and the skilled workers to maintain the system are, of course, finite resources, but the raw material of cyberspace gets more plentiful every year.

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Notes

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1. Usenet formus are public electronic bulletin boards covering a hierarchy of topics ranging from politics to sex to the infamous alt.ensign.wesley.die.die.die (originally a lighting rod for complaints about a too-geeky *Star Trek* character, now mostly a spam-filled wastesland).

2. For several years before weblogs burst on the scene, I had been regularly visiting various websites featuring a "link of the week" or a "link of the day," though these links were almost always completely decontextualized -- that is, you would have to click on "link of the day" to find out what was on the other end of the link.   In February of 1998, only a few weeks after Barger's post, I must have noticed that more webmasters were adding context to their links and doing a better job explaining their selection criteria; while I hadn't come across the term "weblog" yet, I did write a short, earnest instructional handout urging web authors to Annotate Your Lists of Links. By early 1999, I was posting regular entries to a web site I called "Writing Links and Commentary." In the summer of that year, I began dating my entries, and soon afterwards changed the title of my site to Literacy Weblog: Online and Offline Literacy Links.

3. As the author of this article on Google, I count myself among those attempting to ride on Google's coattails. I hope my candor does not make my insights any less valuable.