What the Geeks Know: Hypertext and the Problem of Literacy

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ABSTRACT

Recent theories of hypertext usefully emphasize continuity with earlier media; but in the general social environment, this continuity is not well understood, and may even be opposed in some quarters. The paper argues that we should define hypertext as the basis for a new version of general literacy and place greater emphasis on teaching in our agenda for applications and research.

KEYWORDS

Theory, remediation, archive, literacy, pedagogy.

1. CATCHING WAVES

He conocido lo que ignoran los griegos: la incertidumbre. [5]

Following Dalgaard [6] and Liestøl [19], we can identify three waves in the history of hypertext so far. In the first instance, pioneers like Nelson, Engelbart, and Van Dam originated the concept and built the first experimental systems. A second wave, beginning with the introduction of personal computers and running through the popularization of the Internet, produced widely distributed systems and the first examination of their uses and implications. The arrival of the World Wide Web opened a third phase, characterized less by wild experimentation and utopian ideas than refinement of existing technologies. In many respects, the third wave represents the oft cited transition from digital immigrants to digital natives, driven largely by researchers who have had access to advanced technologies from the start of their careers.

The third wave concerns itself with hypertext as reality, not novelty: with what Dalgaard calls the "archive," a communication environment in which virtually all texts are exposed to automated search, retrieval, and hypertextual reference. The term is general in scope, referring to no particular system, and might thus stand for any application of hypertext. Still, Dalgaard restricts himself to scholarly discourse, speaking of "the scholarly archive". This paper broadens the concept to include all areas of communication, a shift in focus that could have significant implications for hypertext research and development.

There is much to admire in the third wave, even among those earlier surfers on whom it tends to break. Much of the recent criticism is productive. As Dalgaard says, early accounts of hypertext emphasized the rejection of linear presentation in ways that sometimes limited both our understanding of hypertext's other properties, and our awareness of what others have called "remediation" [4], the co-evolution of older and newer media. Approaching hypertext not as a negation of previous practice, but as a medium in its own right, facilitates connections with related, parallel developments such as the emerging concept of "new media" [20] or Aarseth's more precise and useful notion of "cybertext" [1]. It also permits us to think about forms of hypertext that depart from the metaphor of pages or screens [33]. There can be no doubt that third-generation ideas, particularly the concept of the archive, are essential to further progress in this field.

However, as we situate the archive in relation to other media, and within areas of communication beyond academia, it appears that the integrative, "remediating" approach that marks the third wave may fail to address certain aspects of social reality. Thus the post-millennial revision of hypertext theory may itself benefit from critique. To some extent we may need to reassert or re-examine earlier positions, particularly the difference between hypertext and what has been called print culture. Yet the aim here is not to refute the third wave, but rather to temper and strengthen its doctrine. We must indeed understand reading, writing, and participation in the context of the archive, but we must first recognize that in some sectors of society, the archive, and digital media generally, have yet to establish legitimacy.

2. MISREADING READING

This last claim may seem dubious, if not outrageous. Technologies based on personal computing and Internet Protocol are generally acknowledged as leading factors in the long awaited productivity gains of the 1990s. The World Wide Web continues its global expansion, making hypertext, or at least information retrieval from hypertextual networks, a regular experience for hundreds of millions. Home pages proliferate, and the "blogosphere" has become a rising force in political, social, and personal life [25].

Yet for some, these developments seem either invisible, or worse, ominous. Recently the U.S. National Endowment for the Arts (NEA) released a lugubrious report called "Reading at Risk," focusing on declining interest in leisure reading of literature [13]. Among other things, the report predicts that in another half century there will be no paying customers for fiction and poetry, aside from compulsory assignments in schoolrooms. The end of these reading practices, we are told, will somehow make Americans less inclined to think critically, vote, or take part in civic life. The findings are eminently debatable, but seem less important in themselves than as indicators of a larger problem.

The electronic archive, whether in Dalgaard's special, scholarly view or in the more general sense used here, does not feature in the NEA's account of reading, which the authors explicitly confine to books, and beyond that, inexplicably, to fiction, poetry, and some drama. Weblogs do not exist in the NEA's world, nor do USENET groups, WIKIs, or MUDs and MOOs. Even audio books are left out. We are told that "[p]rint culture affords irreplaceable forms of focused attention and contemplation that make complex communications and insights possible." Yet the report has nothing to say about electronic delivery of conventional texts, such as print on demand, even though at least one leading figure in the book trade calls this approach the salvation of literary publishing [11].

Where electronic media figure in the NEA report, they appear as threats. Television promotes passivity; computer games and the Internet "foster shorter attention spans and accelerated gratification." The report's recommendations for further research begin with this question: "How does literature, particularly serious literary work, compete with the Internet, popular entertainment, and other increased demands on leisure time?" The question is of course very heavily loaded in favor of the negative. Books, we are told, are fighting a losing battle against the forces of cultural decay.

For many in the present community, this pessimism probably misses pathos on its way to absurdity. As one critic put it, the question about competition "seems to be staring up at me from a puddle of its own drool" [23]. Indeed, the NEA document may seem largely dismissable. The executive summary misrepresents its research data more than once. Its strongest claim, concerning literary reading and civic participation, rests entirely on a correlation, and may demonstrate not the decline of reading so much as the demise of a middle class with appreciable leisure time. Finally, there is the source to consider: a peripheral agency in a notably doctrinaire administration, whose focus on literature and the arts absolves it from thinking about more general forms of literacy.

Many may decide, reasonably enough, to regard this complaint as a tempest in someone else's teapot. The "two cultures" of literature and science seem as distinct today as when Snow described them in 1959 [29]. Since poets and novelists are not scientists or engineers, the latter may care little if the former reject forms of communication essential to scientific work. Scientists may even be inclined to respect the sentiments of the poets, however dubious, so long as they keep to their side of the campus.

However, this may be a particularly bad time for scientists, engineers, and humanist fellow travelers to look politely the other way. At the very least, the NEA report demonstrates dismaying ignorance about digital technologies and a failure to understand the electronic archive as a site where literacy continues to evolve. *Evolution* is of course something of a fighting word here. The report issues from an administration that regularly scores points with its base by goading the scientific establishment, pursuing a self-described culture war against science and secular materialism. Though still at the simmering stage, this conflict has already produced some ominous eruptions. In one instance, a professor of biology was placed under federal investigation for requiring that students accept a scientific account of the origin of species in order to receive recommendations for graduate study [31].

Fortunately, the causes of science and advanced communication are not confined to the decidedly irrational sphere of U.S. politics. Yet the present international situation offers little comfort to those concerned about the future of intellectual discourse. The policies of the present American regime are shaped in some degree by a global war against extremists whose own hostility to rational inquiry makes most western fundamentalism seem mild. Neither opponent can dispense with modern technology -- both the American war machine and Al Qaeda's propaganda depend on satellites and I.P. networks. Yet in crucial ways, and to be sure, in very different degrees, each side rejects key elements of modernity [2].

In this there is a kind of convergence. If they agree on nothing else, fundamentalists of all sects share an investment in closed systems of truth embodied in immutable texts. Both, at their most extreme, define reading even more narrowly than the NEA: not simply as an encounter with books, but as the study of a single, absolute book -- an entity about as far removed from the hypertextual archive as it is possible to conceive. The archive must seem to them at best illegitimate, at worst an abomination. Facing these facts, we may want to think more carefully about the situation of hypertext in a world that seems, paradoxically, to grow more contentious and reactionary even as its lines of communication grow and improve. To find our way through this eminently hazardous predicament, we may need to rethink both our theory and our practical agenda.

3. WHAT THE GEEKS KNOW

Remediation and other integrative approaches highlight successful or at least viable outcomes, such as the mutual influence of Web design on tabloid newspapers, and vice versa. However, as Bolter and Grusin point out, the process that creates these products is neither smooth nor neatly deterministic. Encounters between old and new media are inherently adversarial and never assured of balanced resolution. Innovation in communication seems inescapably problematic. When Apple's advertising declares: "Rip. Mix. Burn. It's your music," it invites users to break laws that benefit owners of older media [17]. Music publishers have responded with several attempts to curtail technical development. There is little new in this stragegy. As an earlier theorist observed: "Monopoly capitalism develops the consciousness-shaping industry more quickly and more extensively than any other sectors of production; it must at the same time fetter it" [10].

Writing at the end of the 1960s, Enzensberger saw popular, participatory media, such as audio and video recording, as likely means to overcome repression. That prediction proved both right and wrong. Cassettes stoked revolutions in Iran and the Philippines, yet monopoly capitalism thrives, and is in fact the main reason we are able to study technologies like hypertext. Paradox and complicities aside, Enzensberger's logic remains valuable in thinking about the future of the archive. Updating his insight to include textual puritans as well as monopolists, we might understand the affordances of networked computing as the next wave of eruptive, unfettered forces working against intolerant, oppressive ideologies. In many respects they represent a potential limit to all brands of fundamentalism.

Miles observes that hypertext belongs not to an economy of scarcity, but to a mode of excess [22]. Hence one reason students of this technology might puzzle at the NEA's attention anxiety: the archive does not know sufficiency, only surfeit. With trillions of documents almost instantly available, there is too much of nearly anything, so attention must always be elective. The epistemology of electronic text differs radically from that of conventional writing. As Bernstein observes [3], repetition in hypertext is not a vice; nor is it really the same thing as repetition in earlier modes, since our return to the same item belongs to a process of navigation that cannot be separated from the meaning of the text. Certainly, as Rosenberg contends [26], any given episode or "session" of hypertextual engagement retains at least local coherence, but this effect is framed against a background of discursive alternatives. Links or relations traverse an undefinable "semantic space" [7], leading to what I have called "the analog experience of digital culture," the sense that in the archive, any two points A and B always imply some intervening set whose number cannot be determined [24].

As noted earlier, however, the aim here is not simply to reassert these insights, but to combine them productively with later thinking. Dalgaard warns correctly about the dangers of dwelling on hypertextual difference: any approach based on excess will of course go too far. The analog experience of digital culture is just Zeno's paradox in modern dress, and what do we gain by this rehearsal? Unless we are careful, perhaps not much. Portraying the archive simply as the oceanic limit to any continent of totalizing discourse risks the sort of facile relativism that makes much postmodern thinking odious. Perhaps in some sense hypertext operationalizes the deconstruction of writing, but as Landow crucially observed, we must now test this innovation not as theory, but as practical implementation [16]. Whether we can describe it or not, semantic space is regularly traversed, or opened for access, by a sizeable portion of humanity. "The archive" may be an abstract term, but it proceeds from actual structures such as HTTP, XML, and so forth.

The concept of a "universal without totality" [18] offers a promising way to unify theory and practice in thinking about the archive. Lévy contends that postmodernism erred by discarding both totality (claims to absolute truth) and universality (discourses or methods available to all). This mistake led to the notoriously bad relationship between postmodern theory and science, as demonstrated in the *Social Text* hoax [30]. To move beyond postmodernism, Lévy suggests, we must rescue the universal under the aspect of practice or know-how. Lévy specifically cites the textual systems of the Internet -- the archive, either in Dalgaard's sense or mine -- as a primary instance of the universal without totality.

The contents of the World Wide Web, for example, cannot be constrained by any singular dogma. Many countries legally forbid criticism of the ruling party, yet such sentiments regularly appear on Web sites. Less happily, the German prohibition of fascist symbolism does not keep extremists in other countries from posting swastikas on their pages, and while those pages can be partly suppressed within national boundaries, they cannot be completely banished from the system. Censorship seems impossible on the Web, and if Dillon is right about semantic space, we can no more summarize the Web than we could the Spanish language (natural languages being another good illustration of universal without totality).

At the same time, the absence of totality does not preclude universality. If not in strict terms ubiquitous, the Web is at least highly extensible. We could locate some place, group, or discourse not presently connected, but there is nothing inherent to the technology that keeps us from making a connection. Obstacles of politics and logistics, while no doubt substantial, seem unlikely to last forever. Moreover, this extensibility proceeds from protocols arrived at by international consensus, which are thus assured both of broad technical support, and more important, of maximal access. It is when we turn to this last feature -- access -- that we may begin to grasp the importance of what we know as a community of technologists, and how we can best apply our knowledge to practice.

4. LITERACY IN BABYLON

The archive is certainly not at odds with print culture in general, just with its more extreme or bigoted varieties. In fact, we might still learn a few things from a famous librarian. In 1941, Borges published a story called "The Lottery in Babylon," describing a civilization that reorganizes its epistemology around a municipal numbers game [5]. The lottery evolves from an ordinary sweepstakes into a mysterious scheme for social control whereby good or bad numbers, drawn in secret, bring reward or punishment. Eventually Babylonians come to see the ineffable Company that runs the lottery as an all powerful deity. Anything that happens in the city, good or ill, artificial or natural, is thought to be determined by repeated throws of the dice, iterated on some vast and unknown scale.

Considered in historical context, this story probably has much to do with 20th century physics, filtered through contemporary philosophy. "I have known that which the Greeks do not know," the narrator declares, "incertitude." He defines his momentary existence as the aggregate resolution of multiple possibilities, or as we might also say, a cascading collapse of state vectors. It is easy enough to read "Lottery in Babylon" as a quantum mechanical parable: perhaps God does not play at dice with the universe; but then again, perhaps God *is* the dice.

Today, though, we might understand Borges' *incertidumbre* in a somewhat different sense: as the main feature of an episteme founded on the universal without totality -- or to put this more usefully, as a foundation for modern literacy. In place of quantum uncertainty (and bearing no detailed technical resemblance), we have the undefinable extent of semantic space that surrounds any data presently at hand, always implying a way to move from particular data presently at hand to other tokens or locations somewhere in the network. The transition from local to remote is usually described as *navigation*, but that term, with its antique sense of seafaring, seems less useful than Aarseth's *ergodics* or *pathwork* -- deliberate use of a system, cybernetic or otherwise, to select one line of discursive development from a range of alternatives [1]. The term applies as easily to programming, simulations, and video games as it does to the Web, and thus seems to have broad importance for the ways we currently communicate.

What would it mean to argue for a new definition of literacy founded on pathwork in the hypertextual archive? At minimum, a move in this direction might counter various tendencies we have criticized: ignoring digital systems altogether, relegating them only to scholars, or assigning them to one side of the two-culture

boundary. We long ago passed the point at which literacy could be ceded to print culture alone [15]. Scholars now regularly invoke cultural literacy, visual literacy, media literacy, even in one recent case, video game literacy [12]. In this postmodern soup of divergent definitions, the concept of a general literacy of pathwork, universal but not total, could significantly advance both understanding and practice.

Constructing a new basis for literacy in the archive might permit us to move beyond distinctions between production and reception (writing and reading, in the old idiom) that seem increasingly inappropriate today. In terms of hypertext research, it might encourage further development of a thread that still seems somewhat neglected in our field: descriptive and ethnographic studies of user populations, especially in contexts that include production as well as reception (e.g., [28], [21]). As Dillon notes, present studies of usability in electronic text tend to fragment across various theoretical approaches and thus do not offer a "broad picture" [8]. If we think of the digital archive not as a component of other tasks but as a primary site of textual engagement, this unified view might begin to emerge. In our own recent research, we have found Druin's concept of intergenerational design partnership a particularly promising approach to this problem [9].

Finally, putting forth hypertext as a basic foundation for literacy would take our community into a domain where it has almost never gone before, but where others have been preparing the ground for many years. I refer to studies of education and pedagogy. While few in our field are specialists in this area, the converse is not necessarily true. As Dalgaard points out, the scholarly archive makes most academics very familiar with the hypertext paradigm, if not with underlying theory or aspects of system design. This was not true in the earlier days of our research, but times have changed. Many notable figures in writing pedagogy and technical communication are well acquainted with hypertext research [14] or are expanding the study of literacy in ways that bear substantially on our concerns [27]. Closer integration of our work with those of literacy educators, and especially with those who prepare them, could make a crucial contribution to the greater problem of educational reform.

If these suggestions seem impossibly utopian, remember that in Snow's account of the two cultures, it was the scientists who seemed more responsible to the world's pressing problems, and more optimistic about solutions. History bore out Snow's assessment. As biologists and economists in the last century met the challenge of feeding an exploding population, we might take up the work of reinventing literacy for a world increasingly beset by ignorance. No doubt a change in agenda by any particular group of academics will not in itself correct the widespread misunderstanding of media, let alone combat vast global threats like the rejection of modernity. Yet as all in this community know, ideas that start here -- e.g., the World Wide Web -- have tended to exceed initial expectations.

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