Brian Greenspan
Rilla Khaled
Pippin Barr
Chris Eaket
Robert Biddle

The Bias of Hypertext:

Linking Narrative and Locative Media

Is hypertext a time-biased or a space-biased medium? Harold Innis himself might have had difficulty deciding. The grand historical metanarrative that Innis undertook in *The Bias of Communication* (1951) charts the evolution of Western imperialism in relation to various communications media, including cuneiform, papyrus, the sidereal calendar, universal weights and measures, birch bark canoes, the telegraph, newspapers and radio. In Innis's scheme, the material characteristics of each medium exhibits a specific "communications bias," depending on whether it is "better suited to the dissemination of knowledge over time than over space" (Innis, "Bias" 33). A society's predominant medium, which influences its overall production of time and space, is always controlled by an elite cadre of kings, priests or politicians who emphasize control either through time (tradition, law, religion) or through space (the administration of markets, provinces or colonies; Babe 46). Innis believed that cultural stability in any culture or historical period has depended on striking a balance between "time-binding" and "space-binding" media, between the custodians of community and tradition on the one hand, and the administrators of markets and empire on the other. However, he also observed that the elite class of any given society always maintains its power by promoting one medium over all others, thereby disrupting the temporal and spatial balance, and ensuring its own ultimate demise.

Innis's discovery of the ongoing dialectic of media biases led him to perceive

contemporary Western cultures as dangerously biased toward space, to the extent that they

exhibit "a disappearance of an interest in time" ("Plea" 61). The advent of digital media has

only exacerbated this tendency in the view of many commentators. Heather Menzies, writing

in 1999, could claim with utter certainty that "[o]ne thing is clear. What Harold Innis called

the bias of space in modern communications is being dramatically fulfilled in today's

multimedia digital networks, . . ." (2). For Menzies, the spatial bias of digital networking is

most visible in the globalized economy's tendency toward the outsourcing of labour and the

marginalization of traditional sites of production and consumption, as more businesses go

online and employ subcontractors from other continents. If Innis was concerned with how

such a spatial bias is destroying time (i.e. cultural traditions), then Menzies is just as

concerned with the loss of space: "digital networks fulfill the bias of space in the late

modern era as more and more social actions are de-institutionalized from *grounded place* and

time, . . . " (Menzies 9; emphasis added). This perceived "virtualization" of space translates

for her into an evacuation of sites of social engagement, as citizens are "cut off from

grounded contexts through which they might have retained their own particular perspective,"

and so "become passive, going with the flow of digital data" (11).

To be sure, digitally networked communications initially seem to bear out Innis's sense of

the predominance of spatial over temporal bias. After all, websites allow the instantaneous

dissemination of information practically anywhere around the globe, while providing few

assurances of permanence or continuity, leading to claims that the Internet collapses time into a

globalized spatial medium that eliminates historical memory, nation-states and collective

identities alike. Communicative biases are not intrinsic to media and, as Graeme Patterson notes,

Innis stressed the relativity of his terms (79): a parchment scroll is space-biased relative to a stone tablet, but time-biased relative to an e-mail message. Even so, digital media certainly seem space-biased relative to print media, which by comparison appear more fixed and durable. Even the daily newspaper, which Innis saw as a space-biased medium connected in America to western expansion and competition between metropolitan centres ("Plea" 78), is increasingly coming to stand for tradition, continuity, ceremony and hierarchy relative to newer, amateur or community-based online news sources.

Claims that the Internet is fast eroding communities and civil society at large are hardly uncommon; in focusing expressly on the economic uses of digital networks, however, such admonitions ignore the myriad ways in which people use digital media to engage politically, tactics that Geert Lovink, Henry Jenkins, Graeme Miekle, and many others have documented. In fact, digital media offer new tactics and opportunities for challenging centralized knowledge monopolies through the global dissemination of local interventions. Instead of mapping Innis's dichotomy of time- and space-bias onto a dichotomy of "real" and virtual (networked) spaces, as Menzies does, we might instead plot it onto the divide between those who use media to sustain the status quo, and those who use media to challenge it.   Whereas space-biased media in Innis's scheme frequently support "secular, present-minded, individualistic" cultures "intent on territorial expansion and administration of vast territories" (Babe 46), the radically dispersed architecture of digital networks means that they do not exhibit the same tendency toward centralization that Innis observed, and distrusted, in newspaper or television networks. On the contrary, digital media are enabling the emergence of new forms of decentralized, communal self-governance bearing little resemblance to traditional bureaucracies and advancing no claims over spatial territory. Digital networks, by virtue of their interactivity, are not as conducive to

the sort of media centralization that Innis, to his credit, was the first to observe, but rather exhibit what might be termed *a spatial bias toward decentralization*.

Digital media force an expansion of Innis's categories, so that we may begin to talk of different kinds of time and space biases. Innis's notion of media relativity means that the same medium can exhibit a time- or space-bias relative to itself when used in a different context: a newspaper might be space-biased when bought each morning off the newsstand, but time-biased when archived in the State Library. Every medium is thus neither inherently time- nor space-biased, but exhibits different biases depending on its particular applications and signifying contexts. For Innis, who traced the rise and fall of empires over millennia, these contexts were relatively stable, which might explain why the historian lamented the compressed timeframes of our space-biased culture that make it increasingly difficult to track epochal shifts in media bias. This phenomenon of general acceleration is aggravated by the particular shifting properties of digital media: whereas stone tablets were likely always time-biased, the very dynamism, mutability and procedurality of digital media predict that they will not always necessarily carry a spatial bias in every instance. A text on microfilm might initially seem more durable than the same text stored on a 5-1/4" floppy disk, but as microfilm readers and floppy drives become increasingly rare, the relative ease of migrating digital data to ever newer physical storage lends it a time-bias that is not easily matched by moribund analog media. Given that data migration or copying extends both the duration and spatial dissemination of a digital medium, one might talk of a reproductive bias. Likewise, the quotidian printed newspaper appears much less time-biased and more ephemeral when compared with online news sites, which are easily linked to deep archives of past news. Digital media have quickly come to coexist with, and frequently remediate, a range of older media, thus foregrounding shifts in relative media bias that were

formerly much more gradual. Of course, the mutability of digital media biases does have its

limits: the ancient vellum codex that appears in a copy of the game *Myst* (1993), originally

released for the Macintosh Classic environment, does not in any way bias that particular game

towards time, or allow it to run on newer systems without some type of emulator. If a medium

can be defined as that which remediates (Bolter and Grusin), then media bias is that property of a

medium which, bound to history, escapes remediation.

The Spatial Bias(es) of Locative Media

Whether or not digital networks in themselves contribute to the growing spatial bias of

contemporary life, recent locative media and location-based services hold out the promise of

reversing that imbalance by re-infusing online data with spatial and temporal determinacy.

Locative media return the sense of "grounded place and time" to digital networks, by infusing

geographical sites with historical context–in particular, the indigenous, immigrant,

environmental, and other "minor" histories effaced by imperialism and the project of modernity.

Innis characterized media biases as locked in an unending dialectic or, as McLuhan put it, as

figure and ground constantly reversing (Patterson 39). With locative media, space no longer acts

as the ground against which communication technologies are measured, but instead becomes the

figure of mediality itself.

StoryTrek is a prototype locative hypernarrative system that radically alters our

understanding of time- and space-biased media. Most spatial hypertext systems still depend

upon the standard WIMP GUI (Windows-Icons-Menu-Pointer Graphic User Interface) for user

input; our system, by contrast, allows authors to create artistic hypertexts with fine-grained

geospatial awareness that respond in real time to the user's geographical context and physical

movement. With a wifi- and GPS-enabled tablet or pocket PC in hand, users navigate our system by simply walking through an urban or natural environment, a practice that we call "StoryTreking". Our approach involves rethinking locative media systems, along with the tools and user interface for reading and writing hypertext. Locative systems typically follow a landmark-and-graffiti model of geocoding; that is, if the user's GPS coordinates indicate that he is standing in front of Ground Zero in Manhattan, the interface can link to blog postings from survivors, or play an mp3 recording of 9-11 memorial speeches. Such systems are limited to the recognition of waypoints only, not travel vectors; what they offer is a tour of disconnected sites, not a story (Greenspan 2009).

Our system is based upon narrative and navigational patterns rather than waypoints, providing continuous feedback of live, richly contextual information in narrative form, matched to the user's route and location. In "Patterns of Hypertext," Mark Bernstein (2003) first identified numerous spatial structures common to the topology of artistic hypertext narratives: the *contour*, the *tangle*, the *counter-point*, and so on; to this list, Marie-Laure Ryan (2006) has added several other common structures–the *maze*, *track-switching*, and so forth. Unlike other hypertext authoring systems, StoryTrek elicits connections between these implicit narrative patterns and the explicit navigational patterns of actual users. Some hypertext patterns (like the *cycle* or *counter-point*) readily translate into pedestrian motion, while others (such as the *sieve*, *flowchart* or *sea-anemone*) do not. For our prototype, we began with the simplest motion patterns: the straight line, ninety-degree turn, backtrack, pause and zigzag, although in the next build, we intend to combine these primitives to produce more complex motion and story patterns. The Flash-based StoryTrek system consists of a reading tool, and a tool to support the authoring of interlinked lexia while allowing management of the relationship between these lexia and the

reader's actual spatial environment. StoryTrek authors begin by drawing an area on a Google

map of their choosing within which any given story pattern will be operative. Story patterns are

represented in the authorware interface by icons that users drag onto user-defined maps. For

each new motion pattern added to the map, the system opens a new story segment with an empty

lexia that is linked to the designated map coordinates. Story segments can comprise any number

of lexia containing text or images; in future builds, the system will also accommodate audio-

video files and dynamic Flash objects. Authors can also zoom to different scales of the map,

adding new story patterns at each level, while the system sorts these patterns across nested areas

and scales. This design approach represents a departure from authoring tools like Eastgate's

seminal Storyspace, which uses a spatial network model in which lexia are represented as

graphic nodes linked together by edges.

The StoryTrek Reader operates on any handheld device with GPS running a Flash-

capable browser; for our initial tests, we used a Nokia 810 Internet Tablet with a Sirf III

GPS chip. This portable unit sends NMEA data recording the user's location and motion

patterns to a spatial parser, which smoothes the data and identifies the geometric pattern

of the user's route. By matching the user's physical movement at any moment to a

database of geospatially coded story patterns, the system assembles coherent narratives

on the fly that are relevant to the user's actual location and movement through space. As

the user moves into the area of any given storytrek, the reader matches her motion pattern

with a story pattern, and returns the first lexia of the associated story segment. Where

story segments comprise multiple lexia, the system displays each lexia in turn, checking

after each screen refresh that the existing story segment still matches the user's path of

movement. If the pattern of movement has changed, an alternate, appropriately matching

story is then displayed. Map areas are arranged according to a "stacking" principle so

that, in the case of overlapping areas, the system will default to the topmost area. The

most recently created areas are added by default to the top of the stacking order, but this

ordering can be changed in the authorware, in a fashion similar to the reordering of

"layers" in graphics editing tools. We have also integrated a text-to-speech (TTS) option,

so that the system can read textual lexias aloud. In practice, all these operations are semi-

transparent to the end-user, who is presented with a seamless story that evolves

continuously as she explores her urban environment. The user is thus free to speculate on

the relationship between her own physical navigation of the city and the story paths

returned by the system.

　　For our initial test implementation, we used the authoring tool to create a suspense/horror

narrative, *Crisis 22*. Set in an ambiguous country, this storytrek focuses on a character's repeated

experience of a traumatic event, in homage to Michael Joyce's pioneering *afternoon: a story*.

The user experiences the story by walking in patterns that dictate the kind of narrative triggered.

In this case, moving forwards leads to a present-tense narrative of a character walking through a

city toward a rendezvous. Turning around or moving backwards yields narrative elements from

the protagonist's past, filling in some of his back-story. Turning away from a straight path yields

peripheral narrative elements, events taking place around the protagonist that he may or may not

notice. Finally, if the user stands still, the system knows that she is lingering, and triggers lexia

containing the protagonist's thoughts. Wherever the user decides to go, the system will present

her with a coherent but dynamically changing narrative cued to her relative location, walking

speed and direction. Our system uses the city itself as an interface and the user's motion as input,

so that the explicit topography of the user's physical wanderings becomes a heuristic for

exploring the implicit structure of the narrative. In this way, it translates the navigational

barriers of traditional hypertext (random jumps, drifting, backtracking, and so on) and into a

meaningful form of input, taking readerly disorientation as the basis for a meaningfully situated

experience.

While this particular storytrek demonstrates the system's potential for fiction writing, it also

enables the artistic, historical and critical exploration of social spaces by transforming the

physical environment into an interface to archival accounts in words and images. The writer's

work becomes a kind of spatio-temporal programming with "design patterns" (Gamma et al.),

primitive structural elements that can be reused, akin to those first enabled by the influential

Idraw architecture (Vlissides) and following the model of Christopher Alexander. For readers,

StoryTrek combines the exploratory movements of geocaching games with the navigational style

of the iPhone, which allows music to be shuffled through, skipped and replayed, all the while

interleaved with conversations or reference materials. Such devices are already part of the

experience of mobility: we select GPS maps and music while traveling, with the effects of our

choices reflected on-screen and in our real-world surrounds. Our interface blends textual and

real-world navigation, adding narrative structure and continuity to the experience.

Innis attributed "the emergence of 'mechanized communication' to the dissolution of an

embodied sense of time" (Kroker 122). By providing new physical forms of control for the

suturing of textual and physical spaces, StoryTrek returns a sense of embodiment to the time and

space of narrative media. If hypertext is less about isolated lexia than the navigation between

them (what Adrian Miles calls the "event of connection"), then StoryTrek transforms linking into

an even more eventful, active and contextualized process. As Menzies notes, Innis's overall bias

was "toward the embodied human voice speaking his or her experience and the empathetic ear

listening and reciprocating–that is, intimate scale and human pace, not the disembodying scale and pace of instant global connectivity" (13). Through text-to-speech and audio files, StoryTrek returns at least a sense of orality and aurality to networked media, while adjusting their scale to that of the individual subject.

Hypertext as a Minor Medium

Innis's dualistic theory of communications bias has clear congruencies with his earlier histories of the cod, fur, lumber, pulp and paper industries that shaped North American economic, social and cultural development, at least to Canadian interpreters. For Arthur Kroker, the struggle between time and space that Innis located in the Canadian mind reflected a plea for "an emancipatory recovery of the 'heritage' of western civilization itself" as a barrier against "the quick absorption of Canadian society into the continentalist strategy of American empire" (97). And yet, as Jody Berland notes in her discussion of the figure of marginality in, Innis's writing, his overwhelming concern with the continuity of European civilization prevented him from seeing how the colonization of North America negatively affected its indigenous people (305).

StoryTrek originated in an Australian initiative to develop digital interfaces for aboriginal songlines. Songlines are a nomadic people's narrative database, an archive of stories accessed by traveling the land. Our prototype emulates songlines in approach, though it does not attempt to capture the content of traditional knowledges; our project is rather to document how urban development and migration in Canadian and Australian metropolises has affected aboriginal populations. The StoryTrek user retrieves stories of movement and migration, mined from State archives, to retrace the pre-urban spatial histories of Melbourne and Ottawa, and recall the map

of songlines and trade routes paved over by modern development. Our goal is to turn the archives inside-out, using the streets themselves as an interface for location-based spatial histories. If Innis developed his concept of media bias as a means of dialectically exploring moments of historical crisis, then StoryTrek provides a "dialectical interface" for exploring the changing space-time ratios of modern cities. Berland writes that in modern space-biased cultures, "Power is sought through development of the most 'advanced,' most up-to-date, farthest reaching, and most quickly disseminated information. Access to space becomes the precondition for all empowering knowledge, including knowledge of or continuity with the past" (285). StoryTrek promises to generalize spatial access to history and tradition, restoring the media balance.

And yet, "only at rare intervals are the biases [of a civilization] offset by the influence of another medium and stability achieved" (Innis, "Plea" 64). The emergent media of narrative hypertexts and locative artworks might well be the province of a small technocultural elite, but they remain marginalized by the elite cultural custodians whose monopolies of knowledge depend upon maintaining the superiority of recorded media, whether in printed, audio or visual formats. An Innisian approach can help to historicize these familiar "books vs. bytes" debates as arguments for preserving a relative time-bias (represented by printed books) against a relative space-bias (symbolized by digital texts). If Western culture as a whole is space-biased, then university humanities departments function in part to maintain a retrograde time-bias. As Innis showed, the center of the media empire maintains the margin through knowledge monopolies: "[t]hrough control of such constraints - copyright, ownership and distribution, economies of scale, technical standards, technical obsolescence, government regulations, research and citation, and so forth - the centre works to maintain power over communicative space (Berland 292).

Hypertext narrative does not present any clear challenge to the spatial empire of print, but instead represents what might be called a *minor medium*—that is, the experimental medium of a small population that makes a minority use of technological systems and power structures, analogous to the "minor literatures" described by Deleuze and Guattari. The power of hypertext lies in its ability to restore a sense of relativity to print's temporal biases while simultaneously laying bare its spatial bias, its imbrication in the control mechanisms of publishing empires. Like geocaching and alternate reality games, StoryTrek appropriates Geographic Information Systems technologies from military or commercial applications for use in artistic works, personal journals, entertainments, subcultural practices and community histories, enabling a spatialized counter-discourse. It transcodes the marginality of hypertext narrative into geospatial frames of reference, providing a tool for generating spatial allegories of (post)modernity, and for enacting a local readjustment of the time-space imbalance that underpin "centre-margin relations" in contemporary Western societies.

Hypertext and Hypermedia Lab
Carleton University

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