From Hypertext to Hyperloquy

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The human mind is capable of rising to something even better than hypertext: "hyperloquy." Hypertext was the idea that texts and parts of texts could be linked to one another in the online medium. It led, among other things, to the miracle of the worldwide web: mankind's entire written corpus, all interlinked and seamlessly navigable through and through. But despite the fact that links are added, consciously and dynamically, to static text, there is still a static flavor to a hyperlinked textual world. There is something missing, and that something comes close to the essence of the human capacity for thought, language, and colloquy.

Let's take a few steps backward. Our species speaks. This sets us apart from our fellow creatures. What does it mean to be able to speak? It means to be able to say any proposition. What is a proposition? It is any string of symbols that says something is true. (The proposition may be false, but to propose is to say something along the lines of "It is true that (say) *snow is black*." "Snow is black" is the proposition; and implying, by the very act of saying it, that *it is true that* "snow is black" comes with the territory of being able to say any and every possible proposition. But not every proposition we say will be true, of course. Every possible proposition includes all the true ones and all the false ones too.

Fear not. This essay will not turn out to be an exercise in symbolic logic. I introduced the proposition – and the fact that it is all-powerful -- by way of reminding us how very different our capacity for language has made us from our fellow-creatures. They think too, but we think very differently from the way they do because we are capable of thinking in terms of propositions. This means that (again, in principle) we can describe anything and everything that is true of our world. Or perhaps I should say language can, and we can use language to do so inasmuch we are capable of knowing or figuring out some of what is true of our world.

But one of the fundamental things about language is that it is interactive. It evolved for interaction, for sharing and exchanging information (which just means sharing and exchanging true propositions). Yet even that sounds too static, because one imagines that I know some propositions that you don't know and you know some that I don't know, so I give you mine and you give me yours – and a lot of oral communication is indeed just that. But the whole here is very much more than the sum of its parts. A conversation doesn't just give you the propositions you were missing that your interlocutor had and vice versa: It also stimulates new propositions in your brain, in real time, uttered neither by your interlocutor nor by yourself. That makes language a much more profoundly interactive medium than the proposition-sharing model would imply. It is really as if two (or more) brains were thinking collectively,   via distributed cognition, rather than merely trading autonomous thoughts between monads.

And that is also why the real-time dimension is so important in oral communication: The speed of speech and the speed of thought are roughly of the same order. Some of us think a bit faster than we talk, and some of us talk a bit faster than we think, but the need to stay in phase keeps the tempo of both roughly in phase. That is a biological property of our brains, a property that evolved hundreds of thousands of years ago with the advent of speech, and no one will deny that it was a revolutionary property. With it began the oral tradition, passing down propositions from generation to generation through colloquy by word of mouth.

Have there been any further revolutionary changes in our brains? We invented writing tens of thousands of years ago, and writing made it possible to preserve propositions without having to transmit them in real time, by word of mouth ("colloquially"). Writing is instead an "off-line,"noninteractive medium. (So is reading.) It is out of the real-time, interactive loop, of interdigitating thoughts and brains, of distributed cognition.

You might want to say there is still some interactivity in writing, only at a much slower tempo. That is certainly true. But that slow-down of the tempo also lost something fundamental: The speed of communication via reading/writing is radically out of phase with the speed of thought. The permanent written record is a great gain (verba volant, scripta manent), but the absence of the oral interaction, the colloquy for which our brain evolved and specialized is a great loss too; the possibility of real-time distributed cognition is gone. And because the invention of writing was not a biological event, it did not generate any adaptive biological changes in our brains, as the advent of speech had. It was simply an invention – one of many that the evolution of speech had made possible.

Since the invention of writing, media have come and gone – illuminated manuscripts, print (hot and cold), type-writer s, word-processors, digital texts – and all have extended the speed, flexibility and reach of the written word. But none has restored the real-time interactivity of the oral tradition that the written medium seems to have irretrievably lost. Nor did the innovations in the "volatile" medium of speech (tape-recording, dictaphones, tele-conferencing) bridge the gap with the "lapidary" medium of script: A teleconference is still an oral one; it leaves a permanent record, but that is just the record of an oral interaction. Automatic speech-recognition and transcription into print holds

some promise, but that too is either just the record of an oral interaction or a faster/better way of generating a written text.

The problem remains one of the *timing* of the interaction. Thinking is organically adapted to interactions at conversational speed. Typing cannot keep up; but even if it could, via automatic and immediate dictascript, what's the point? If we want to have a real-time conversation, we might as well have it orally, rather than watch one another's instant dictascript.

And yet, and yet: There have been some other parallel innovations. Digital text processing made cut/pasting possible. (File that away for a moment.) Then email made it possible to exchange written communication at a much faster rate than ever before possible. Still not at the speed of speech and thought, but getting close. And email could be sent at that same speed as one-to-many many, not just one-to-one. There are limits to that form of interactivity, because a simultaneous N-way email interaction can become un-navigable, just as a simultaneous N-way oral conversation can. But, just as in public interactions at symposia and colloquia, not everyone needs to talk at once; and usually only a minority actually intervene rather than just lurk. My own notion of "skywriting" was first inspired by multiple email discussion lists, which naturally evolved into web-based ones, with the interaction ordered and made instantly accessible to all via threaded Hypermail or its equivalent.

Now retrieve the cut/pasting capability (which we momentarily filed away above): I believe that is the most revolutionary ingredient in the new form of "hyperloquy" I am trying to evoke here. We usually think of cut/pasting as a banal routine in the editing of our own digital texts; sometimes it may also involve pasting in quotes from others. But in email it becomes the quote/commenting of the message you have received, where you delete the portions you don't wish to respond to, and quote/comment those you do. As I noted, email turn-around time is fast, though not as fast as oral communication. Moreover, even if email *were* as fast as oral conversation, it would still be easier and more natural to converse orally by phone, using tape or dictascript merely as a means of preserving a permanent record of the interaction, not a better medium in which to conduct it.

But *within* an email, *the quote/commenting itself is a form of interaction* – faster than exchanging written messages directly with your interlocutor, yet far more focused, navigable and manipulable than oral interactions. The interaction is with a text (the quote), yet it has the flavor of a real-time oral interaction, and almost its speed too (depending on how fast one can type – a disparity that will be bridged once dictascript is perfected).

And quote/commentary has two other unprecedented features too: It can be iterated and embedded to any level of depth one wishes: one can quote/comment a quote/comment on a quote/comment, all hyperlinked. An elegant, natural and efficient way of coding and navigating multiply embedded quote/commentary has not yet been designed, but it does not require too much imagination to see how it could be, along the lines of threaded

Hypermail, with both a side-bar showing the structure of the embedding, and the capability of clicking through as deeply as one wishes, while keeping track of where one is, and who said what, when. A taste is already available from open peer commentary journals, both paper and online. (Moreover, unlike mere hypertext, which links from a word/phrase to another word/phrase or full-text, and is hence rather awkward for one-to-many fan-out, quote/commentary is intrinsically modular and one-on-one – commentary-on-quote -- recovering the original quoted document from many-to-one fan-in.)

The second feature of quote/commented text is again the skywriting dimension: That this is not just one-on-one email, but written up in the sky, for everyone to see, and potentially quote/comment on. And the text on which one is quote/commenting in the sky need not even have a living author: the quote/comment brings the text alive and puts one into public dialogue with the author. The interactive flavor of quote/commentary -- plus the publicly visible and accessible nature of the interaction, with the everpresent possibility for any other skyreader to join in the skywritten quote/commentary – engage the ancient oral interactive powers for which our brains were specifically designed in ways that neither the oral nor the written medium has ever before been able to engage: skywriting at the speed of thought, with near real-time interactions between not only minds and minds, but minds and texts: hyperloquy.

I close with a brief bibliography on skywritten quote/commentary.

Harnad, S. (1979) Creative disagreement. The Sciences 19:18 - 20.

_____ (1990) Scholarly Skywriting and the Prepublication Continuum of Scientific Inquiry. Psychological Science 1:pp. 342-343.

_____ (1991) Post-Gutenberg Galaxy: The Fourth Revolution in the Means of Production of Knowledge. Public-Access Computer Systems Review 2(1):pp. 39-53.

_____ (1992) Interactive Publication: Extending American Physical Society's Discipline-Specific Model for Electronic Publishing. Serials Review 18, Special Issue on Economics Models for Electronic Publishing, pp. 58 - 61.

_____ (1995) Interactive Cognition: Exploring the Potential of Electronic Quote/Commenting, in Gorayska, B. and Mey, J.L., Eds. Cognitive Technology: In Search of a Humane Interface, pages pp. 397-414. Elsevier.

_____ (2003) Back to the Oral Tradition Through Skywriting at the Speed of Thought. Interdisciplines.

(2006) Distributed Processes, Distributed Cognizers and Collaborative Cognition. Pragmatics and Cognition

Light, Paul and Light, Vivienne and Nesbitt, Emma and Harnad, Stevan (2000) Up for Debate: CMC as a support for course related discussion in a campus university setting, in Joiner, R., Eds. Rethinking Collaborative Learning. London: Routledge.