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### **AN INTERMEDIA WITH 2 BILLION SCREENS PEERING INTO IT**

We already know that our use of technology changes how our brains work. Reading and writing are cognitive tools that, once acquired, change the way in which the brain processes information. When psychologists use neuroimaging technology, like MRI, to compare the brains of literates and illiterates working on a task, they find many differences, and not just when the subjects are reading.

Researcher Alexandre Castro-Caldas discovered that processing between the hemispheres of the brain was different between those who could read and those who could not. A key part of the corpus callosum was thicker in literates, and "the occipital lobe processed information more slowly in individuals who learned to read as adults compared to those who learned at the usual age." Psychologists Ostrosky-Solis, Garcia and Perez tested literates and illiterates with a battery of cognitive tests while measuring their brain waves and concluded that "the acquisition of reading and writing skills has changed the brain organization of cognitive activity in general is not only in language but also in visual perception, logical reasoning, remembering strategies, and formal operational thinking."

If alphabetic literacy can change how we think, imagine how Internet literacy and 10 hours per day in front of one kind of screen or another is changing our brains. The first generation to grow up screen literate is just reaching adulthood so we don't have any scientific studies of the full consequence of ubiquitous connectivity, but I have a few hunches based on my own behavior.

When I do long division or even multiplication I don't try to remember the intermediate numbers. Long ago I learned to write them down. Because of paper and pencil I am "smarter" in arithmetic. In a similar manner I now no longer try to remember facts, or even where I found the facts. I have learned to summon them on the Internet. Because the Internet is my new pencil and paper, I am "smarter" in factuality.

But my knowledge is now more fragile. For every accepted piece of knowledge I find, there is within easy reach someone who challenges the fact. Every fact has its anti-fact. The Internet's extreme hyperlinking highlights those anti-facts as brightly as the facts. Some anti-facts are silly, some borderline, and some valid. You can't rely on experts to sort them out because for every expert there is an equal and countervailing anti-expert. Thus anything I learn is subject to erosion by these ubiquitous anti-factors.

My certainty about *anything* has decreased. Rather than importing authority, I am reduced to creating my own certainty — not just about things I care about — but about anything I touch, including areas about which I can't possibly have any direct knowledge. That means that in general I assume more and more that what I know is wrong. We might consider this state perfect for science but it also means that I am more likely to have my mind changed for incorrect reasons. Nonetheless, the embrace of uncertainty is one way my thinking has changed.

Uncertainty is a kind of liquidity. I think my thinking has become more liquid. It is less fixed, as text in a book might be, and more fluid, as say text in Wikipedia might be. My opinions shift more. My interests rise and fall more quickly. I am less interested in Truth, with a capital T, and more interested in truths, plural. I feel the subjective has an important role in assembling the objective from many data points. The incremental plodding progress of imperfect science seems the only way to know anything.

While hooked into the network of networks I feel like I am a network myself, trying to achieve reliability from unreliable parts. And in my quest to assemble truths from half-truths, non-truths, and some other truths scattered in the flux (this creation of the known is now our job and not the job of authorities), I find my mind attracted to fluid ways of thinking (scenarios, provisional belief) and fluid media like mashups, twitter, and search. But as I flow through this slippery Web of ideas, it often feels like a waking dream.

We don't really know what dreams are for, only that they satisfy some fundamental need. Someone watching me surf the Web, as I jump from one suggested link to another, would see a day-dream. Today, I was in a crowd of people who watched a barefoot man eat dirt, then the face of a boy who was singing began to melt, then Santa burned a Christmas tree, then I was floating inside mud house on the very tippy top of the world, then Celtic knots untied themselves, then a guy told me the formula for making clear glass, then I was watching myself, back in high school, riding a bicycle. And that was just the first few minutes of my day on the Web this morning. The trance-like state we fall into while following the undirected path of links may be a terrible waste of time, or like dreams, it might be a productive waste of time. Perhaps we are tapping into our

collective unconscious in a way watching the directed stream of TV, radio and newspapers could not. Maybe click-dreaming is a way for all of us to have the same dream, independent of what we click on.

This waking dream we call the Internet also blurs the difference between my serious thoughts and my playful thoughts, or to put it more simply: I no longer can tell when I am working and when I am playing online. For some people the disintegration between these two realms marks all that is wrong with the Internet: It is the high-priced waster of time. It breeds trifles. On the contrary, I cherish a good wasting of time as a necessary precondition for creativity, but more importantly I believe the conflation of play and work, of thinking hard and thinking playfully, is one the greatest things the Internet has done.

In fact the propensity of the Internet to diminish our attention is overrated. I do find that smaller and smaller bits of information can command the full attention of my over-educated mind. And not just me; everyone reports succumbing to the lure of fast, tiny, interruptions of information. In response to this incessant barrage of bits, the culture of the Internet has been busy unbundling larger works into minor snippets for sale. Music albums are chopped up and sold as songs; movies become trailers, or even smaller video snips. (I find that many trailers really *are* better than their movie.) Newspapers become twitter posts. Scientific papers are served up in snippets on Google. I happily swim in this rising ocean of fragments.

While I rush into the Net to hunt for these tidbits, or to surf on its lucid dream, I've noticed a different approach to my thinking. My thinking is more active, less contemplative. Rather than begin a question or hunch by ruminating aimlessly in my mind, nourished only by my ignorance, I start doing things. I immediately, instantly *go*.

I go looking, searching, asking, questioning, reacting to data, leaping in, constructing notes, bookmarks, a trail, a start of making something mine. I don't wait. Don't have to wait. I act on ideas first now instead of thinking on them. For some folks, this is the worst of the Net — the loss of contemplation. Others feel that all this frothy activity is simply stupid busy work, or spinning of wheels, or illusionary action. I think to myself, compared to what?

Compared to the passive consumption of TV or sucking up bulky newspapers, or of merely sitting at home going in circles musing about stuff in my head without any new inputs, I find myself much more productive by acting first. The emergence of blogs and Wikipedia are expressions of this same impulse, to act (write) first and think (filter) later. I have a picture of the hundreds of millions people online at this very minute. To my eye they are not wasting time with silly associative links, but are engaged in a more productive way of thinking than the equivalent hundred of millions people were 50 years ago.

This approach does encourage tiny bits, but surprisingly at the very same time, it also allows us to give more attention to works that are far more complex, bigger, and more complicated than ever before. These new creations contain more data, require more attention over longer periods; and these works are more successful as the Internet expands. This parallel trend is less visible at first because of a common short sightedness that equates the Internet with text.

To a first approximation the Internet is words on a screen — Google, papers, blogs. But this first glance ignores the vastly larger underbelly of the Internet — moving images on a screen. People (and not just young kids) no longer go to books and text first. If people have a question they (myself included) head first for YouTube. For fun we go to online massive games, or catch streaming movies, including factual videos (documentaries are in a renaissance). New visual media are stampeding onto the Nets. This is where the Internet's center of attention lies, not in text alone. Because of online fans, and streaming on demand, and rewinding at will, and all the other liquid abilities of the Internet, directors started creating movies that were more than 100 hours long.

These vast epics like *Lost* and *The Wire* had multiple interweaving plot lines, multiple protagonists, an incredible depth of characters and demanded sustained attention that was not only beyond previous TV and 90-minute movies, but would have shocked Dickens and other novelists of yore. They would marvel: "You mean they could follow all that, and then want more? Over how many years?" I would never have believed myself capable of enjoying such complicated stories, or caring about them to put in the time. My attention has grown. In a similar way the depth, complexity and demands of games can equal these marathon movies, or any great book.

But the most important way the Internet has changed the direction of my attention, and thus my thinking, is that it has become one thing. It may look like I am spending endless nano-seconds on a series of tweets, and endless microseconds surfing between Web pages, or wandering between channels, and hovering only mere minutes on one book snippet after another; but in reality I am spending 10 hours a day paying attention to the Internet. I return to it after a few minutes, day after day, with essentially my full-time attention. As do you.

We are developing an intense, sustained conversation with this large thing. The fact that it is made up of a million loosely connected pieces is distracting us. The producers of Websites, and the hordes of commenters online, and the movie moguls reluctantly letting us stream their movies, don't believe they are mere pixels in a big global show, but they are. It is one thing now, an intermedia with 2 billion screens peering into it. The whole ball of connections — including all its books, all its pages, all its tweets, all its movies, all its games, all its posts, all its streams — is like one vast global book (or movie, etc.), and we are only beginning to learn how to read it. Knowing that this large thing is there, and that I am in constant communication with it, has changed how I think.