On Ambient Information

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What do ambient media mean for the economics of attention? The human mind has always wandered, but has never had such abundant means of doing so. Not only has the volume of mediated information recently exploded, but so also have the formats. The arts of data formation reduce the cognitive load of information artifacts, especially amid urban situations where information is a feature, but not the identity, of objects. For perception is not just a preliminary input to a disembodied mental model, but an embodied, often pre-semantic process that depends on habits, practices, scale, and orientation. This makes it worth reconsidering what is meant by "information." Not all information is something sent. The urban citizen is informed by more than messages, and by the intrinsic eloquence of the world. The latter may be enlivened by participatory pervasive media; or it might just be covered up. This is not a new issue; city form has always mixed with inscriptions; yet it seems like a key one today, as media diversify. How do urban informatics help you tune in, and not out? How can the addition of situated media actually reduce the sense of overload?

1. Inscribing the City

Urban computing is now coming of age. Information permeates the built environment at the scale of urban resource networks. Ambient information transforms the usability of the city (Greenfield, 2012). It increasingly affords a bottom-up awareness of places to intervene in various urban systems. Yet just thirty years ago, "smart city" meant fashionable dress.[1] Just ten years ago, "smart grid" had yet to appear in the mainstream news media.[2] This field is new.

Inscriptions, whether in stone, print, or electronics, may hardly seem like the main form of data in the age of the network cloud, yet they remain important. As is evident from scrawled graffiti and chiseled proclamations alike, to tag a place is to assert a stake in it, and to assert oneself or one's organization, not just everywhere, but within a specific context. As observed by the late William Mitchell in the oft-cited lead essay to his collection *Placing Words* (which title this conference has upgraded to *Placing Sense*), context remains vital to communication. Context disambiguates phrases that mean different things in different places. While often purely social, this sense-making role can also be physical. Sites, objects, and props give meaning to communications embedded in them. Thus, as Mitchell famously observed, the cognitive role of architecture, at least with respect to communications, is to give them *mise-en-scène* (2005, p. 3).

The recent explosion of locative, geotagged, and situated media increasingly demonstrates this. The proliferation of display formats, both very large and very small, puts data feeds almost everywhere. Positional tags and coordinates link with stored data to make anyplace an accumulation. So whether with text, numbers or just lists of who has checked in at any particular spot, the act of writing the city has diversified into many more contexts and situations.

2. Distraction Reconsidered

Although this technological explosion suggests many cool things to build, let us put aside that urge for a moment, and take a breath to consider the economics of attention. For a superabundance of mediated information may just be the second most distinct aspect of these times (besides planetary change). Information superabundance is the quality by which these times differ most from even very recent ones. Everyday environments are filling with ever more kinds of information, in many new formats of technology. Some of these make the world more understandable, even pleasant, but many prove difficult to escape. Whether carried about in your bag, hung on the walls, playing from the ceiling or built into everyday objects, media feeds seem to

be everywhere, as if people would suffer without them. Unlike the soot and din of a bygone industrial age, many of these feeds have been placed deliberately and are not side effects, and many of them appeal to the senses.

Outcry over distraction has thus been escalating. You may squirm a bit in the passenger seat as the car perceptibly drifts out of its lane when the driver switches from a voice call to texting. A third-grader should do homework in a room without television, the standard assignment sheet says, sadly with the implied assumption that most of time, in the homes of most children, somewhere a television is on. Personal productivity management gurus do a big business telling people not to do everything at once, or at least to limit multitasking to situations where there are actual benefits of concurrency.

Of course, one can reach distraction using no more technology than a jug of wine or a pair of dice. Of course the mind likes to jump about. And, of course, sensitive souls who lived long before computer networks complained of overload (Blair, 2003). "Is there anywhere on earth exempt from these swarms of new books?"[3] asked Erasmus, the first modern editor, early in the 16th century. With the rise of the modern industrial city, new forms of din and dislocation produced a new kind of overload, and hence of detachment or under-involvement, expressed by Durkheim as *anomie* and Simmel as *blasé* (Frisby, 1984). Distraction thus has long been a core concept in urban sociology. Yet today is an age of unprecedented distraction. Although the human mind naturally tends to wander, never before has it had such abundant means for doing so. As the cultural critic Bill McKibben put it, "Distraction has always been a human condition. Sages have always been quick to point out how even a few minutes of meditation prove the jumpy nature of our consciousness—our monkey minds. But now every force conspires to magnify that inattentiveness: technology has made distraction ubiquitous" (2009, pp. 9–10).

The experience of urban informatics has changed so much since the industrial city and the heyday of print and broadcast media that it is time to reexamine the urban citizen's distraction. Participatory, filtrative, location-specific, pervasive, and ambient, this isn't the clanking industrial Berlin of Simmel, nor the television age of Reagan. Much of the change has been away from command by any one information medium. Frankly, nothing may be designed on the assumption that it will be noticed. Anyway, much as the city is no longer a steam economy, it isn't an information economy. This problem was famously identified by the information scientist Herb Simon in 1971: "...in an information-rich world, the wealth of information means a dearth of something else: a scarcity of whatever it is that information consumes. What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention and a need to allocate that attention efficiently among the overabundance of information sources that might consume it" (1971, pp. 40–41).

"We're motivated by a desire not to miss anything,"[4] the design strategist Linda Stone has observed. Stone cautions about "continuous partial attention." She distinguishes this from multitasking, and finds both of them voluntary. "Information overload. I don't think so. Blaming the information doesn't help us one bit. Information over-consumption. That gets us to the heart of it" (2008).

Overconsumption happens when its objects become more prevalent. The sociologist David Shenk cautioned in the 1990s, long before ubiquitous media: "Just as fat has replaced starvation as the nation's number one dietary concern, information overload has replaced information scarcity as an important new emotional, social, and political problem" (1999, p. 29). The supply of mediated stimulus is at an all-time

high, (at least for the luckiest billion humans), like that of food. When a resource becomes so abundant that people instinctively consume wherever possible, because in a natural state it was scarce, overconsumption occurs. As with sugar and fat, so with information: obesity happens. Empty calories exist, for example, in the echo chambers of Twitter, but really anywhere.

Neuroscientists explain that at some base level of brain resource cycles, especially for more complex tasks, multitasking is a myth.[5] Monitoring occurs naturally in some ways in your alerting systems, but has no pathways to handle perpetual or simultaneous messages. Embodied context is vital to sense-making but has been underrepresented in research, for it is difficult to study clinically.

Of course, it doesn't take a neuroscience lab to demonstrate the existence of limits to how many distinct foci you can keep. For example, a simple exhibit at San Francisco's famed Exploratorium asks you to watch a blue square among about a dozen green ones, as they all move about the screen, until it then turns the same color green, and so seems to disappear among the others. Then a couple of seconds later you are asked to identify which of the squares was once blue. This is a trivial exercise with one square, can typically be done with two or three, so the exhibit explains, and is already quite difficult with four or five. So if there were forty squares, and twelve of them turning blue to green, you would have to be prepared to miss some doing so.

3. Sensibility or Missing Information? (McKibben, 1992)

One trouble with distraction by information media is a lost opportunity for attention restoration by the world. The less people engage their surroundings, the greater the risk of imbalance and overload.

"The unspeakable eloquence of the world," as the philosopher Albert Borgman has called it, may be just what today's perpetually messaging person could miss. There is a difference between information about the world, information for the world, and information as the world, Borgman explained. "Information can illuminate, transform, or displace reality" (1999, p. 1). Mythology, poetry, and geodata are *about* the world, as it is known. Information *for* reality makes bold plans to alter aspects of experience and realizes them through the contingencies of the physical world (Floridi, 2007, p. 9). The Latin root *contigere* connotes consummation more than circumstance. The enduring, situated doneness of the work gives it its power, especially for orientation and memory. Without contingency or permanence, and without enough difference between things that are made and signs that prescribe them, information would not be *for* reality. Information *as* reality lacks these epistemological anchors. It can be anything, and something else the next moment.

Leading the focused life depends on a better balance among these kinds of information. In an age of distraction engineering, you have no choice but to manage your attention more mindfully. Better filtering becomes mandatory. There are many kinds of filters, of course: semantic, social, situational, and of sensibility. Each of these may introduce still more information, or may make use of greater, more precisely differentiated information, to get more of whatever is wanted and screen out more of what is not. The mechanisms of this paradoxical use of more to get less seem obvious enough in semantics and search, those more usual pursuits of technologists. Here, instead, consider the mechanisms of taking in more from embodied context.

For this, the intrinsic structure of the world often supports tacit expertise. Experts play situations. The city supports deliberate practices. Attention flows effortlessly in situated actions. What is more, environmental structure tends to be perceived at higher resolution and lower pace than other media by which it increasingly gets covered.

Especially in natural phenomena, such quiet fascination can be restorative (Kaplan, 1995). Too much about human cognitive structure depends on a greater depth and range of contexts for us to accept glowing rectangles as reality for years on end. Now as technology becomes tangible and embedded, will it afford better attention skills amid participatory cultural practices? Now that would be "placing sense."

So the question for urban informatics is this: Does this latest layer of urban infrastructure help one tune in, or just to tune out? The word "sensibility" best describes how habits of attention affect perception, especially amid habitual contexts rich in embodied cognition. "Ambient" is a sensibility, as is "overload," as is a willingness to notice the world as it is, not for one's own ends, but out of simple fascination. It must be an oversimplification to say this, but after an age of passively consumed media, people don't even know that they don't know, say, for whom the streets have been named, where their food comes from, the name of any one tributary to the local river, which vegetation is native, the prevailing directions of wind, or what phase the moon is in. Will more participatory ambient information improve such sensibilities? Will it enliven the world, or just further eclipse it?

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1 On a Lexis-Nexis word search of "smart cities" in world news media, two-thirds of the ~1000 results from the last thirty years are from the last ten years.

2 On a Lexis-Nexis word search of "smart grid" in world news media, half of the ~1000 results from the last thirty years are from the last four years, and the earliest are from 2003.

3 Quoted in Blair, Ann. "Information overload, the early years." *The Boston Globe*. 28 November 2010: K1-2.

4 Linda Stone on "Continuous Partial Attention": http://lindastone.net/

5 For an example of a widely cited neuroscientist of attention: David Meyer. For extensive reporting for the layman on Meyer and the neuroscience of attention, see Maggie Jackson (2009). *Distracted: The Erosion of Attention and the Coming Dark Age*. New York: Prometheus. For a classic technical citation: Rubenstein, Joshua S., Meyer, David E. & Evans, Jeffery E. (2001). "Executive Control of Cognitive Processes in Task Switching." *Journal of Experimental Psychology, Human Perception, and Performance*, 27(4), pp. 763–97.

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