

Information as a Cultural Category

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One of the questions that invariably comes up when discussing ambient intelligence is the thorny problem of just what the term might mean. It's catchy and provocative, but attempts to define it tend to be unsatisfying. Sometimes, of course, a slogan of this sort can productively inspire without necessarily being crisply defined, and so it is with "ambient intelligence." However, it is still worth taking the question of meaning seriously. Our concern here is not simply with the meanings of the words around which we define our work, but with what *kinds* of meanings they might have, with where those meanings come from, and with their consequences.

Ambient intelligence is heir to two traditions within computer science research – the artificial intelligence program and the more recent considerations of ubiquitous computing. As such, then, it inherits the ways in which those traditions postulate the nature of human behavior and its relationship to the world within which it arises.

In his classic article, Weiser (1991) makes the telling remark that there is more information available to us in a walk in the woods than there is when we sit in front of a computer, our quintessential information processing system. By this, he wants to draw attention to the complexity and clumsiness of traditional computer interfaces, and the obstacles that they put in the way of the tasks that they are designed to support. However, his analogy raises a separate question, which he does not explore but we wish to here – why should we think of a walk in the woods as an information exercise, and what happens when we do?

The use of "information" as a mass noun is a relatively new phenomenon (Day, 2001). "Information" had previously referred to the process or activity of informing or of being informed; to "receive information" was to participate in a process, much as one might "receive confirmation." More recently, though, and particularly since the development of electronic information systems, our idea of information has changed, and we start to think of information as a thing in itself (Buckland, 1991.) So, in casting the embodied experience of the physical world in information terms, Weiser isn't breaking new ground; rather, he is following in a distinctly twentieth century tradition of searching for mathematical models of everyday life. In particular, the notion of "information" as a fundamental coin of the realm is part of a broader movement from the analog world to the digital, a movement that also involves a radical conceptual shift. When digital information processing machines were first introduced, they were dubbed "electronic computers." Although it is difficult to remember now, this was not a new term; "computers" was a term in common use, referring to the people (largely women) who performed rote calculations for the production of, for example, artillery targeting. The new machines, then, were electronic computers in the sense that they were electronic equivalents of (human) computers. Indeed, these new machines were generally understood and thought of as equivalent or similar to organic entities; they were, as so many newspaper headlines declared, "giant electronic brains."

In the subsequent years, and particular with the emergence of cognitive science in the 1960s and 1970s, a fascinating conceptual shift took place. The fundamental perspective of cognitive science was that the mind could be understood in computational terms; that information flow, information processing, and information storage were the terms in which human cognitive

activity could be modeled and understood. In other words, where previously we had understood computer systems to be derivative of human behavior, this model was now inverted; humans were now to be understood as a form of computer. Where once the computer was a giant electronic brain, now the brain was a biological computer. Accordingly, the rhetoric of information processing that was part and parcel of the world of electronic computation became the model by which human experience was to be understood; memory could be understood in terms of storage capacity, and rationality in terms of operations performed per second.

As analog devices have increasingly been replaced with digital counterparts, this information rhetoric has continued to spread. Recent developments in ubiquitous computing – the same set of trends that Weiser was discussing – have been part of this shift. Ubiquitous computing sees the movement of computation away from traditional computer systems and into the everyday world, through the development of networked embedded and wearable technologies. So, the world becomes a site of computation and an object of informational representation. We start to understand and model the world in information terms, as suggested by Weiser's remark that even a walk in the woods can be thought of in terms of its information content.

This seemingly innocuous statement is actually a quite radical one. It equates information with experience (or, rather, suggests that experience is founded upon information.) It is a way of using the concept of information that is both practiced and culturally bound. Information, in other words, is a cultural category; an element of a broad cultural understanding of reality. We can see this best, perhaps, by looking for the boundaries. If a walk in the woods can be thought of in information terms, how about a loving relationship? How about a performance of Beethoven? How about an insult, or a physical exchange of blows? The very fact that we would inherently resist a suggestion that these experiences can be modeled and understood in terms of information flows, storage, and processing highlights the way in which "information" is a cultural category, one that reflects the ways in which we understand and think about the world and our place within it.

So, ambient intelligence, as a research program, arises within this broader context which sees information as an object that can be uncovered, moved around, and processed, rather than as a reflection of social and cultural relations.

We can see this at work in the notion of ambience. Ambience draws our attention to distinctions between focus and periphery (Brown and Duguid, 1994) and the different ways in which information can be incorporated into an environment. But at the same time, it retains this same focus on information as an object, while obscuring other ways in which environments might be informative. For example, return to Weiser's question of the experience of space, but think about it from different points of view. Aboriginal Australians, for example, have an experience of their landscape that is quite different from Western traditions. They experience the landscape in terms of a series of ritual responsibilities, not just for its upkeep, but for its very existence. The link between the Dreaming and the everyday world, the link that connects the land to the processes that brought it into existence and continue to shape it, must be actively maintained. The land is experienced, too, in terms of clans and lineage groups; the very features of the land link it to the Dreamtime actions of totemic creatures whose continuance is marked by patterns of land occupancy and responsibility. Finally, the land is experienced in terms of historical events; the actions of humans leave their marks, both physically and spiritually, on the land. Any movement through the landscape, and any experience of it, is cast in these terms. There is much more to be "read" in the land than purely physical form, but this is an aspect of daily experience, not an information experience to be thought of as looking up a dictionary. Indeed, the land may be experienced first in terms of its symbolic meaning and only secondly in terms of its physical form. The landscape is experienced as meaningful, not read or processed as information (Dourish and Bell, 2005).

If we think of information as a cultural category, then, and of “informating” – that is, the process of reading aspects of everyday life in information terms – then it is sensible to ask what is being done by that process. Arguably, the process of describing aspects of the world in information terms makes them amenable to information-based processes; to the forms of representation, transformation and processing associated with a variety of technical disciplines. In recent discourse, though, the informating of everyday life brings it particularly into the domain of computer scientists and of commercial information systems providers. If your problem can be conceived of as an information problem, then it is a problem that Microsoft and IBM can help to solve. If your problem can be conceived of as an information problem, then it is a problem that a computer scientist can address. If your problem can be conceived of as an information problem, then it is one on which Moore’s Law will naturally have its effect. What is at stake, then, is the right to create, define, and lay claim to both problems and solutions.

More broadly, this alternative view suggests some important research challenges for ambient intelligence. Recent shifts in how we think about technology and experience as embodied phenomena (Dourish, 2001) mark not only an increasing concern with the physical aspect of interaction design, although that has clearly been an important issue and a significant element of the ambient intelligence program, but a quite different reading of interaction beyond the “information processing” approach. Research in ubiquitous computing and ambient intelligence has often made use of social science methods as ways of understanding settings into which technology might be introduced; our considerations here suggest that we might fruitfully also use these approaches to investigate how these settings are understood by the people who populate and enact them. If “information,” “ambience” and “intelligence” are cultural categories, then how can the relationship between technology and social and cultural practice be reimaged?

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