Media in Built Environments: The Technologies of Mediatization

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ABSTRACT

Media are becoming constitutive elements of the built environment. From the perspective of mediatization theory, this paper explores the implications of such a claim, with the automobile as an illustrative case, which in turn leads to four observations concerning media and physical space, material and immaterial interfaces, media's simultaneous functions as means of infotainment/interaction/infrastructure and intelligent environments. Together, they point the way to a media-architectural approach.

Categories and Subject Descriptors

H 2.1 Intermedia, H 3.4 Web 2.0, H 4.3 Internet

General Terms

Design, Human Factors, Theory

Keywords

Media-architecture, mediatization, media in the built environment, automobile as media site

INTRODUCTION

Media are leaving behind their long history as discrete devices and dedicated objects like TV sets, record players and telephones. Instead, as currently epitomized by the smartphone, they are becoming highly portable and intensely personal *multi*media whose familiar cross-media differences are nevertheless dissolving – as when a medium reads text aloud or a video clip appears in a textual message. At the same time, and somewhat paradoxically, media are becoming accessible through a multitude of networked non-media objects that are capable of learning, automatically responding to and even anticipating the user (famously, the smarthome and soon the internet of things). Finally, it is not so much media as media functionalities – audio, video, text – that are dispersed and embedded in built environments, creating constitutive ecologies of ubiquitous media that are regularly encountered in wearables, vehicles and physical locations [1].

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MEDIA IN CARS

This broad technological transformation is neither science fiction nor speculation about possible futures. It can be observed in a familiar site, the automobile (for a fuller discussion, see [2]). There is no obvious or necessary connection between cars and media. But media have been a persistent feature in cars, beginning in the early twenties, the decade when automobile sales grew explosively. By then, AM radios were being installed in cars. They were very expensive, large and unreliable, with poor sound quality, but manufacturers gave them enticing names like Roamio and the Magic Brain. By the late thirties, car radios were selling in the millions. Families listened to the radio in the car together. Radios grew smaller and were integrated stylishly into the dashboard. Push-button and foot controls became available. After the war, related to the development of high-fidelity audio in the home, to the recorded-music industry and to the increase in FM radio stations, car audio quickly became nearly universal. Automobile phonographs were introduced, along with radios that could be removed and used as portables. Car radio was of course a central feature to sixties youth culture. In the decades afterward, audio options became more numerous: 8-track tape players, audio cassettes, CB radio, improved sound insulation, better and more numerous speakers, compact discs, satellite radio. Powerful audio systems turned cars into rolling loud speakers. And DVD players brought Hollywood film and television programs into the car. One effect was to make it an intensely personalized, private site of mobile media consumption. The twentieth century then, the time of the "automobilization" of society, was equally a period of the steadily increasing presence of ever-more sophisticated media in the car - a dramatic, large-scale instance of the mediatization process, when media technologies become fundamental, unavoidable elements in everyday life, altering patterns of social communication.

Media in cars, however, have gone beyond being a significant means of mobile entertainment. Automobiles are now designed, built and operated with the aid of digital technology. Scores of electronic control units and other digital devices monitor, guide and record the mechanical operations of a car. Some improve safety by over-riding the driver's action in braking, staying in the proper lane, seeing in the dark. The driver can electronically choose drive programs that alter ride quality, steering and engine responsiveness. GPS navigation is a standard feature. A car's operating data can be transmitted automatically to the manufacturer; the car's software is updated and service messages are presented. Smartphones connect to the car and display their content wirelessly on small video screens, enable hands-free phone calls, play the occupants' preferred music. Advanced car models feature numerous interfaces that use increasingly natural ways to control media. Successful experiments in driverless cars

depend on highly developed on-board digital technology. Automobiles today are nearly fully digitalized vehicles and simultaneously sites of mediatized cultural consumption and production.

The mediatization and digitalization of the car, a quite banal, universal means of transportation, illustrate principal themes concerning media in built environments generally: media infiltrate and contribute to the redefinition of space; media interfaces take on a variety of forms that can make them a material part of other objects, though engaging a medium by going "through" its interface is less and less an act of manual or mechanical manipulation; media functionalities blur the line between providing infotainment, acting as interactive means of communication and being essential, immaterial infrastructural components of the environment; media help create environments that learn, respond to and anticipate user behavior, distributing intelligence throughout the material world.

From this perspective, theorizing media architecture demands the conceptualization of a media-architecture - acknowledgement of the growing inseparability of media and constructed spaces and designed objects, most of which are not obviously or primarily "media." This approach, which implies one kind of research agenda, has greater kinship with Le Corbusier's almost century-old admonition that a house is a machine for living in than with more recent attempts to link media and architecture, such as Beatriz Colomina's [3] claim that "modern architecture only becomes modern with its engagement with the media" - by which she means mainly gaining the attention of popular culture (think present-day starchitecture) - or that "the building is a mechanism of representation in its own right." The latter sentiment has guided interesting analyses of old and new media buildings whose exuberant design boldly announces their occupants' self-importance to major urban centers [4]. In contrast is the aesthetic shared by Corbusier's Villa Savoye (1929), Grete Schütte-Lihotsky's 1920s Frankfurt kitchen and Frank Lloyd Wright's 1930s Usonian houses. Influenced by the efficient design of steamships and automobiles, or in a quest to maximize living space within the limits of a tightly constrained place, or to enhance the illusion that brings the outdoors inside or to achieve low cost through the application of industrial practices, these are built environments that integrate the tools of everyday life into their very structure. An open floor plan facilitates the flow of occupants throughout the space, visually and actually, breaking down traditional divisions between the labors of daily existence. Built-in furniture is explicitly tailored to the overall design. Natural light fills what would otherwise be dark or artificially illuminated spaces (see also Walter Gropius's "total architecture" [5]).

The study, design and construction of media-architecture with this sort of sensibility must turn its attention to everyware media, embedded and ubiquitous in an emerging world of continuous interfaces.

MEDIATIZATION

Mediatization labels a body of developing theory that attempts to capture the sheer pervasiveness and fundamental influence of contemporary media [6]. Its proponents make a powerful case. Norm Friesen and Theo Hug [7] argue for the widespread "condition of the mediatic a priori," by which they mean that today media "can be said to structure our awareness of time, shape our attentions and emotions and provide us with the means for forming and expressing thought itself. Media, in slightly different terms, become epistemology: the grounds for knowledge and knowing itself." This comprehensive, ecological quality of media is reiterated by Eric Rothenbuhler, who sees them as "something we live inside as much as they are technologies we use for expression, information, influence and entertainment" [8]. For these reasons and others, media do far "more than mediate in the sense of 'getting in between'," [9] but reshape relations among all social institutions. Scholars view the mediatization process on the same historical scale and with a similar scope of consequences as globalization, urbanization and individualization [10]. As Friedrich Kittler [11] famously wrote, "Media determine our situation."

What Kittler has in mind, however, does not concern the content of media. To the contrary. In his essay "There is No Software," Kittler [12] claims that, "there are good grounds to assume the indispensability and, consequently, the priority of hardware in general." His view is that the technological means of media production, distribution and consumption determine the features of immaterial content and, presumably, strongly influence the nature of its experience – which turns common sense on its head, since while people "listen to the radio," it is music or speech they wish to hear. And it is there where conventional media analysis tends to focus. Nicholas Gane [13] calls Kittler's position "radical post-humanism," and refers to him as a pioneer in "media materialism - an approach that privileges, at all costs, analysis of the material structures of technology over the meanings of these structures and the messages they circulate." (Gane [14] also says that Kittler himself uses the term "information materialism.") As a post-humanist, Kittler [15] judges that the media age "renders indistinguishable what is human and what is machine." This is so partly because information machines "can imitate any other machine, and that includes us, in so far as they can imitate our thinking" [16].

Most mediatization theorizing lacks Kittler's technological emphasis. Instead, the principal debate is between institutionalists and social constructivists. The former [17] argue that mediatization occurs when either formerly non-media activities are absorbed by the media, like online banking (the strong or direct version), or when a social activity grows dependent on the media, as when popular knowledge of a foreign country comes chiefly through Hollywood films (weak or indirect). From this perspective, media share a "logic" – genres, organizational structure, expectations about audiences – that other social actors take on, to greater or lesser degrees, as part of their own functioning (politics is the typical example). Social constructivists look more closely at "small life-worlds" to determine which media are involved in what kind of changes in micro-level communication behavior [18]. Andreas Hepp argues for a common ground between the two schools in determining what he calls the "molding forces" of a given medium in a specified situation. Seeking a synthesis, Hepp [19] begins to appreciate the technological element when he recognizes that media act to "reify" social communication behavior through "technical apparatuses."

Klaus Bruhn Jensen [20] criticizes the general formulation of mediatization theory for neglecting considerations of technology. He makes three points: (1) that digital technological developments have problematized familiar notions of (mass) media; (2) that media are becoming distributed and embedded in "multiple objects and settings"; and (3) that "communication is transgressing boundaries of the physical world, becoming embedded in both the natural environment and the human body." These features may mean, Jensen observes, that digital media will make changes "in radically new ways" and exhibit a pace of innovation and adoption different from their analogue predecessors. It seems clear then that attempts to conceptualize the mediatization process must attend closely to the technologies of emerging new media. Some of that work has actually begun, and with specific implications for a media-architecture.

Media In The Built Environment

Hardware, software; object, content; device, functionality. This bifurcation or tension between the material and the immaterial is an abiding quality of media. It is not surprising then that a recent Pew [21, emphasis added] survey of experts on the future of the internet begins by forecasting both features, "an ambient information environment where accessing the internet will be effortless and most people will tap into it so easily that *it will flow through their lives 'like electricity*.' [The experts] predict mobile, wearable and embedded computing will be *tied together in the internet of things*, allowing people and their surroundings to tap into artificial intelligence – enhanced cloud-based information storage and sharing." The imagery suggests almost magical conditions: intangible, ubiquitous information made accessible through commonplace objects. It is fair to say that in the report as a whole, emphasis is on the former and its consequences (divided, of course, into the "more-hopeful" and "less-hopeful"). Very little is said directly about the things that will constitute the historically new type of media interface.

Quite apart from specific media considerations, there is a substantial body of literature, in anthropology and cognitive science, for example, that clearly establishes the social significance of objects – as in the internet of *things*. Daniel Miller [22] asks, "Can we have a theory of things?" His response asserts the centrality of objects, which, barely noticed, literally frame social life and help shape people's "categorization and appraisal of our circumstances. The less we are aware of artifacts the more powerfully they can determine our expectations by setting the scene and ensuring normative behavior . . ." Moreover, the objects people make – and this certainly bears on media – act like a "distributed mind" [23] and influence others' minds. This thinking immediately elevates the importance of the design and affordances of media objects in a way that the Pew study misses entirely.

Other researchers consider material objects and their relation to embodied cognition. There is evidence, for instance, that the act of handwriting, but not keyboarding, stimulates regions of the brain that contribute to children's learning to read. The manual task of writing a letter appears to make the mental recognition of the letter more successful [24]. Likewise, research shows that understanding abstract number concepts is related to the motor experience of writing numerals or using one's figures to count. There may even be a necessary connection between experiencing an emotion and accurately grasping the meaning of the emotional concept [25]. Raymond Gibbs [26] argues for the significance of "kinesthetic-tactile experience" to conceptions of the self and higher order thinking generally. And there are those like Andy Clark [27] and Katherine Hayles who view humans and their material tools as inextricably interlinked, each fashioning the other. People invent tools and develop the practices of their use, which in turn alter cognition and physical ways of being in the world. Hayles [28] explicitly points to generational differences in reading styles that she ascribes to digital natives' experience with new media. This, she believes, has fostered "hyper-reading," or techniques of scanning, shifting attention and textual sampling, unlike the "deep reading" of older people (she and others see this as an appropriate instance of evolutionary adaptation).

People's relations with media objects can be surprisingly intimate as well. The use of smartphones entails feelings of self-identity and bodily extensions. A familiar sensation is being continually available to others – and expecting others to be available. Their design (brand, color, case, wallpaper, ringtones), choice of apps, frequent handling, storage of music, photos, mail, texts – all deeply personalize the smartphone and make its absence hardly bearable and its loss a crisis [29]. John Urry [30] views the increasing intermingling of people and intelligent environments, replete with emotional, psychological and aesthetic relations, as typical of the new century. It is, he says, "through inhabiting machines that humans will come to 'life'."

These observations return the discussion to the four themes of media in built environments that were derived from the experience of the automobile.

Media And Physical Space

The twentieth-century biography of audio-visual media is one of over-lapping cycles of steady introduction, adoption and replacement. The dynamics behind such waves of innovation are as much corporate and regulatory as strictly technological. AM radio was quickly colonized by commercial networks, FM was delayed by turf battles and a preference to develop television first, recorded music formats (the several analogue discs, reel-to-reel tape, etc.) took complicated decades to reach present-day digital streaming technology. All of this is important, cannot be forgotten and must be held in the background, but is not the principal subject here.

A media-architectural analysis of the automobile would note that cars were originally not intended as media sites, but rapidly became a prime example, and that consumer media began as or quickly became domestic products, but were many of them nevertheless adapted to the automobile. Media in the car were mostly quite different objects from their domestic sisters. An in-dashboard AM/FM radio, a portable radio and a hi-fi receiver/amplifier might have shared transistor technology, but none could be mistaken for the other. A medium like television was immensely popular but took a very long time to find a perhaps limited place in the car. Recorded audio has been a persistent auto medium, but never included reel-to-reel and phonographs, for obvious reasons, were impractical.

These sorts of general observations throw down conceptual and empirical challenges. How, when and to what extent did automobile design take into account the requirements of media? What was the nature of explicit collaboration between the car industry and with what is now called the consumer electronics industry, especially as they both globalized? To what degree were the histories of cars and media distinct or overlapping? For example, while the regular availability of FM radio in cars may have been integral to the sixties, the history of FM technology, regulation, station construction and industry development is so complex that the convergence of the two may have been an historical accident. Do people's lives with media at home create continuities with transportation media, or not? To what extent might consumer demand foster the mediatization of cars compared to the influence of automobile marketing or audience-seeking by media industries? If it can be said in material-cultural terms that media remade the automobile, did automobility contribute to the desire for and acceptance of mobile and dematerializing media?

It is one thing to observe the surprisingly persistent and transformative presence of media-in-cars, and another to account for it. Some of the questions it leads to can be quite particular design matters – about seating, say, and speaker placement – while others are far more complicated – for example, the influence of car audio reproduction capabilities on the composition and recording of popular music. And finally, while the automobile has the empirical advantage of being a very bounded site, it is still possible to ask, just where does automobility stop? There are roads, driveways, garages, advertising/marketing/sponsorship, clothing, posters, models, movies and television shows . . . a car culture, in fact.

Still, it should be apparent that media remade the car and the

experience of automobile travel. This was not intentional in the sense that zoning leads to the construction of specific kinds of neighborhoods. And yet today it is clearly impossible to imagine cars without media. Unless "automobiles" become something else entirely, like some urban smart cars that have no radios.

Material And Immaterial Interfaces

Swiping a plastic card unlocks a door, charges a credit account, allows travel on public transportation. Driving through a toll station on the highway automatically pays the required fee. Touching a smartphone screen affects the heating or cooling at home. Wearing a wristband records and transmits a body's vital signs. Gesturing controls a video game. A vehicle's GPS system gives spoken directional information. These are all examples of natural user interfaces (NUI). Taken more broadly, the idea might also include the inevitable daily encounters with video screens (airports, elevators, bars and restaurants), background music and scrolling text displays, some of which are interactive. Electronic funds transfer (EFT) and monthly auto-pay from one's bank account are related phenomena. The normal, baseline situation of media use – at a desk with keyboard and mouse, in a chair before a television set, standing in place with a corded telephone, one that requires people to conform to the affordance demands of the device, is becoming anomalous.

The NUI experience is growing familiar, but unevenly. People might open their car door electronically, but not the door to their house. Proponents of the Quantified Self movement might obsess over their "data double," but most people are probably unaware of and uninterested in these possibilities. In addition, the expected internet of things (IOT) promises that media functionalities will be accessible through greater numbers of inter-connected non-media objects and sites. The grander conceptual speculation is that media devices per se, and especially those that require distinct, "unnatural" means to operate them, will become uncommon. Together, these observations suggest a period of transition, intermediate technologies, mismatched expectations and conflicting technical standards. If the car is an instance of episodic, semi-planned and even unexpected mediatization, perhaps a more digitally savvy media-architecture can contribute to a less chaotic shift in the nature of media interfaces.

One category of media-architectural challenge is technological compatibility (and obsolescence). No doubt there is at least one home in the world that plays music on vinyl LPs, audiotape cassettes and, in the car, CDs and satellite radio. None of which is compatible, each medium affording a discrete experience, and to hear the same treasured tune across the several media would involve considerable effort. Whether this sort of situation is desirable or sustainable under media conditions of natural user interfaces in an internet of things is questionable.

Infotainment/Interaction/Infrastructure

Kittler [31] says even his own written text "no longer exist(s) in perceivable time and space, but in a computer memory's transistor cells." People get the news in text, audio and video on their smartphone, which also displays their pet's photograph and a stream of microblogs and plays their preferred music – and allows them to make a telephone call. The movement of people through a room may increase the level of light, turn up the air conditioning and alter the tempo of mood music. In each case, "media" are at work. And conceivably in a coordinated way, as when the space detects the presence of a particular person's smartphone, which determines how the indoor environment will respond. Both conceptually and practically, to use "media" to describe all of this activity, some of it happening simultaneously, is a problem. Especially since, as Jensen noted, "media" still carries the connotation of mass media, which imply "broadcast" media (from one to many) in contrast to the point-to-point (tele)communication afforded by the telephone. Now, of course, "media" is a much broader umbrella, gathering the examples like those above.

Because a given built environment will find media acting as sources of information and entertainment, operating as means of social interaction and functioning as electronic infrastructural networks, more than new terminology is required. Basic considerations of media-architecture must be engaged.

Interface design may proceed in an instrumental way from the task at hand or the user's preferred relationship to the functionality. For example, James Katz believes that people may experience small, perhaps handheld devices as appropriate to intimate personal communication, while other kinds of interaction may use other means.[1] This somewhat describes present conditions, when a middle-class home might have a large flat video screen for common viewing along with its residents' personal smartphones and tablets, plus laptop or desktop computers that are used for work. The proliferation of touch screens could soon make each of these devices' interfaces quite similar, though different in size and use. Such a design uniformity has been pioneered successfully by Apple across the iPod, iPad and iPhone and perhaps soon the iWatch, and to a lesser extent the Macintosh, and Apple TV.

This practical approach suggests that interface design must consider the degree of the user's conscious intentionality when using media. Branden Hookway [32] says human-machine interaction possesses a "fluidlikeness," implying a spectrum of users' awareness of the interface itself when he observes, "the interface takes on a seeming transparency as it is worked through, and as its user is enabled through augmentation." Technologically, a new media interface in the built environment could operate simultaneously as a source of information and entertainment, a way of interacting with others and as an immaterial part of the place's infrastructure. But a specific use might dictate the extent of its transparency and the degree of intentionality required for engagement by users. For some purposes – temperature or lighting, say – the interface might be invisible to most occupants, acting automatically. For purposes of what Malcolm McCullough [33] calls the "ambient common," say, presenting news of wide interest, screen or text might be easily visible but without much means of user intervention. Interaction with intimates, following Katz, might require a tactile relationship with something carried on the body.

Hookway [34] speculates that the interface "encounter is an introjection of machinic intelligence into human selfhood, as well as a projection of human intelligence onto the machine." Perhaps media encountered in the physical world will have networked intelligence of a fairly uniform kind. What will vary will be users' awareness, sense of purpose and, consequently, designed means of accessing them.[2]

Intelligent Environments

The prospect of some version of an internet of things or intelligent spaces has had fairly wide currency in popular culture. Steven Spielberg's *Minority Report* (2002), which was informed by well-known information technology experts, including Stewart Brand (*Whole Earth Catalog*, the WELL, Long Now Foundation) Neil

[1] Professor Katz made this comment in response to a question during a Skype visit to my seminar on Media in the Built Environment, 26 March 2014.

[2] This thought could be pursued according to the terms of the theory of distributed cognition [35].

Gershenfeld (MIT physicist), Jaron Lanier (virtual reality) and William Mitchell (MIT architecture dean), continues to be appreciated for its scientific prescience, while earning more than $200 million in profit. The recent film *Her* (2014), according to one writer [36], is anti-*Minority Report* in the sense that the future it conjures is only subtly different from the present (*Minority Report* is set in 2054) - though its computers lack keyboards, instead using a speech-recognition interface. The story revolves around artificial intelligence so smart that it guides the emotional life of the main characters. *Her* was a critical but not, apparently, a commercial success. These films, and many other examples, have laid the imaginative groundwork for the mediatization of everyday life.[3] And yet, like much else under discussion here, the future is not yet born.

The notion of intelligent environments sums up much of what has been discussed here. As a particular construct, it has an extensive literature. This includes a recent "manifesto" that lays out the field in some detail [39], government studies that imagine ambient intelligence "scenarios" [40], technical instructions for deploying intelligent environments [41], academic programs [42], regular international conferences and special symposia [43].

These are mostly engineering-heavy approaches that can inform but are certainly not the same as a media-architectural approach. This leaves an opening for expanding the scope of analysis along the lines suggested in this paper.

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