Introduction

From Here to Ubiquity

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INTRODUCTION

The impetus for this edited collection was the increasingly frequent appearance of the word "ubiquitous" in reference to a wide variety of media and technologies in both the popular and academic press. A Google Ngram search on the phrase "ubiquitous media" reveals the term has been appearing sparingly in texts since 1964, but shows a sharp increase in use since 1984.[1] Even a cursory online search will reveal multiple articles claiming that we live in a "world of ubiquitous media," a "ubiquitous media landscape," or some variation thereof. The wireless technology developer Qualcomm (2011) has released statements referring to "ubiquitous connectivity and seamless experiences that are developing across mobile phones, computing and consumer electronics" and articles that reference ubiquitous media examine its problems and promise in fields ranging from advertising (Åkesson and Ihlström Eriksson 2010), to journalism (Gillmor 2010), to politics (Garon 2012; Mihailidis and Thevenin 2013), to education (Cope and Kalantzis 2010). Other texts, such as a 2009 volume of the journal *Theory, Culture & Society* edited by Mike Featherstone (2009), and the book *Culture, Aesthetics, and Affect in Ubiquitous Media: The Prosaic Image* by Helen Grace (2013) examine ubiquitous media within specific geographic regions or cultures, such as Asian communities in Japan or Hong Kong.

Despite these thoughtful examinations, there is a general tendency to treat this "world of ubiquitous media" as a given, or at least as something of which everyone has an intrinsic understanding. As a result, there is a tendency to define ubiquitous

media specifically in relation to a particular field in lieu of developing broader understandings of the term. Such an approach would seek to understand the concept of media ubiquity as a phenomenon with wide economic, social, and cultural ramifications. One of the goals of this book is to directly contribute to the development of a more comprehensive literature on ubiquitous media. Our examination begins with a simple question: what does it mean to live in a world of ubiquitous media? As Featherstone (2009, 3) argues: "Theorizing ubiquitous media becomes an integral part of theorizing culture and society today." Answering this question requires a consideration of the conditions—including material, technological, and social—that enabled the development of ubiquitous media as well as an investigation of how such a media environment affects social formations and institutions, our interactions with others, and our conceptualizations of space/place.

HISTORICAL PRECEDENTS

We begin here with an attempt to situate ubiquitous media within the larger history of the development of media and communication technology. Featherstone (2009, 2), whose introduction to the *Theory, Culture & Society* issue dedicated to ubiquitous media has become a seminal text on the topic, argues that the emergence of a ubiquitous media environment has been rapid:

> We have moved within a generation from the terminology of 'mass media,' or 'the media,' with debates about the monopolistic concentration of media power and dangers of pervasive manipulation ('the culture industry,' 'the consciousness industry,' 'the hidden persuaders'), to the sense that media are now differentiated, dispersed, and multi-modal.

While it is important to acknowledge that changes in the current mediascape, both social and cultural, have their roots in the pre-digital era,[2] it is undeniably true that understandings of media and their sociocultural role has seen a dramatic transformation in the last two decades, particularly because of the emergence of digital media devices, networks, and services.

A comprehensive summary of the innovations that led to the development and wide-spread adoption of digital media technologies could fill a book in itself. In fact, there are several excellent books dedicated to the topic, such as Martin Campbell-Kelly's and William Aspray's *Computer: A History of the Information Machine* (2004) or Manuel Castells' renowned book *The Rise of the Network Society* (2000). However, there are some important antecedents that we feel it is important to highlight in order to provide a historical foundation for the discussions of ubiquitous media in the following chapters.

Digitalization

One of most important movements that enabled the development of a ubiquitous media environment is a shift away from analog technologies due to the emergence of digital operating systems. Simone Murray (2003) refers to the digitalization of media technologies as the "second wave" of media convergence, following an initial wave of industrial convergence in the form of horizontal and vertical integration enabled by the deregulation of the media industry. Digitalization is often considered in terms of technologies rather than social impacts. Robert Burnett and David Marshall (2003, 1), for example, describe digitalization as enabling a "blending of the media, telecommunications and computer industries, and the coming together of all forms of mediated communication in digital form." Murray (2003, 9) considers digitalization from an industrial perspective, arguing that the establishment of common digital operating systems "radically challenges the media industry compartmentalization traditionally favored by political economy."

Discourse on convergence reached new level of frenzy in the 1980s–90s because of the "exponential growth effect that occurs with the integration of media and products" (Cartwright 2002, 417). The shift to digital operating systems, for example, allowed content previously restricted to one medium or platform (e.g., televisual content) to be conveyed via other channels (e.g., the Internet). For the first time, people could access multiple forms of content flowing across multiple technologies in ways never before experienced, reshape that content, or even create and distribute content of their own. As a result, content "has come to be redefined as a highly transferable commodity inscribed in—but not exclusively embodied by—any one specific media platform" (Murray 2003, 10). The ability for media content to flow freely between media platforms is key to Jay David Bolter's and Richard Grusin's (2000, 45) concept of "remediation," or the "representation of one medium in another." As Featherstone (2009, 2) argues, digitalization "restructures the ways in which material is stored and accessed in the archive….In effect, the *digital media become both a topic and resource, something researchers need to study and theorize to make sense of the world, but also the resource, the interface which cuts into and opens up that world*" (emphasis added).

The flow of media texts across platforms, combined with increased opportunities for participation and interactivity are similarly central to Henry Jenkins' (2006, 2) concept of "convergence culture," which he famously describes as "where old and new media collide, where grassroots and corporate media intersect, where the power of the media producer and the power of the media consumer interact in unpredictable ways." Jenkins sees digitalization and convergence culture as a significant shift; one that, in his words, would result in a "new cultural order" (2006, 93). Jenkins is arguably a bit celebratory in his claims, but the emergence and rapid adaptation of digital technology, platforms and media has indeed created oppor-

tunities for shifts in the "cultural order" as well as opportunities to reinforce the status quo, as some of the chapters in this volume demonstrate. Digitalization has made content available anywhere, anytime, and on virtually any platform, defying the conventional economics of scarcity and triggering a profound, and ongoing, restructuring of the content producing industries.

Ubiquitous Computing

As a practical matter, the pervasive flow of data, information, and content is enabled by the proliferation of digital devices. Paul Dourish and Genevieve Bell (2011) link the emergence of the current spate of digital devices to the historical development of computing technologies. To illustrate this trajectory, they refer to the work of Mark Weiser, a computer scientist who led the Computer Science Laboratory at the Xerox Palo Alto Research Center (PARC) in the late 1980s and early 1990s. Weiser (1996) argued that developed societies in the early 1990s were witnessing the beginning of a "third wave" of computing, following the first wave of shared computer mainframes ("one computer, many people") and a second wave characterized by personal computers ("one person, one computer"). The third wave, according to Weiser (1996), is one of "ubiquitous computing, or the age of *calm technology*, when technology recedes into the background of our lives" (emphasis in the original). This third wave of ubiquitous computing (UC or UbiComp) will be characterized by "many computers sharing each of us" (Weiser and Brown 1996).

Weiser, who is sometimes referred to as the "father of ubiquitous computing," believes that the goal of ubiquitous computing research is "to make a computer so imbedded, so fitting, so natural, that we use it without even thinking about it." Weiser and Brown (1996) further elaborate:

> Some of these computers will be the hundreds we may access in the course of a few minutes of Internet browsing. Others will be imbedded in walls, chairs, clothing, light switches, cars—in everything. UC is fundamentally characterized by the connection of things in the world with computation.

They refer to these technologies as "calm" or "encalming" because they are designed "so that the people being shared by the computers remain serene and in control" and contrast them with "information technologies" such as the Web, mobile phones and email that "bombard us frenetically" (Weiser and Brown 1996). Instead of attention-demanding devices, Weiser (1991, 94) advocates for "a new way of thinking about computers, one that takes into account the human world and allows the computers themselves to vanish into the background."

Despite Weiser's and Brown's attempt to contrast it from "information technologies," information and data are integral to UbiComp, as their emphasis on the "connection of things in the world with computation" suggests. This information

is then used to enhance our way of life. Canadian computer scientist Bill Buxton (1997) expanded upon Weiser's conceptualization of ubiquitous computing, arguing that there is a "seeming paradox that arises between the principle of ubiquity and that of transparency" he hoped to resolve. He introduces the related concept of "ubiquitous video" (UbiVid) in which "there are a range of video cameras and monitors in the workspace, and that all are available. By having video input and output available in different sizes and locations, we enable the most important concept underlying UbiVid: exploiting the relationship between (social) function and architectural space" (Buxton 1997).

Buxton (1997) made a key observation about his UbiVid concept, namely, that it serves as a "complement to UbiComp in that it shares the twin properties of ubiquity and transparency." He ultimately argues that there is only a "seeming" paradox; in reality, by smartly adding *more* equipment (ubiquity) "there actually appears to be less technology and far less intrusion of the technology in the social interactions that it mediates" (transparency). Moreover, he argues that UbiVid and UbiComp "work hand-in-hand" and should collectively be called "ubiquitous media" (Buxton 1997). In contrast to "multimedia computers, in which functionality is inherently bundled into a single device, located at a single location, and operated by a single individual," ubiquitous media represent "an architectural concept in that it is concerned with preserving, or building upon, conventional location-function-distance relationships" that augment reality rather than present an artificial world (e.g., virtual reality).

Buxton's article contains some of the earliest references to terms that are more familiar today, namely "augmented reality" and—important to this volume—"ubiquitous media." However, while his working definition for augmented reality, which is based on the concept of computer-augmented environments in which computers are used to "augment objects in the real world" (Wellner, Mackay, and Gold 1993), is still relatively cogent, his conceptualization of ubiquitous media is somewhat limited, focusing on video conferencing (and a multitude of cameras and screens that attempt to make interaction over great distances more natural). Even so, his arguments for a design approach that "shift to builds upon users' existing skills, rather than demanding the learning of new ones" is central to ubiquitous media design approaches today that try to naturalize or make effortless our interactions with technology.

Some of the most recognizable attempts to naturalize media experiences can be seen in the haptic interfaces and voice-based artificial intelligence (AI) systems common to smartphones, such as Siri on Apple devices. Mark Deuze and the Janissary Collective (2012, 297) argue that these interfaces represent the "seamless integration among human beings, nature, and technology." Mobile technologies in general are a key precursor—if not central element—of the modern ubiquitous media environment. Past and current mobile technologies from pagers to PDAs, and cell phones to modern smartphones and wearables, are some of the most visible manifestations of the progression toward ubiquitous media in nearly every corner of

the world. Mobile giants such as Google Android and Apple dominate markets in the US and Europe, and mobile technologies are particularly important in emerging and developing nations where mobile data subscriptions outpace fixed broadband connections by a significant margin (International Telecommunication Union 2016). Hence, mobile devices are one of the key harbingers of ubiquitous media as both a technical/material and discursive reality for individuals around the world.

Other mobile devices extend this trend and incorporate the data collection and processing characteristic of UbiComb. Bechmann and Lomborg (2015, 1), for example, argue that wearable technologies including fitness trackers that "log, accumulate, and organize sensory, biometric, geo-locational, and other types of personal data are introduced to users in pursuit of, among other things, self-monitoring and augmentation of lived experience." This idea is echoed by Featherstone (2009, 3), who seemingly connects the ideas of UbiComp and ubiquitous media, stating:

> Increasingly, as media become ubiquitous they become embedded in material objects and environments, bodies and clothing, zones of transmission and reception. Media pervade our bodies, cultures and societies—a shift made possible by miniaturized electronic circuitry, the cheap ubiquitous computer chips embedded in environments and mobile devices that sustain a new communicative infrastructure.

Of course, for content and data to flow between devices and channels, a communication system is required to connect them. The Internet fulfils that role today, existing both as one of the infrastructures supported by and supportive of UbiComp.

Networking and the Internet

Bechmann and Lomborg (2015, 1) argue that the Internet itself has become ubiquitous and "extends itself across a wide variety of digital technologies." But much like ubiquitous computing, the development of the Internet into a ubiquitous network has a long and complex history. Campbell-Kelly and Aspray (2004, 255–256) note that one of the theoretical predecessors of the Internet is the encyclopedia, since a primary goal of both is to bring order to the world's knowledge and make readily available to all. This basic idea inspired science fiction author H. G. Wells to write a series of essays on what he called the World Encyclopedia or World Brain between First and Second World War. He envisioned this as having an open, international, scholarly cooperative with a distributed infrastructure and networked management. Wells' World Brain similarly influenced scientist, inventor, and M.I.T. Professor Vannevar Bush to conceive, pre-WWII, of the Memex, a theoretical information storage-and-retrieval and proto-hypertext machine remarkably similar to Wells' World Brain (Campbell-Kelly and Aspray 2004, 256–259).

Neither the World Brain nor the Memex were ever realized, but the basic ideas of a distributed architecture with networked management for information

sharing and collaborative work were incorporated into ARPANET, a "fault tolerant computer network" developed under the supervision of Joseph Carl Robnett Licklider (1963–1966) and Larry Roberts (taking over in 1966) at the United States Department of Defense's Advanced Research Projects Agency (ARPA) beginning in 1963 (Campbell-Kelly and Aspray 2004, 260). The establishment of ARPANET was dependent upon the previous developments in computing and information communication technology (ICT) including, but not limited to, general purpose computers, starting with ENIAC at the University of Pennsylvania in 1946; the "computer on a chip" or the microprocessor, invented by Intel engineer Ted Hoff in 1971; and packet-switching communication technologies, a communications paradigm in which packets (i.e., discrete blocks of data) are routed between nodes over data links shared with other traffic (see Castells 2000, 40–46).

Packet-switching was originally handled by a communication standard simply called the Network Control Protocol (NCP) but, eventually, a more advanced protocol was developed called Transmission Control Protocol/Internetworks Protocol (TCP/IP). Highly flexible, TCP/IP allowed different kinds of private networks to communicate with each other, meaning computers on differently structured local networks were able to encode and decode data packages for each other (Sterling 1993). Because of its flexibility, TCP/IP became an ARPANET standard in 1980 and is still the network protocol we use to communicate on the Internet today.

Packet switching not only made the network fault tolerant as desired—if part of the network is down, messages would simply be rerouted automatically—but it also allowed for the most efficient use of these data lines; a single user could not monopolize a line since data would be shuttled around the network in discrete packets. In addition, by networking ARPA's computer systems together, the users of each computer would be able to use the facilities and processing power of any other computer on the network. In essence, packet-switching enabled a (relatively) stable and ever-present network that was (theoretically, provided the right equipment and permissions) available to everyone.

ARPANET first went online on September 1, 1969, and consisted at the time of four nodes located at universities in the western United States: The University of California, Los Angeles, Stanford University, the University of California, Santa Barbara, and the University of Utah. Access was restricted to the military and university researchers. New nodes were added over time. By 1971, there were 23 total nodes; by 1977, that number had increased to 111. While the linking of computers via ARPANET was motivated by economic considerations (Campbell-Kelly and Aspray 2004, 260)—namely, the ability for various institutions to share computing resources an processing power—ARPANET was also quickly adopted for interpersonal communication and group socialization, in large part thanks to the invention of e-mail by Ray Tomlinson in 1971. As Bruce Sterling (1993) summarizes: "The main traffic on ARPANET was not long-distance computing. Instead, it was news

and personal messages. Researchers were using ARPANET to collaborate on projects, to trade notes on work, and eventually, to downright gossip and schmooze." Mailing lists dedicated to topics such as science fiction became increasingly popular and, although this "was frowned upon by many ARPANET computer administrators…this didn't stop it from happening" (Sterling 1993).

Demand for access to the Internet (and tools such as e-mail), coupled with an ever-increasing amount of (primarily social) traffic led to the creation of new networks built upon the same principles. These networks included MILNET for the military, CSNET for computer scientists, the National Science Foundation's NSFNET, among others. Although the traffic was split, all of these sub-networks still used the original ARPANET as a backbone thanks to TCP/IP. Because of that, people started calling this "network of networks" the ARPA-INTERNET and then, eventually, just INTERNET[3].

At the same time, others who were excluded from participation in ARPANET or put off by "acceptable use" rules established by the US military and member universities, started establishing alternatives to the early Internet. These ad-hoc networks usually relied on the use of a modem, devices that (at the time) could modulate a signal, similar to that used by telephones, to carry digital information. Examples of thee alternative systems include Usenet, a topic-based discussion/messaging board through which people could communicate and exchange files (USENET was developed by students at Duke University and the University of North Carolina, two universities excluded from ARPANET) (Campbell-Kelly and Aspray 2004, 265); the "Whole Earth 'Lectronic Link" or WELL, a text-based "virtual world" people could connect to via modem; Bulletin Board Systems or BBSs, which could feature both synchronous (chat) and asynchronous (bulletin board) elements; and Multi-User Dungeons or MUDs, text-based predecessors to today's graphical Massive Multiuser Online Role Playing Games (MMORPGs). All of these systems worked to increase the popularity of computer networking outside of the "official" Internet.

Eventually, commercial pressures combined with the growth of private and non-profit networks led to opening up access to the Internet in 1992–1993, followed by the closing of government operated Internet backbone in April 1995, and to a full privatization of the Internet. At this point, many of the extra-Internet systems mentioned above shifted to Internet protocols and were eventually integrated into the Internet itself, which helped greatly expand the Internet with little effort. Even with this integration, the Internet was still very difficult for most people to use. It was heavily text based, often required special knowledge, had limited graphic capabilities, and lacked organization, which made it difficult to find and retrieve specific information.

The invention of a new Internet-based application would solve many of these problems and shift the Internet into the mainstream: the World Wide Web. The

Web was developed in the late 1980s and early 1990s by Tim Berners-Lee, a software engineer from the United Kingdom. The idea of the Web stemmed from his experiments with hypertext systems in 1980 during a six-month consulting position at CERN, a nuclear physics research facility in Geneva, Switzerland (*ibid.*, 268). That idea was in part based on the work of Ted Nelson who, in 1974, imagined a new system of organizing information that he called "hypertext" which used a series of horizontal links between information sources, allowing users to construct their own information maps. Berners-Lee revisited the system he developed, which he called Enquire, when he returned to CERN in 1984 and began to push for a "more expansive hypertext program" (Lambert 2005, 16).

The inspiration for this new global hypertext program was to allow physicists all over the world to collaborate and share information without having to worry about interoperability between different networks and computer systems. One of the outcomes of the proposed program, in other words, would be to make all information instantly accessible regardless of a researcher's physical, geographic location. Although the concept of ubiquity was never referenced, Berners-Lee's project represents one of the first, nascent steps towards making media, information, and even connectivity itself ubiquitous. In 1987, he began cooperatively working with his CERN colleague Robert Cailliau, who was experimenting with Apple's hypertext-based Hypercard database software, to further develop this system (Lambert 2005, 16), but it was Berners-Lee who envisioned the system as a "marriage of hypertext and the Internet" (Campbell-Kelly and Aspray 2004, 269). Finally, in 1989, the pair made a formal proposal to CERN for what they called "the World Wide Web" (Campbell-Kelly and Aspray 2004; Lambert 2005). The subsequent development of graphical web browsers meant to run on personal computers, starting with Marc Andreessen's Mosaic browser (which would eventually become Netscape Navigator), both simplified and mainstreamed the use of the Web (Campbell-Kelly and Aspray 2004, 271–273).

Later developments, including mobile technologies such as Internet-enabled smartphones and mobile apps, have further cemented the Web and the Internet into the daily lives of those with access (see International Telecommunication Union 2016). As Anja Bechmann and Stine Lomborg (2015, 1) state, "personal computers wired to the internet have become a natural part, for some even the backbone, of how people across the globe plan and execute work and leisure activities in everyday life." They speak of a "ubiquitous Internet" that "manifests itself in diffusion patterns of ubiquitous internet devices, a diverse set of cultural practices of digital media use, and a whole range of sociopolitical issues across domains" (Bechmann and Lomborg 2015, 1). Their concept of the ubiquitous Internet resonates with Castells' (2001, 1) contention that the Internet has become "the fabric of our lives." Here, Castells is building upon his concept of the "network society," i.e., a new societal configuration in which nearly all structures, activities, and institutions are influenced

by, if not dependent upon, information processing via networked communications, with the Internet representing the network *par excellence* (Castells 2000, 2001). This "network society" is related to concepts that have emerged in recent years such as digital culture (e.g., Miller 2011), a culture of connectivity (van Dijck 2013), or "mediatized worlds" (Hepp and Krotz 2014). Within these "media lives" (Deuze 2012), people have become intertwined with networks, content, and devices in their everyday lives to the point that these digital media are taken for granted.

Considered alongside Featherstone's reference in the section above to computers embedded in a multitude of object and environments, once can see the way all three of these historical precedents—digitalization, UbiComp and Networking—have contributed to the conceptualization of the "Internet of Everything," an environment strongly related to ubiquitous media comprised of "a whole host of connected endpoints that in some way interact with the physical world, whether sensing, acting, or reacting" (Greene 2015). These always-on, always-connected devices "not only provide the potential for ubiquitous connectivity and greater interactivity, enabling everyone to communicate with everyone else; they also open up a further stage, that of a physical environment of things talking to each other" (Featherstone 2009, 4). As one "professional services company" put it, a ubiquitous media environment is one in which "anything—a shoe, a city, your own body—can become a touchpoint for engaging people with media" (Becker 2009).

THEMES

To reiterate, this overview of ubiquitous media's historical precedents is cursory and incomplete. However, the interrelation of the three concepts outlined above provides us with a general framework for this book, in which we consider ubiquitous media from a variety of perspectives and in a variety of contexts. Despite the multitude of approaches represented here, four major themes emerge in the chapters that follow that are worth noting, many of which emerge from the antecedents discussed in the previous section. These themes include:

- **a tension between visible and invisible media** somewhat reminiscent of the tension between transparency and ubiquity in UbiComp;
- **increasing datafication** made possible by more devices in more places capable of collecting, storing and transmitting more information;
- **a merging of digital/virtual/online and analog/real/offline environments** such as in augmented reality and, finally;
- **a merging of bodies and media** in which our bodies, in a sense, become media through the incorporation and use of wearable technologies.[4]

SECTION AND CHAPTER OVERVIEW

We asked each of the authors in this collection to consider and discuss the question of what it means to live in a world of ubiquitous media in their respective chapters. The texts they produced not only address the themes outlined above, but also discuss how the emergence of these themes impact our culture and society at the macro, meso, and micro level. These chapters have been divided into six "contexts" or major motifs that each represent a different approach to understanding the concept of ubiquitous media. These contexts, and the chapters in each, are outlined briefly below.

Archaeologies: Histories and Futures of Ubiquitous Media

This opening section fills in some of the gaps in our discussion of the historical precedents of ubiquitous media above by examining the past development and deployment of ubiquitous media. Laura Steckman's chapter begins by diving deeper into the role of Xerox's Palo Alto Research Center (PARC), outlines some of the major technological advances involved in ubiquitous computing and media, discusses the evolution of the mobile phone into a miniature, fully-functional, computing device that also is a central component in the ubiquitous media environment, and covers multiple concerns that impact US policy in light of emergent technology. Tanner Mirrlees explores the relationship between media and war in a chapter that aims to clarify the meaning of "ubiquitous media war" in the twenty-first century, in which he conceptualizes "ubiquitous media war" as a war waged by a plurality of actors who produce, distribute, exhibit, consume, and interactively prosume a war of images and messages across every available media form and platform. He positions the US war in Iraq (2003–2011) as the twenty-first century's first ubiquitous media war to demonstrate this concept. Finally, Eric Lehman similarly uses a case study, in this instance of the Sony/BMG rootkit scandal, to examine that company's attempt and failure to execute ubiquitous yet covert control over music media in the form of Digital Rights Management (DRM) as a both a literal and symbolic contagion narrative. From this example, he argues that while media and its controls are thought to be everywhere, specific incidents are not always seen even though they are present and active; only in their ability to "go viral" by entering the public imagination do these controls reveal their omnipresent nature.

Mobilities: Mobile Devices, Wearables, and Locative Media

The second section recognizes the central role mobile technologies play in the understanding and definition of ubiquitous media. Aaron Shapiro contributes to our understanding of ubiquitous media by contrasting locative ubiquity with an

alternative, one that focuses not only on the ubiquity of mediating devices but also on the ubiquity of representations, specifically representations of space and place within the Google Street View platform. Rather than a user moving through and connecting with a networked environment via his or her phone, ubiquitous representations of space in this case are enabled by the proxy mobility of the Google car, which travels across the Earth's surface collecting street-level images to enable "armchair exploration" of a virtual world. Sebastiano Nucera and Marco Centorrino focus on the use contexts of wearable technologies and how they affect the ways that despatialized knowledge is propagated. They argue that wearable technologies are building a system of uses and relationships similar to technologies of the past, where the body is "co-opted" as an active part of content creation.

Visualities: Ubiquitous Media and Visual Culture

The third section examine ubiquitous media through the lens of visual culture. Ana Rita Morais introduces us to the term "mobile infography," which she defines as "the visual representation of information as projected through the mobile hardware of the camera, and subsequently translated via the software of the mobile apps." From this definition, she outlines the ways in which mobile devices work collectively with bodies and objects in a process of inscribing meaning and value into both social and spatial relations. Pilar Lacasa, Julián de la Fuente, and Katiuska Manzur examine the Bakhtinian concept of the chronotope in tandem with a two-year ethnographic study in order to examine the practices of children when interacting with ubiquitous mobile devices in their daily lives, and how these ubiquitous tools enable the construction of digital "micro-stories" that play a role in meaning-making. Finally, Kris Belden-Adams examines digital photography, particularly forms of "vernacular" photographs such as selfies, in relation to Walter Benjamin's concept of aura. Her examination demonstrates how the concept of aura can help us understand the sociocultural role of digital photography and reveal potential new approaches to vernacular photography for digital humanities scholars.

Economies: Critical Political Economic Perspectives on Ubiquitous Media

This section examines ubiquitous media in relation to issues such as capitalism, economic class, labor, and the economics of production. Edward Comor's contribution relates media ubiquity to Harold Innis's concerns regarding media, civilization, imperialism/centralization of power, and monopolies of knowledge. Innis intimately captures the power relations that ubiquitous media reflect and affect, while never losing sight of the importance of locating these in broader

historical and political economic dynamics. Comor applies his remarkable understanding of Innis' concepts in order to demonstrate that the ubiquity of digital media widens and deepens status quo relations and thinking but, in so doing, it tends to bias (or forge rigidities) in knowledge/cultural capacities (thus undermining or isolating certain kinds of creativity and adaptability). Margaret Reid approaches ubiquitous media through a critical political economy approach to analyze major shifts in the business, labor, and practice of news media creation in a digital context. She analyses how the immaterial labor undertaken by journalists operates both to create value for social media sites while also creating potential value for journalists themselves through brand development. She also provides theoretical insight into the politics of ubiquitous media in the context of journalistic work, and the difficulties that emerge when media use and brand building are contextualized as labor, in an already precarious labor economy. Finally, Susan Bryant uses an analysis of a survey of undergraduate teaching assistants working in an online academic writing course to illustrate the theoretical issues related to ubiquitous media involving both digital labor and the challenges of the so-called "work-life balance," with a particular emphasis on some of the gendered aspects of social relations. She uses Dorothy Smith's feminist approach to political economy, which focuses on peoples' everyday/everynight activities, in order to highlight the artificiality of the perceived dichotomy between "work" and "life," especially for women, and to elaborate on why and how this analytical dichotomy is even more problematic in the era of ubiquitous connections.

Localities and Communities: Spaces, Places and Time

The chapters in this section examine the role of ubiquitous media in specific communities, as well has how they influence or alter our understanding of specific places and spaces. Jacqueline Fewkes and Abdul Nasir Kahn discuss how citizens and media providers in Kargil, a region in the north Indian Himalayas, use social media and mobile apps to make possible the establishment of traditional local television stations. They argue that the use of multiple media platforms allows local stations to combine global television styles with community interests in ways that are common for community-based television. With a particular focus on the use of the mobile messaging app WhatsApp, they demonstrate how digital media can enable the combination of the multiple perspectives of a talk show and the narrative approach of a documentary with the urgency of breaking news into a text based media presence integrated into users' daily lives. Tiro Uskali interrogates concepts of "ubiquitous journalism" or "journalism everywhere" by examining the emergence of long-form livestreams on Finnish and other Scandinavian television networks. Pulling from a variety of examples, he outlines the similarities and differences

between livestreams and (ubiquitous) journalism while pointing out the potential and pitfalls of both concepts.

Surveillances: Privacy, Surveillance and Ubiquitous Media

This last section deals with one of the most prominent and highly-discussed issues in recent years: digital privacy and surveillance. Mark Andrejevic emphasizes how ubiquitous media enable the redoubling of the world in the form of data. The result of this datafication of everyday life is the rise of a condition of "framelessness", which is an expression of the cultural logic of big data. He explores the political, economic, and cultural implications of big data as an expression of ubiquitous media. Sarah Harney compares surveillance techniques used during the Civil Rights movement in the 1960s in the United States to those used against the Black Lives Matter movement to ask how ubiquitous media has changed how surveillance of social movements is enacted. Relying on the concepts of biopower, and the surveillant assemblage, she details how technology, covert tactics, and legislation work together to attempt to monitor dissent and enact social control. Finally, Susan Currie Sivek outlines the ways consumers' media experiences are shaped by the input from an array of sensors that gather a range of data about users. Her chapter investigates the consequences of this gathering, analysis, and application through the growing use of "emotion analytics." She incorporates case studies of Apple and the lesser-known start-up Affectiva to demonstrate how these companies are already deeply engaged in the innovative use of emotion analytics to surveil users' emotions and then to tailor media and advertising messages to their emotional status, which she argues is indicative of a type of emotional labor in which our emotional responses generate value for corporate data-gatherers.

Each of these chapters offers a unique but ultimately illustrative and critical approach to the concept of ubiquitous media. In so doing, the authors assembled here not only contribute to our understanding of the definition of ubiquitous media, but also offer detailed insights into the effects a world of ubiquitous media will have on our experiences, cultures, communities, and understanding of ourselves.

NOTES

1. An n-gram is a graph that shows how often a word or phrase has occurred in a body of texts over a selected range of years. For more information, see https://books.google.com/ngrams/info. The Google Ngram search tool is available at https://books.google.com/ngrams/.
2. Examples of pre-digital roots of ubiquitous media include the postal system (Siegert 1999); the establishment of the telephone as central via common carrier laws; the invention of transistors that allowed for the miniaturization of devices; the embrace of neoliberalism and its emphasis on

personal responsibility and choice; leading to the valorization of "vernacular" culture and creativity (Burgess and Green 2009) in the digital era.

3. The ARPANET backbone, having become obsolete, closed down on February 28, 1990, at which point the backbone of the Internet was NSFNET. This too was decommissioned, in 1995. Now the Internet consists entirely of the various commercial ISPs and private networks.
4. As Featherstone (2009, 10) argues, current technologies are increasingly "adapted and integrated into the human body and the body itself changes with technologies."

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