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RHETORIC AND DIGITAL MEDIA

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CRITICS of computational media can often be seen as being allied with one of two genealogies, that of Marshall McLuhan or that of Friedrich Kittler. McLuhan famously declared that "the medium is the message" (1964: 7) and expanded the range of cultural messages worth celebrating to include media that might seem to resist interpretation, such as lighting and clothing. McLuhan also distinguished between "hot" media, such as film, which supposedly provide an audience experience of deep immersion through sequential, linear, and logical arrangements, and "cool" media, such as comics, which require perception of abstract patterning and a simultaneous decoding of all parts. Like Vannevar Bush, who viewed the computer largely as a storage and retrieval device, McLuhan saw the computer as a "research and communication instrument" (1995: 295) and compared it to print genres like the encyclopedia or print storage systems like the library.

If McLuhan (1962, 1964, 1992) considered media to be "extensions of man," Kittler saw technology as having certain autonomous operations. Once computer programs were written and pathways were etched upon silicon chips, there were logics of progression at work independent of human agency. For Kittler, media are not simple vessels for extending the human body. Kittler argues that specific technological devices, such as the typewriter, the gramophone, or the film camera, shape human expression, and that the computer operates similarly, although computer code functions very differently from human language. He examines how media record, store, and display information as part of the larger history of technology. Along with Vilém Flusser, Kittler is often seen as a key figure in contemporary German media theory, one whose approach focuses on the workings of an increasingly automated and technical world rather than the agency of human beings who interact with technologies and media merely as tools.

Many critics would argue that an understanding of rhetoric in relation to the procedural systems of computational media has an even longer history that dates back to the birth of computer science in the mid-twentieth century. For example, in Claude

Shannon's famous 1949 text on information theory, *The Mathematical Theory of Communication*, the introduction by Warren Weaver includes a meditation on how "propaganda theory" operates, and imagines how audiences in the Soviet Union might understand the persuasive functions of a US newsreel. (The fact that the title of Shannon's work had gone from "A Mathematical Theory" to "The Mathematical Theory" speaks to his own understanding of making effective claims to expertise.) By 1965, Robert Abelson and J. Douglas Carroll were speculating about "computer simulation of individual belief systems" in the journal *American Behavioral Scientist* and positing how an "ideology machine" could be constructed that reduced the premises of political arguments to if–then statements. In 1966 Joseph Weizenbaum built the ELIZA computer program, which mimicked patient interchanges with a Rogerian therapist by using a logic of repetition and open-ended questions as a template for scripting outputs from inputs. In 1968 J. C. R. Licklider and Robert W. Taylor wrote the influential essay, "The Computer as a Communication Device," which predicted that people would soon be able to communicate more effectively through a machine than face to face.

In the 1970s came the rise of what Peter Lunenfeld has called "The Aquarians," a group of technological utopians that included Douglas Engelbart, Alan Kay, and Ivan Sutherland. Lunenfeld (2011) argues that these technologists promoted a *Kindercult* that emphasized the early education of children with computers as a way to promote human creativity and to bridge the gap between a specific culture of scientific and mathematical rationality and the rest of humanity. The same period spawned the influential manifestos of Ted Nelson about the liberatory potential of hypertext and how computers could serve as "dream machines" (1974: 1); Nelson's self-published pamphlets influenced early microcomputer designers at Xerox PARC and Apple, among others. In his attempts at software development, Nelson's ideas about possible alternatives to the design of hyperlinked HTML pages or the traditional desktop computer never proved to be practical for the mainstream market. Despite this failure in practice, Nelson's importance in theory is difficult to minimize, and his work has been cited as inspiration for Tim Berners-Lee's design for the World Wide Web.

Although some rhetoricians were aware that the paradigm of media theory was changing in the post-McLuhan era, relatively few viewed the computer as a device for communicating as well as for calculating until the 1990s. The term "digital rhetoric" can be traced to Richard Lanham and his seminal essay on the subject, "Digital Rhetoric: Theory, Practice, and Property" (1992), which later appeared as "Digital Rhetoric and the Digital Arts" (1995). Lanham's essay focuses on one central question: "What happens when the text moves from page to screen?" and suggests that the fact that texts have become "unfixed and interactive" (1995: 31) undermines already decaying traditional canons of knowledge while also creating exciting new possibilities along with the rise of electronic information. At the time Lanham was writing, he was part of a larger debate about the "death" of print literature, although Lanham's specific interest in rhetorics of digital media dated back to the early 1980s and his attendance at gatherings of computer graphics specialists at the SIGGRAPH conference and his involvement with early experiments with publishing in new multimedia

digital formats. While Lanham challenged the idea that rhetoric should be located exclusively in humanities disciplines, he also described "digital rhetoric" primarily through the verbal and visual features that would be familiar to his fellow humanists (see Lanham 1995).

Jay David Bolter and Richard Grusin could similarly be seen as conservative figures because they situated new forms of digital "remediation"—how "digital forms both borrow from and seek to surpass earlier forms" (1999: 171)—in a longer lineage of conventional rhetorical history, albeit one that included branching multimodal media in its cultural narrative, such as illuminated manuscripts, stained glass windows, and comic books. While Bolter and Grusin emphasized the importance of visual as well as verbal rhetoric, they also deemphasized the importance of computer algorithms and other rule-based systems and flattened the potential dimension of computational rhetoric to the reconfiguration of existing methods of symbolization.

Instead of focusing on the technical specifics of code and platforms, earlier digital rhetoricians in the 1990s frequently analyzed how new digital genres for the screen, particularly hypertext fiction, were composed by authors and received by audiences. Much of this criticism also responded to at least one of two trends in rhetorical study during the 1980s and 1990s: the rise of deconstruction and poststructuralism more generally and the elevation of pre-Socratic rhetoric, especially by feminist theorists. The work of Gregory Ulmer, Victor Vitanza, Stuart Moulthrop, and George Landow could be seen as typifying the poststructuralist turn in rhetorical study, while the work of Kathleen Welch (1999) might be seen as representative of the feminist pre-Socratic one.

In his classic and frequently upgraded book, *Hypertext*, which later appeared as *Hypertext 2.0* and *Hypertext 3.0* (1991, 1997, 2006), Landow navigates the pathways through which electronic documents link to each other and makes generalizations about how the reader makes choices among competing texts and alternative logical paths. Landow sees a cultural convergence taking place in which software development and poststructuralist theory are producing similar texts, and he frequently cites the work of Michel Foucault, Roland Barthes, and Jacques Derrida (along with that of Ulmer) as a way to understand seemingly nonlinear texts created for the screen. Yet Landow asserts that the poststructuralist reader is still oriented through a "rhetoric of arrivals and departures" and suggests that hypertext conventions could be codified into what he calls "a rhetoric and stylistics of writing for e-space" (1999).

Welch's 1999 book, *Electric Rhetoric*, also cites Ulmer as it rejects the Aristotelian/Platonic/Socratic model of rhetoric as fundamental and proposes Isocrates as the better classical rhetorician through which to understand the current media age. Isocrates, she argues, did not rely on the rigid, mutually exclusive, binary opposition of writing to speaking, and could be seen as both a sophist and a precursor to postmodernism for whom the word *logos* represented a "flux of language, thought, and action" rather than a master logic of structured hierarchies and a taxonomy of parts to wholes.

Although this small cadre of rhetoricians was exhilarated by the advent of new media, many other new media critics tended to devalue the importance of the legacy of classical rhetoric if their work was devoted to radical paradigm shifts in communication. For

example, in *The Language of New Media* software theorist Lev Manovich concludes that "digital rhetoric" was probably insignificant if not obsolescent:

> Traditionally, texts encoded human knowledge and memory, instructed, inspired, convinced, and seduced their readers to adopt new ideas, new ways of interpreting the world, new ideologies. . . . While it is probably possible to invent a new rhetoric of hypermedia that will use hyperlinking not to distract the reader from the argument (as is often the case today), but rather to further convince her of an argument's validity, the sheer existence and popularity of hyperlinking exemplifies the continuing decline of the field of rhetoric in the modern era. (2001: 76)

Ironically, by the 2009 annual conference of the College Art Association, Manovich was celebrating the power of what he called "database rhetorics" for furthering strong digital arguments about politics and policy with massive and heterogeneous collections of evidence.

Scholars of mass media and social psychology also began taking an interest in computation media and considering how they might influence both individual human actors and specific segments of the population. Because computational media could narrowcast personalized content and schedule reinforcing stimuli with more precision based on user feedback, computational media promised to capture more cognitive attention in more user environments than even television had, and moral panics about excessive use and digital "addiction" soon became part of the larger cultural conversation. Those such as B. J. Fogg (2002) of the "persuasive technologies" movement argue that the aim of such technologies should be to persuade rather than coerce. They locate the new field of "captology" in the traditional frameworks of classical rhetoric in general and Aristotle in particular. With the rise of ubiquitous computing technologies, the emphasis of Fogg's persuasive technologies movement has perhaps shifted from the screen to the sensor, as "smart" environments cue users to avoid risk, conserve energy, exercise, and promote other forms of public health and safety.

High-profile technocrats championing digital inclusion and the adoption of new technologies tended to approach the rhetorical tradition somewhat differently as a framework for thinking about traditional technologies of memory, recording, display, replication, and dissemination in comparison to digital ones. For example, the ancient method of rhetorical training known as the "palace of memory" or "theater of memory" technique has been an important point of reference. In *Being Digital* Nicholas Negroponte argues that memory structures that survive from classical antiquity serve as valuable models for "navigating three-dimensional space to store and retrieve information" (1996: 107). Plato's anxieties about writing or the theater (and his debates with Aristotle about new media technologies) were frequently cited in discussions about digital culture by both cyberutopians and cyberdystopians and became an important touchstone for Nicholas Carr's *The Shallows* (2010).

With the invention of web browsing software in the 1990s, new forms of Internet-based communication such as blogs, wikis, vlogs (video blogs), and online video games

began to flourish and thus also spurred new forms of rhetorical criticism in response. When Patricia Roberts-Miller created a blog supposedly written by her dog that was popular with rhetoricians, it suggested that there were many new questions about identities, roles, subjectivities, and voices to be asked with Web 2.0 technologies. The once relatively small movement in rhetoric and composition, in which scholars had networked through one journal, *Computers and Composition*, and one conference, *Computers and Writing*, since the 1980s, suddenly grew in complexity and size as new journals, conferences, mailing lists, and groups on social media sites shared information and showcased debate. Laura Gurak (2001), Barbara Warnick (2007), Jonathan Alexander (2006), and John Logie (2006) published books about the rhetorical dimensions of new forms of online behavior and new media literacies, and some scholars, such as Cheryl Ball and Virginia Kuhn, intentionally eschewed print publication in order to argue for the greater rhetorical richness of writing that is not dependent on the limitations of the printed page. The collaborative nature of digital genres such as wikis and blogs also appealed to specialists in writing with multiple authors, such as Andrea Lunsford and Lisa Ede. Increased access to once-forbidden types of texts, such as pornography, was explored by John Durham Peters, who argues that the advent of pornography that is "privately viewed, digital, networked, virtual in sociability, and based as much in image as text" (2011: 158) challenges traditional definitions of obscenity. Even the senior rhetorician Gerald Graff was defending the practices of digital youth against critics like Mark Bauerlein, author of *The Dumbest Generation* (2009), in the fall 2008 President's Column in the Newsletter of the Modern Language Association.

Rhetoricians also became more concerned with copyright policy after the passage of the Digital Millennium Copyright Act by the US Congress in 1998. Just as their students were expanding their creative experimentation with these new genres, it seemed that many kinds of new digital behaviors were being prohibited, particularly since exemptions from the law's antiduplication regulations were only granted initially for film and media studies professors. Because rhetoric and composition was not judged to be a protected field, and many writing studies faculty did not have regular professorial appointments, many felt that the language of the law would bar the fair use of digital materials in learning environments in ways that would hamper instruction in digital literacy. In 2005 Martha Vicinus and Carolyn Eisner organized the Originality, Imitation, and Plagiarism conference at the University of Michigan, which invited a number of popular "copyleft" and free culture advocates, who became participants in an influential subsequent publication (Vicinus and Eisner 2009). Writing faculty such as Martine Courant Rife testified before Congress, pleading for revisions to the law, and the intellectual property caucuses and working groups of a number of professional associations sought to challenge the law. While algorithms to detect plagiarism came into wider use, and many campuses adopted proprietary technologies such Turnitin, some free culture advocates like Rebecca Moore Howard (1995, 2005) championed the importance of Internet "patchwriting" and encouraged multicampus research efforts, including the Citation Project, to explore the developmental function of online borrowing as writers imitate and evolve their own styles.

However, before the publication of Ian Bogost's *Persuasive Games: The Expressive Power of Videogames* in 2007, rhetoricians—like new media scholars—often overlooked theories from discourses of computer science and the role of what Bogost calls "procedural rhetoric," which he characterizes as "the art of persuasion through rule-based representations and interactions rather than spoken word, writing, images, or moving pictures" (Bogost 2007: ix). According to Bogost, such persuasion is "tied to the core affordances of the computer: computers run processes, they execute calculations and rule-based symbolic manipulations" (ix). For Bogost, playing computer games can spur understanding of procedural rhetoric because players can infer the structures of underlying rules.

Bogost cites the work of James Paul Gee (2003), who had become an influential figure in understanding the rhetoric of games, which Gee characterized as an important model for comprehending literacy, discourse, and expertise. Gee argues that games often contain messages that require play to decode. For example, he famously argued that the mechanic of play in *Tomb Raider* actually encourages the student Lara Croft to defy the professor who seems to be a didactic source of authority in the beginning. *Persuasive Games* appeared near the height of a heated debate in computational media criticism between the so-called narratologists, led by Janet Murray and Henry Jenkins, and the so-called ludologists, led by Espen Aarseth and Gonzalo Frasca. Murray (1997) argued that interactive media have lasting cultural value because such media represent an ongoing commitment to storytelling that deeply engages audiences, and that the narrative function of new media as a relationship between teller and tale is primary. In contrast, Aarseth insisted that such media are much more like games than stories, and that they are structured primarily by rules rather than by plots. Aarseth also asserted that games have a rich cultural history that should not be undervalued, and that game studies as a formal scholarly discipline has a place in the academy as well.

Bogost later allied himself with speculative realism, a school of philosophical thought very different from the positions of either Murray or Aarseth, but one that matched his own understanding of how "unit operations" function when software programs are actually executed. Bogost adopts a stand in favor of what he calls "object-oriented ontology" (OOO), a metaphysical movement that rejects the privileging of human existence over the existence of nonhuman objects and follows the antianthropocentric teachings of Bruno Latour (as read by Graham Harman [2009]). Other rhetoricians were also drawn to OOO, some of whom examined objects of study in the rhetorical tradition related to complex systems like the environment or politics rather than computational media, as did Bogost and, later, Alex Reid (2007), author of *The Two Virtuals: New Media and Composition*. Romanticist Timothy Morton (2011) has argued that the canon of rhetoric related to delivery (Gk. *hypokrisis*; L. *actio*), for example, invites an engagement with the discrete components of the physical world, whether it be the pebbles in the mouth of Demosthenes, the parts of a modern amplification system with a microphone, or the components of a contemporary computer chip.

Since publishing *Persuasive Games*, Bogost has become embroiled in a number of disputes with advocates of "gamification" who reduce procedural rhetoric to a schema

that focuses on simple correlations between the motivation of participants to participate in play and how rewards are either gratified or delayed. The gamification movement in business, education, and other sectors of the economy and culture has also spurred a backlash from critics of digital labor, who argue that the paradigm of recreation and voluntary engagement hides the way that gamification schemes compel compliance with rule-based systems in which it may be more difficult for users to gain an advantage than in traditional games.

The work of defining digital rhetoric has continued throughout the twenty-first century. Elizabeth Losh's (2009) *Virtualpolitik* took issue with Bogost's claim that rhetoric was more about persuasion than occasion, though she was one of the first rhetoricians to accept his procedural rhetoric framework and the importance of examining technical affordances and constraints. She defines digital rhetoric as existing on four levels: (1) the conventions of new digital genres that are used for everyday discourse, as well as for special occasions, in average people's lives; (2) public rhetoric, often in the form of political messages from government institutions, which is represented or recorded through digital technology and disseminated via electronic distributed networks; (3) the emerging scholarly discipline concerned with the rhetorical interpretation of computer-generated media as objects of study; and (4) mathematical theories of communication from the field of information science, many of which attempt to quantify the amount of uncertainty in a given linguistic exchange or the likely paths through which messages travel. Losh argues that naive positions that laud efficiency in communication as a primary goal actually show a failure to understand the actual writings of early pioneers of telecommunication and cybernetics like Shannon and Wiener, who understood the value of seemingly inefficient message redundancy and the use of multiple channels.

Despite the utility of procedural rhetoric as an analytical and design tool, Bogost later embraced Losh's account of public rhetoric as an apt description of many, and perhaps even most, computational rhetoric practices in the first decade of the new millennium. In particular, both the positive and negative characterizations of software and video games by the government in the public media primarily serve to associate public works with (or dissociate them from) functional aspects of that medium, irrespective of how any actual examples are put to use. For example, as part of First Lady Michelle Obama's "Let's Move!" campaign to end childhood obesity, the White House ran a contest inviting submissions of "apps for healthy kids." As Losh's theory of public computational rhetoric predicts, the actual quality, accuracy, or utility of the resulting programs have much less rhetorical effect than the fact that the contest itself existed and associated the White House with the positive features of the "app economy." Likewise, when Vice President Joe Biden assembled a gun control task force in the wake of the Sandy Hook massacre of 2012, his invitation of media industry representatives, including members of the video game industry, placed that medium in the position of potential wrongdoer not by virtue of what behavior video games do or do not elicit but by making the industry a participant in talks in the first place. This gesture had the political effect of allowing Biden to appear to be addressing all possible concerns, not just that of firearm access and manufacturing, even if his task force really hoped to impose controls on the latter from the start. In both these cases,

the procedural rhetoric of specific software programs, applications, and games is less rhetorically relevant than the public positioning of those forms in the media.

In his encyclopedic account of digital rhetoric, Douglas Eyman (2013) contests a number of the central claims in Losh's *Virtualpolitik*, while still characterizing it as an important precursor in the attempt to write a global theory to characterize the field. Eyman is particularly vexed by Losh's appropriation of information theory, on the grounds that she is repeating the mistakes of Tiziana Terranova, who fetishizes the quantitative character of information at the expense of rhetoric, though Eyman agrees with Losh and Bogost that technological theories may well add complexity and depth to the field of digital rhetoric. Like N. Katherine Hayles, whose account of posthumanism tells the "story" of "how information lost its body" (1999: 4), Losh was interested in recovering the Latin understanding of the *forma* as being analogous to a "last, mold, or stamp" closely tied to investments in material substrates, and regretted possible misreadings of her work.

Eyman (2013) devotes a section of his introduction to "computational rhetoric," which incorporates theories from artificial intelligence about argument and computation and relies on the development of argumentation schema and computational methods to address and process informal logic and persuasion. Eyman specifically cites Floriana Grasso's (2002) "Towards Computational Rhetoric" and Crosswhite et al's (2004) "Computational Models of Rhetorical Argument" as examples of efforts to use rhetoric to design the programming of artificial intelligence systems. Eyman insists that the main drawback to the computational rhetoric approach is its reliance on formal argumentation schemas, which reveals a tendency to reduce rhetoric to argument, which he considers to be just as incomplete as reducing rhetoric to ornamentation. Eyman also asserts that representing complex systems purely algorithmically makes it too easy to ignore material connections.

By the time of Eyman's critique, Noah Wardrip-Fruin (2009) had revisited Abelson and Weizenbaum in his work on "expressive processing" that challenged older models of hypertext rhetoric. He also had worked with Pat Harrigan to create the *First Person* (2006), *Second Person* (2007), and *Third Person* (2009) series of edited collections about the relationship between identity, subjectivity, and playable systems. In addition to his work on "procedural literacy," Wardrip-Fruin's colleague Michael Mateas developed what he calls "rhetoric engines" in creating AI systems to stage virtual dramas or create interactive multimedia textbooks.

Yet as issues involving computational rhetoric become more mainstream in rhetorical studies, new critics have argued that this rhetoric may be constituted too narrowly. Cynthia Selfe has led a group advocating for the importance of auditory rhetorics and the need to avoid privileging the visual over other kinds of interactions involving human perception with computational media that record, store, and display/play information. Her 2009 call to action, "The Movement of Air, the Breath of Meaning: Aurality and Multimodal Composing," was particularly influential. Rhetorician Jentery Sayers (2010) has asserted that a similar bias against considering the sound file as an object of study also operates in archival projects in the digital humanities.

Other scholars argue that digital rhetoric has become too focused on first-world rhetorical practices and personal electronics that privilege individual freedom and a self separate from social agency. François Bar (Sey et al. 2013) led an international team of researchers studying public computing on a multiyear odyssey that seemed to show that private ownership of consumer electronics without social interaction with "infomediaries" is not the first choice of many residents in the Global South. Genevieve Bell and Paul Dourish (2011) note that technological visions about infrastructure and ubiquitous computing were shaped by ideologies and assumptions that could not be assumed to be natural or universal. However, subaltern computational practices were not idealized either. Nishant Shah and Sunil Abraham (2009) note the presence of digital vigilantism in China and India and the problems with assuming that Pierre Lévy's model of collective intelligence would always hold true. Wendy Chun (2009) analyzed Internet rumors in South Korea. Sam Gregory, the head of WITNESS, a video sharing web archive for citizen journalism captured with mobile devices, challenged celebratory narratives about the digital rhetoric of remix culture by emphasizing the importance of privacy, consent, and verification in cases involving human rights abuse and the value of traditional ethics developed in fields such as documentary filmmaking, ethnography, and international law. Political activists working to promote civil society in the developing world argued that people's technological preferences in vehicles of rhetorical expression are not always for devices that require extensive infrastructure and consequently risk surveillance by the authorities. For example, Tad Hirsch, creator of Freedom Fone, developed an open-source software system that enables person-to-person broadcast without relying on the Internet. Among self-described rhetoricians, Gustav Verhulsdonck and Marohang Limbu (2014) have challenged the Anglo-American biases of discourses around digital literacy and called for a broader approach to the field.

Questions about the necessary expertise for effective rhetorical instruction have also risen to the forefront as digital rhetoric becomes a recognizable academic field. The discipline of digital design is increasingly important for rhetorical studies; graphic designers such as Ellen Lupton spoke to rhetoricians, and rhetoricians such as Anne Frances Wysocki participated in design communities. xtine burrough redesigned the basic Bauhaus course developed in Weimar Germany for the Adobe Creative Suite. When Annette Vee, Mark Marino, Mark Sample, Dave Parry, Karl Stolley, Carl Whithaus, Jim Brown, and many other digital rhetoricians made the argument for explicitly teaching students to write lines of code in specific computer languages, many pedagogues responded with anxiety about issues of access and competency. Melanie Yergeau and Paul Heilker (2011) also feared that disability issues around cultures of difference and affective comfort would be ignored.

The work of defining "digital rhetoric" continues as members of the Digital Rhetoric Collaborative attempt to separate—as well as integrate—rhetorics *within* computation from rhetorics *about* computation. Understanding how particular rhetorical operations may be inscribed in the processes of computation is important to these stakeholders, but so is positioning themselves as public rhetors in the growing body of commentary

about new forms of literacies and new types of computer-mediated engagement with machines and other human beings.

This is not necessarily a victory for rhetoric and computation. While earlier forms of rhetoric might seem less rhetorical, in the sense that they are less about making themselves appear valuable or important and more about inventing and carrying out processes of communication, persuasion, and expression, the truth is that computational rhetorics arose at a time when it had become difficult to ascend beyond appearances in public rhetoric. Stated differently, computational rhetorics that deeply and earnestly engage with the unique representational features of hardware and software have a hard time overcoming the popularity and conventions of more familiar forms of inscription: writing, speech, and images. In part, this is because the computer as a medium is mostly used as an extension of these prior forms of inscription; it is primarily used as a networked terminal for creating and distributing text, images, and video via websites, blogs, apps, and other online services. In this sense, today's computer age is really a continuation of the prior triumph of writing and images.

Rhetoric still has much to offer computation as a field and today's computational culture. Traditionally, rhetoric has thrived by breaking down forms of representation and signification into component techniques, both through the formal activity of identification and cataloging and through the expository activity of practice and pedagogy. By digging deeper into the computational foundations of software and hardware systems and elucidating those systems as participants in meaning creation as much as engineering practice, rhetoric has the potential to offer a complement or "counterpart" (*antistrophos*) to computer science and engineering.

FURTHER READING

In addition to the well-known works of Marshall McLuhan, those interested in the material properties of media in general and digital media in particular should consult the works of Friedrich Kittler in greater detail: *Discourse Networks 1800/1900* (1990), *Gramophone, Film, Typewriter* (1999), and *Optical Media* (2009). Vilém Flusser's *Into the Universe of Technical Images* (2011) is also helpful for understanding contemporary German theories of computational media. Historically speaking, the "father of cybernetics" Norbert Wiener's book, *Cybernetics* (1965), and his introductory article, "Men, Machines, and the World About" (1954), complement Vannevar Bush's 1945 article, "As We May Think," a speculation about the informational uses of computational devices. Those interested in the origins of hypertext and the World Wide Web should consult Ted Nelson's (1965) "A File Structure for the Complex, the Changing, and the Indeterminate" as well as web inventor Tim Berners-Lee's (2000) autobiographical *Weaving the Web*. Alan Kay and Adele Goldberg's (1977) classic article, "Personal Dynamic Media," accompanies Licklider and Nelson as an influential text of the early days of the personal computer. For a one-stop dip into many of these readings and others, consult *The New Media Reader* (Wardrip-Fruin and Montfort 2003). For more on the relationships

between computer hardware and software, consult books in the MIT Press's Software Studies and Platform Studies book series, especially Wardrip-Fruin's (2009) *Expressive Processing* and Bogost and Montfort's (2009) *Racing the Beam*, as well as Erkki Huhtamo and Jussi Parikka's (2011) *Media Archaeology*.

REFERENCES

Abelson, Robert, and J. Douglas Carroll. 1965. "Computer Simulation of Individual Belief Systems." *American Behavioral Scientist* 7 no. 9: 24–30.

Alexander, Jonathan. 2006. *Digital Youth: Emerging Literacies on the World Wide Web.* Cresskill, NJ: Hampton.

Bauerlein, Mark. 2009. *The Dumbest Generation: How the Digital Age Stupefies Young Americans and Jeopardizes Our Future.* New York: Tarcher.

Bell, Genevieve, and Paul Dourish. 2011. *Divining a Digital Future: Mess and Mythology in Ubiquitous Computing.* Cambridge, MA: MIT Press.

Berners-Lee, Tim. 2000. *Weaving the Web.* New York: Harper.

Bogost, Ian. 2007. *Persuasive Games: The Expressive Power of Videogames.* Cambridge, MA: MIT Press.

Bolter, Jay, and Richard Grusin. 1999. *Remediation: Understanding New Media.* Cambridge, MA: MIT Press.

Bush, Vannevar. 1945. "As We May Think." *Atlantic Monthly*, July.

Carr, Nicholas. 2010. *The Shallows: What the Internet Is Doing to Our Brains.* New York: W. W. Norton.

Chun, Wendy Hui Kyong. 2009. "The Internet: In Theory, in Crisis." Keynote address at the Association of Internet Researchers Annual Conference.

Crosswhite, Jim, John Fox, Chris Reed, Theodore Scaltsas, and Simone Stumpf. 2004. "Computational Models of Rhetorical Argument." In *Argumentation Machines: New Frontiers in Argument and Computation*, edited by Chris Reed and Timothy J. Normans, 175–209. Dordrecht: Kluwer Academic Publishers.

Eyman, Douglas. 2013. *Digital Rhetoric: Theory, Method, Practice.* Ann Arbor: University of Michigan Press.

Flusser, Vilém. 2011. *Into the Universe of Technical Images.* Minneapolis: University of Minnesota Press.

Fogg, B. J. 2002. *Persuasive Technology: Using Computers to Change What We Think and Do.* New York: Morgan Kaufmann.

Gee, James Paul. 2003. *What Video Games Have to Teach Us About Learning and Literacy.* London: Palgrave.

Grasso, Floriana. 2002. "Towards Computational Rhetoric." *Informal Logic* 22 no. 3: 195–229.

Gurak, Laura J. 2001. *Cyberliteracy: Navigating the Internet with Awareness.* New Haven, CT: Yale University Press.

Harman, Graham. 2009. *Prince of Networks: Bruno Latour and Metaphysics.* Victoria, Australia: Re.press.

Hayles, N. Katherine. 1999. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics.* Chicago, IL: University of Chicago Press.

Howard, Rebecca Moore. 1995. "Plagiarisms, Authorships, and the Academic Death Penalty." *College English* 57 no. 7: 708–736.

Howard, Rebecca Moore. 2005. "Plagiarism: What Should a Teacher Do?" In *Guiding Students from Cheating and Plagiarism to Honesty and Integrity: Strategies for Change*, edited by Ann Lathrop and Kathleen Foss, 174. Westport, CT: Libraries Unlimited.

Huhtamo, Erkki, and Jussi Parikka. 2011. *Media Archaeology: Approaches, Applications, and Implications*. Berkeley: University of California Press.

Kay, Alan, and Adele Goldberg. 1977. "Personal Dynamic Media." *Computer* 10 no. 3: 31–41.

Kittler, Friedrich A. 1990. *Discourse Networks 1800/1900*. Stanford, CA: Stanford University Press.

Kittler, Friedrich A. 1999. *Gramophone, Film, Typewriter*. Stanford, CA: Stanford University Press.

Kittler, Friedrich A. 2009. *Optical Media*. New York: Polity.

Landow, George P. 1991. *Hypertext: The Convergence of Contemporary Critical Theory and Technology*. Baltimore, MD: Johns Hopkins University Press.

Landow, George P. 1997. *Hypertext 2.0: The Convergence of Contemporary Critical Theory and Technology*. Baltimore, MD: Johns Hopkins University Press.

Landow, George P. 1999. *A Rhetoric and Stylistics of Writing for E-Space*. Aarhus: Department of Aesthetics, University of Aarhus.

Landow, George P. 2006. *Hypertext 3.0: Critical Theory and New Media in an Era of Globalization*. Baltimore, MD: Johns Hopkins University Press.

Lanham, Richard. 1992. "Digital Rhetoric: Theory, Practice, and Property." In *Literacy Online: The Promise (and Peril) of Reading and Writing with Computers*, edited by Myron C. Tuman, 221–243. Pittsburgh, PA: University of Pittsburgh Press.

Lanham, Richard. 1995. *The Electronic Word: Democracy, Technology, and the Arts*. Chicago, IL: University of Chicago Press.

Licklider, J. C. R., and Robert W. Taylor. 1968. "The Computer as a Communication Device." *Science and Technology* 76: 21–31.

Logie, John. 2006. *Peers, Pirates, and Persuasion: Rhetoric in the Peer-to-Peer Debates*. West Lafayette, IN: Parlor.

Losh, Elizabeth. 2009. *Virtualpolitik: An Electronic History of Government Media-Making in a Time of War, Scandal, Disaster, Miscommunication, and Mistakes*. Cambridge, MA: MIT Press.

Lunenfeld, Peter. 2011. *The Secret War between Downloading and Uploading: Tales of the Computer as Culture Machine*. Cambridge, MA: MIT Press.

Manovich, Lev. 2001. *The Language of New Media*. Cambridge, MA: MIT Press.

McLuhan, Marshall. 1962. *The Gutenberg Galaxy: The Making of Typographic Man*. Toronto: University of Toronto Press.

McLuhan, Marshall. 1964. *Understanding Media: The Extensions of Man*. Toronto: University of Toronto Press.

McLuhan, Marshall. 1992. *The Global Village: Transformations in World Life and Media in the 21st Century*. New York: Oxford University Press.

McLuhan, Marshall. 1995. "*Playboy* Interview." In *Essential McLuhan*, edited by Eric McLuhan and Frank Zingrone, 233–269. Toronto: University of Toronto Press.

Monfort, Nick, and Ian Bogost. 2009. *Racing the Beam*. Cambridge, MA: MIT Press.

Morton, Timothy. 2011. "Sublime Objects." *Speculations* 2: 254–274.

Murray, Janet. 1997. *Hamlet on the Holodeck*. Cambridge, MA: MIT Press.

Negroponte, Nicholas. 1996. *Being Digital*. New York: Vintage.

Nelson, Theodor H. 1965. "A File Structure for the Complex, the Changing, and the Indeterminate." In *Association for Computing Machinery: Proceedings of the 20th National Conference*, edited by Lewis Winner, 84–100. New York: Lewis Winner.

Nelson, Theodor H. 1974. *Computer Lib/Dream Machines*. Chicago, IL: Nelson.

Peters, John Durham. 2011. "Preludes to a Theory of Obscenity." In *Obscenity and the Limits of Liberalism*, edited by Loren Glass and Charles Francis Williams, 146–166. Columbus: Ohio State University Press.

Reid, Alexander. 2007. *The Two Virtuals: New Media and Composition*. Anderson, SC: Parlor.

Sayers, Jentery. 2010. "Integrating Digital Audio Composition into Humanities Courses." *ProfHacker* (blog), *The Chronicle of Higher Education*. May 25. http://chronicle.com/blogs/profhacker/integrating-digital-audio-composition-into-humanities-courses.

Selfe, Cynthia L. 2009. "The Movement of Air, the Breath of Meaning: Aurality and Multimodal Composing." *College Composition and Communication* 60 no. 4: 616–663.

Sey, Araba, Chris Coward, François Bar, George Sciadas, Chris Rothschild, and Lucas Koepke. 2013. *Connecting People for Development: Why Public Access ICTs Matter*. Seattle: Technology and Social Change Group, University of Washington Information School. http://www.globalimpactstudy.org/report/.

Shah, Nishant, and Sunil Abraham. 2009. *Digital Natives with a Cause? A Knowledge Survey and Framework*. The Hague: Humanist Institute for Cooperation with Developing Countries.

Shannon, Claude. 1949. *The Mathematical Theory of Communication*. Champaign: University of Illinois Press.

Verhulsdonck, Gustav, and Marohang Limbu. 2014. *Digital Rhetoric and Global Literacies: Communication Modes and Digital Practices in the Networked World*. Hershey, PA: Information Science Reference.

Vicinus, Martha, and Caroline Eisner, eds. 2009. *Originality, Imitation, and Plagiarism: Teaching Writing in the Digital Age*. Ann Arbor: University of Michigan Press.

Wardrip-Fruin, Noah. 2009. *Expressive Processing*. Cambridge, MA: MIT Press.

Wardrip-Fruin, Noah, and Pat Harrigan, eds. 2007. *Second Person: Role-Playing and Story in Games and Playable Media*. Cambridge, MA: MIT Press.

Wardrip-Fruin, Noah, and Pat Harrigan. 2009. *Third Person: Authoring and Exploring Vast Narratives*. Cambridge, MA: MIT Press.

Wardrip-Fruin, Noah, and Nick Montfort. 2003. *The New Media Reader*. Cambridge, MA: MIT Press.

Warnick, Barbara. 2007. *Rhetoric Online: Persuasion and Politics on the World Wide Web*. New York: Peter Lang.

Welch, Kathleen. 1999. *Electric Rhetoric: Classical Rhetoric, Oralism, and a New Literacy*. Cambridge, MA: MIT Press.

Wiener, Norbert. 1954. "Men, Machines, and the World About." In *Medicine and Science*, edited by I. Galderston, 13–28. New York: International Universities Press.

Wiener, Norbert. 1965. *Cybernetics*. Cambridge, MA: MIT Press.

Yergeau, Melanie, and Paul Heilker. 2011. "Autism and Rhetoric." *College English* 73 no. 5: 485–497.