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A Media Ecology Review

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From the Editor

Lance Strate's excellent report on "media ecology" studies approaches the subject from a literary and philosophical perspective, with some input from anthropological and psychiatric sources. Many communication researchers explore the same territory using sociological and psychological methods that often are quantitative. For example, media effects research, including much important work on media and children (cf., N. Pecora, "Children and Television," *Communication Research Trends*, Volume 19 (1999), Nos. 1 and 2) really deals with the cultural environment in which we live and the ecological relationships it involves. The approaches may use different methods, but they can and should support each other, in the quest for a broader understanding of the role of the media in our lives.

—W. E. Biernatzki, S.J.
General Editor

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1. Introduction

…our first thinking about the subject was guided by a biological metaphor. You will remember from the time when you first became acquainted with a Petri dish, that a medium was defined as a substance within which a culture grows. If you replace the word "substance" with the word "technology," the definition would stand as a fundamental principle of media ecology: A medium is a technology within which a culture grows; that is to say, it gives form to a culture's politics, social organization, and habitual ways of thinking. Beginning with that idea, we invoked still another biological metaphor, that of ecology. . . . We put the word "media" in the front of the word "ecology" to suggest that we were not simply interested in media, but in the ways in which the interaction between media and human beings gives a culture its character and, one might say, helps a culture to maintain symbolic balance. (Postman, 2000, pp. 10-11)

Our present fascination with ecology of all kinds is tied in with the information explosion that has marked our age. . . . With the information explosion, we have become more and more conscious of the interrelationships of all the life and structures in the universe around us, and, with our more and more detailed knowledge of cosmic and organic evolution, ultimately of interrelationships as building up to and centering on life, and eventually human life. The human environment is of course not just the earth but the entire universe, with its still incalculable expanse and an age of around some 12 to 14 billion years. This is the real cosmos within which human beings appeared and still exist. (Ong, 2002b, p. 6)

I would like to dedicate this essay to the memories of Walter J. Ong, S.J. and Neil Postman, who passed away within two months of each other, Ong on August 12th and Postman on October 5th of 2003. Through their careers and the body of work they have left us, these two educators, both of whom achieved the highest possible academic rank, University Professor, at their respective institutions, Saint Louis and New York Universities, were instrumental in establishing the foundations of media ecology as a field of inquiry. Moreover, Walter Ong set the standard and demonstrated the possibilities for scholarship in the media ecology intellectual tradition, and Neil Postman exemplified the practice of media ecology analysis by a public intellectual engaged in social criticism. Working parallel to one another, Ong and Postman built upon an intellectual tradition that has its roots in the ancient world, a tradition that coalesced in response to the revolutions in communication, media, and technology of the 19th and 20th centuries, and brought it into the 21st century.

In viewing Ong and Postman as twin pillars of media ecology, I do not mean to deny that there are significant differences between them. Certainly, it would be possible to contrast their midwest and east coast backgrounds and their Roman Catholic and Reform Jewish faiths. We could also differentiate Ong's historical focus from Postman's emphasis on current affairs, Ong's phenomenological approach from Postman's grounding in linguistics, and Ong's dialectic of the oral and the literate from Postman's of the word and the image. But what separates the two scholars is overshadowed by what they hold in common: a shared perspective and sensibility, and a strong connection to the most celebrated of all media ecology scholars, Marshall McLuhan. In fact, media ecology can be understood as an intellectual network in which McLuhan, Ong, and Postman constitute the prime nodes (corresponding geographically to Toronto, St. Louis, and New York City).

Media ecology is a perspective that embodies what Ong (1977) refers to as "ecological concern," which he describes as "a new state of consciousness, the ultimate in open-system awareness. Its thrust is the dialectical opposite of the isolating thrust of writing and print" (p. 324). Ong goes on to suggest that contemporary questions of ecological concern

echoed earlier thinking culminating in Darwin's work, which has shown how species themselves,

earlier thought of as the closed-system bases of life and taken to be major elements in philosophical thinking, are not fixed but develop through natural selection brought about by open interaction between individuals and environment. The new philosophical attention to openness appears not unrelated to the opening of previously isolated human groups to one another fostered by electronic communications media, telephone, radio, and ultimately television. (p. 324)

Such ecological concern is central to McLuhan's approach to studying media, as he explains in the introduction to the second edition of *Understanding Media* (2003a):

"The medium is the message" means, in terms of the electronic age, that a totally new environment has been created. The "content" of this new environment is the old mechanized environment of the industrial age. The new environment reprocesses the old one as radically as TV is reprocessing the film. For the "content" of TV is the movie. TV is environmental and imperceptible, like all environments. We are aware only of the "content" or the old environment. When machine production was new, it gradually created an environment whose content was the old environment of agrarian life and the arts and crafts. This older environment was elevated to an art form by the new mechanical environment. The machine turned Nature into an art form. (p. 13)

Inspired by McLuhan, Postman formally introduced the term "media ecology" in 1968, in an address delivered at the annual meeting of the National Council of Teachers of English (published under the title of "The Reformed English Curriculum" in 1970). He told his audience that "the first thing to be said about media ecology is that I am not inventing it. I am only naming it" (p. 161). By not claiming the role of founder of a discipline, and not naming anyone else as the inventor, Postman left open the origins of the field, and implied that media ecology has been in existence in one form or another since antiquity. It follows that individuals need not use the term "media ecology" in order to have their work categorized as such. Indeed, they need not have been alive when the term was coined in order to have it identified as media ecological. Postman did, however, provide a definition of media ecology as "the study of media as environments" (Postman, 1970, p. 161), explaining that the main concern is "how media of communication affect human perception, understanding, feeling, and value; and how our interaction with

media facilitates or impedes our chances of survival. The word ecology implies the study of environments: their structure, content, and impact on people" (p. 161). These environments consist of techniques as well as technologies, symbols as well as tools, information systems as well as machines. They are made up of modes of communication as well as what is commonly thought of as media (although the term "media" is used to encompass all of these things). Thus, Postman also describes media ecology as "the study of transactions among people, their messages, and their message systems" in *The Soft Revolution* (1971, p. 139), which he co-authored with Charles Weingartner.

Where Postman defines media ecology as a field of inquiry, McLuhan places greater emphasis on praxis when he uses the term. For example, in a 1977 television interview, in response to the question, "what now, briefly, is this thing called media ecology," McLuhan answers:

It means arranging various media to help each other so they won't cancel each other out, to buttress one medium with another. You might say, for example, that radio is a bigger help to literacy than television, but television might be a very wonderful aid to teaching languages. And so you can do some things on some media that you cannot do on others. And, therefore, if you watch the whole field, you can prevent this waste that comes by one canceling the other out. (McLuhan, 2003b, p. 271)

And in a letter to Claire Booth Luce published in *The Letters of Marshall McLuhan* (1987), he writes: "As for restricting the use of TV, it surely should be a part of a media ecology program" (p. 534). For Postman, praxis first took the form of pedagogy. In "The Reformed English Curriculum" (Postman, 1970) he went so far as to argue for media ecology as an alternative to standard high school English education, a "modest proposal" that did not catch on. In *The Soft Revolution* (Postman & Weingartner, 1971) he reproduced the prospectus for a Ph.D. program in media ecology, stating that "such a program is being contemplated at one university" and extending the invitation, "local catalogues please copy" (p. 138). In point of fact, by the time the book was actually published, New York University had already approved the program, which in 1973 produced the first major treatise to examine media ecology as a formal field of study, Christine Nystrom's doctoral dissertation entitled: *Towards a Science of Media Ecology: The Formulation of Integrated Conceptual Paradigms for the Study of*

Human Communication Systems. There she characterizes media ecology as a "perspective, or emerging metadiscipline . . . broadly defined as the study of complex communication systems as *environments*" and concerned with "the interactions of communications media, technology, technique, and processes with human feeling, thought, value, and behavior" (p. 3).

The first major survey of media ecology as a field was produced by William Kuhns under the title of *The Post-Industrial Prophets* (1971). Although he does not use the term "media ecology," Kuhns makes frequent use of environmental, ecological, and systems terminology as he discusses the work of technology scholars Lewis Mumford, Siegfried Giedion, and Jacques Ellul; media theorists Harold Innis and Marshall McLuhan; and systems pioneers Buckminster Fuller and Norbert Wiener. Kuhns also wrote a short book about technology and contemporary culture, addressed to Christian readers, under the title of *Environmental Man* (1969). While *The Post-Industrial Prophets* emphasizes futurism, media ecology is also concerned with understanding media in a historical context, Ong's area of emphasis. Hence, for example, the four editions of the anthology *Communication in History* edited by David Crowley and Paul Heyer (1991, 1995, 1999, 2003), which represent a somewhat different and more recent attempt at surveying the field as compared to *The Post-Industrial Prophets*. Presenting a sampling of media ecological historical scholarship, Crowley and Heyer emphasize the impact or effects of media, but like Kuhns do not use the term "media ecology." Another anthology in press, edited by Casey Man Kong Lum, entitled *Perspectives on Culture, Technology, and Communication: The Media Ecology Tradition*, covers a good portion of the theories, key concepts, and development of the field.

Over the past 36 years, use of the term "media ecology" has diffused slowly outside of New York and Toronto, and in some instances was adopted with its original meanings lost or distorted (e.g., ADILKNO, 1994; Tabbi & Wutz, 1997). At the same time, other terms were introduced to refer to the same type of perspective and intellectual tradition, such as "Toronto School" (Goody, 1968, 1977), "medium theory" (Meyrowitz, 1985), "American cultural studies" (Carey, 1989), and "mediology" (Debray, 1996). Also, due to its strong association with Ong (1982), "orality-literacy studies" has sometimes been used as a synonym for media ecology. In recent years, however, "media ecology" has come to be widely accepted as the term of choice, especially since the establishment of the Media Ecology Association in 1998. Aptly, Postman (2000) gave the

keynote address at the MEA's inaugural convention ("The Humanism of Media Ecology") and Ong (2002b) wrote the lead article for the first issue of the MEA's journal, *Explorations in Media Ecology* ("Ecology and Some of Its Future"). Since the introduction of the term in 1968, "media ecology" has been understood as a perspective or approach, as a field of inquiry or study, and a curriculum. It has also been understood in very basic and concrete terms as a reading list, bibliography, or pattern of citation. Indeed, one way to recognize media ecology scholarship is by the presence of certain sources in the author's reference list (e.g., McLuhan, Ong, and/or Postman).

Media ecology has also come to be understood as an intellectual tradition, one that Camille Paglia (2000) characterizes as particularly North American, as that is the locus of media ecology's historical development in the 20th century. This is not to say that media ecology is only associated with North Americans, or necessarily so, but that the evolution of the field has been influenced by North American pragmatism and openness. Thus, media ecology is a tradition of independent thinkers who "creatively reshaped traditions and cross-fertilized disciplines, juxtaposing the old and the new to make unexpected connections that remain fresh" (Paglia, 2000, p. 22), thinkers such as McLuhan, Ong, and Postman. It is an intellectual tradition based on what Ong (1977) refers to as "open-system awareness" (p. 324).

An open system enhances creativity, freedom, and the process of exploration and discovery, but it is particularly challenging when the goal is to map the system itself. Media ecology is a network of ideas, individuals, and publications, and it is possible to follow the links of the network in any number of different directions. Some links may bring us closer to the core ideas of the field, and others take us further and further away from them, but there is no definitive boundary line or border to cross, just as there is no single point of origination. It is tempting to claim that only the medium of hypertext could adequately represent such an open network, but the benefits of hypertext are traded off against a certain loss of coherence and order, however much that coherence and order may be artificially produced and arbitrary in nature. I will therefore proceed to present a linear journey through the media ecology network, with the understanding that it represents one of many possible pathways, and that at times I may wander into territory that others would consider outside the network, while overlooking points of interest within the network. This review essay will take as its navigational markers the three prime nodes of media ecology: McLuhan, Ong, and Postman.

2. McLuhan

To begin with McLuhan is not to begin at the beginning of media ecology, but to plunge *in medias res*. Given that the field has no founder and inventor, making it difficult to determine just what constitutes the beginning of the media ecology intellectual tradition, it makes sense to start at the center of the field and work our way outward. Whether McLuhan firmly occupies the center, or is positioned slightly off-center, may be debated, but his importance in establishing the field is generally accepted. As Paul Levinson (2000) puts it

> What did Marshall McLuhan contribute to Media Ecology?
>
> You might well ask what hydrogen and oxygen contribute to the existence of water.
>
> Without those elements, there would be no water. Of course, other factors are necessary. Hydrogen and oxygen on their own, in a vacuum, are not sufficient to create water. They are profoundly necessary, but not sufficient.
>
> Which describes McLuhan's contribution to Media Ecology to a tee. Without his work in the 1950s and '60s, there would be no field of study that sought to explain how the nuances and great sweeps of human history are made possible by media of communication—how media determine the thoughts and actions of people and society. (p. 17)

McLuhan's first book, *The Mechanical Bride: Folklore of Industrial Man*, originally published in 1951, has been reissued by Gingko Press in 2002 after being out of print for many years. Although it is sometimes viewed as a "content book" in contrast to his later emphasis on media, *The Mechanical Bride* is in fact an analysis of how popular culture reflects and promotes the attitudes, beliefs, and values of technological society. Technological man is either a specialist-savant like Sherlock Holmes or an emasculated drone like Dagwood Bumstead, according to McLuhan. Technological woman is mass produced (from the assembly line to the chorus line) with the help of industrial products such as girdles, soaps, and domestic gadgets (or she is replaced by products such as the automobile). Technological children are given baby formula instead of being breast fed (setting up an oral fixation that will later be satisfied by Coca-Cola) and provided a technical education that will allow them to fit into the machine-like organizations of corporate America. Even in death, we are ruled by technology

through the sale of coffins that are weather-resistant. In this highly accessible and concrete way, McLuhan provides a multitude of examples of what Jacques Ellul (1964) calls "la technique" and Postman (1992) "technopoly." The new edition of *The Mechanical Bride* is notable for its high quality reproductions of the numerous advertisements, comics, and newspaper and magazine items that are the subject of McLuhan's commentary. As these "exhibits" are over half a century old, they have gained historical value in the place of currency. The distance of time makes it easier to recognize the values, beliefs, and attitudes that they carry, as opposed to contemporary culture, and this makes McLuhan's analysis easier to follow than it might have been in the past.

Insofar as a field is produced by a community of scholars, McLuhan established the interdisciplinary study of media ecology when he joined together with his colleague, the anthropologist Edmund Carpenter, to publish a journal entitled *Explorations*, funded by a grant from the Ford Foundation. Nine issues were produced between 1953 and 1959, followed by an anthology of the journal's best material, entitled *Explorations in Communication* (Carpenter & McLuhan, 1960). Among the contributors were Dorothy Lee, Ray L. Birdwhistell, Siegfried Giedion, David Riesman, H. J. Chaytor, and Gilbert Seldes, in addition to McLuhan and Carpenter themselves. In 1962, McLuhan published what is generally considered his most scholarly work, *The Gutenberg Galaxy: The Making of Typographic Man*. The word "galaxy" in the title functions as a synonym for system, environment, or ecology (or constellation, for that matter). In this book, McLuhan focuses on the role of the alphabet as the foundation of Western civilization, and of the printing press as the agent that shifted the west from medievalism to modernity. He also emphasizes sense perception and the phenomenology of communication, exploring the historical shift from an acoustic orientation in the scribal era to the visual stress that accompanied the printing revolution. At the close of the book McLuhan discusses the transition from a print media environment to an electronic one, and introduces the term "global village," stating, "the new electronic interdependence recreates the world in the image of a global village" (p. 43). This is one of McLuhan's most enduring ideas.

In 1964, McLuhan published his most influential work, *Understanding Media: The Extensions of Man*,

which has appeared in several different editions, and most recently in a critical edition (McLuhan, 2003a) edited by McLuhan biographer W. Terrence Gordon. The critical edition introduces a much needed index to the work, as well as a glossary, a list of publications by McLuhan, a discussion of the critical response to *Understanding Media*, and excerpts from McLuhan's 1960 *Report on Project in Understanding New Media*. (Sponsored by the National Association of Educational Broadcasters and the U.S. Department of Health, the report became the basis of both *The Gutenberg Galaxy* and *Understanding Media*). Beginning where *The Gutenberg Galaxy* left off, *Understanding Media* focuses on the contemporary media environment, and in particular, on the transformative powers of television. As in *The Gutenberg Galaxy*, McLuhan considers sense perception primary, and discusses the interplay among the senses in terms of sense ratios and the sensorium. No doubt part of the reason that this book won great popular acclaim for McLuhan during the '60s is the fact that he offers an explanation for the turmoil and upheaval of that era: the changing media environment.

It is in *Understanding Media* that McLuhan settles on, and in turn establishes "media" and "medium" as the field's primary terms, which he presents as synonymous with technology. Media may be most commonly associated with communication technologies, but for McLuhan, all human inventions and innovations are media. His broadening of the meaning of "medium" becomes apparent in the second part of the book, where he devotes chapters to media such as the spoken word, roads, numbers, clothing, housing, money, clocks, the automobile, games, and weapons, in addition to the major mass media and communication technologies. And it is in *Understanding Media* that McLuhan brings together some of his most important themes: that media or technologies extend human beings, human capabilities, and the human body; that such extensions are also amputations, numbing us to the effects of technology; that some media require more sensory processing on the part of the audience than others (hence the categories of hot and cool media); that media function as metaphors, languages, and translators of experience. And it is here that McLuhan introduces his famous aphorism, which is generally considered axial in media ecology: "the medium is the message" (pp. 17 ff.). Simply put, it is the idea that the media or technologies that we use play a leading role in how and what we communicate, how we think, feel, and use our senses, and in our social organization, way of life, and world view.

McLuhan's writing style may be characterized as challenging, especially for new readers, which perhaps explains the success of *The Medium is the Massage*, the 1967 bestseller illustrated by Quentin Fiore and produced by New York writer Jerome Agel. Effective because it summarizes McLuhan's key concepts and shows as well as tells the reader what McLuhan is referring to, *The Medium is the Massage* remains a good introduction to McLuhan's approach. *War and Peace in the Global Village*, again illustrated by Fiore and produced by Agel, was published in 1968 as a follow-up to *The Medium is the Massage*. As a sequel, it is a much more substantial book, advancing McLuhan's probes about perception, communication, and technology into new terrain. Paying particular attention to the interactions between technological innovation and warfare, *War and Peace in the Global Village* has become especially relevant in the post-9/11 era. The late 60s and early 70s were a busy time for McLuhan, as he also collaborated with the artist Harley Parker to produce *Through the Vanishing Point: Space in Poetry and Painting* (1968) and *Counterblast* (1969). The literary essays written earlier in his career were collected in a volume entitled *The Interior Landscape* (1969), and he returned to literary theory in a collaborative effort with the writer Wilfred Watson, *From Cliché to Archetype* (1970). And he produced a sequel to *The Mechanical Bride* with the title, *Culture is Our Business* (1970), and joined together with Barrington Nevitt to write *Take Today: The Executive as Dropout* (1972).Through the remainder of the '70s, McLuhan was working on a new version of *Understanding Media*, and this culminating work was published posthumously as *Laws of Media*, co-authored by his son Eric (McLuhan & McLuhan, 1988). The book introduces the tetrad or four laws of media, which are framed as four questions: What does the medium enhance or extend? What does it obsolesce? What does it retrieve that an earlier medium obsolesced? And what does it reverse or flip into when pushed to its extreme? The tetrad can be used to analyze the effects of any innovation, and in *Laws of Media* the term "medium" is further expanded to include any invention, new ideas, philosophies, and linguistic and rhetorical inventions. (An alternate way to understand the four laws is that they represent the dynamics of a system or ecology as it reacts to disturbances in its equilibrium.) The book also presents McLuhan's thinking on the relationship between brain hemispheres and media (literacy is left-brained, orality/electricity is right-brained). A second introduction to McLuhan's tetrad was completed by Bruce R. Powers and published under the title *The Global Village:*

Transformations in World Life and Media in the Twenty-First Century (McLuhan & Powers, 1989).

Several collections of McLuhan's work have also appeared over the past two decades. In *McLuhan: The Man and his Message* (1989) George Sanderson and Frank Macdonald bring together a number of McLuhan's journal articles with contributions from McLuhan's associates, including an essay by Walter Ong on McLuhan as a teacher, and a memoir by John Culkin, the former Jesuit who brought McLuhan to Fordham, on McLuhan's year in New York City. *The Essential McLuhan* (McLuhan, 1995), edited by Eric McLuhan and Frank Zingrone, provides a representative sample of McLuhan's media ecology scholarship from *The Mechanical Bride* to *Laws of Media*, and reprints his famous *Playboy* interview. *Media Research: Technology, Art, Communication* (McLuhan, 1997), edited by Michel A. Moos, brings together many of McLuhan's most important early articles. *The Medium and the Light: Reflections on Religion* (McLuhan, 1999), edited by Eric McLuhan and Jacek Szklarek, collects McLuhan's writing on Catholicism. *The Book of Probes* (2004), designed and illustrated by David Carson and edited by Eric McLuhan, William Kuhns, and Mo Cohen, draws on McLuhan's talent for aphorism and represents the most attractive of many attempts to revisit the style of *The Medium of the Massage*; it includes a section on media ecology and supplemental essays by W. Terrence Gordon, as well as Eric McLuhan and Kuhns. *Understanding Me: Lectures and Interviews* (McLuhan, 2003b), edited by his daughter, Stephanie McLuhan, and David Staines, puts into print for the first time some of McLuhan's most interesting lectures and interviews, including lectures from his year at Fordham.

Understanding Me is based on source material used in the documentary, *The Video McLuhan* (McLuhan-Ortved & Wolfe, 1996). *The Video McLuhan*, a three-part documentary written and narrated by Tom Wolfe, includes a great deal of archival material, including videotaped lectures, interviews, and media appearances, that effectively present McLuhan's personality, career, and ideas. The 2002 documentary *McLuhan's Wake*, directed by Kevin McMahon and written by David Sobelman, provides a stylistic and moving introduction to McLuhan's life and work, emphasizing the relevance of his laws of media in the 21st century; the DVD release contains much supplementary material of interest, including additional interviews with McLuhan's wife, Corinne, his son, Eric, and others such as Neil Postman, Lewis Lapham, and Frank Zingrone.

McLuhan has been the subject of biographies by Phillip Marchand (1989) and W. Terrence Gordon (1997), and numerous books devoted to explaining and/or criticizing his ideas. For example, in *Digital McLuhan*, Paul Levinson (1999) discusses McLuhan's major ideas, indicating how they anticipate and accurately describe the characteristics of digital technology and online communications. Paul Grosswiler (1998), in *Method is the Message*, outlines the common ground between the dialectics of McLuhan and those of Marx, the Frankfurt School, cultural studies scholars, and the postmodernists. Richard Cavell (2002) situates McLuhan within cultural geography in *McLuhan in Space*. And in critical assessments written 30 years apart, *The Medium is the Rear View Mirror* (1971) and *The Virtual Marshall McLuhan* (2001), Donald F. Theall contextualizes McLuhan based on the arts and literature of mid-20th century. McLuhan's influence on French poststructuralism is documented by Gary Genosko's *McLuhan and Baudrillard* (1999), and on the Greenpeace organization by Stephen Dale's *McLuhan's Children* (1996). And an anthology examining the lasting impact of McLuhan on the mass media, new media, journalism, communication studies, cultural studies, literary theory, the arts, history, theology, law, and politics, entitled *The Legacy of McLuhan*, will be published next winter (Strate & Wachtel, in press).

3. Innis and American Cultural Studies

McLuhan (1962) acknowledged that his work was strongly influenced by Harold A. Innis, his colleague at the University of Toronto until Innis's untimely death in 1952. Innis was an economist who earned his Ph.D. at the University of Chicago, and turned to the study of communication late in his career. He is sometimes considered the first media ecology scholar, and certainly is the first to focus on what is commonly referred to as media, as opposed to technology, language, or symbolic form. McLuhan followed Innis's example in adopting the term "media," albeit broadening its meaning and moving away from Innis's purely materialistic sense of the word. For

example, Innis (1951) distinguishes between heavy media, which are durable but difficult to transport, and light media, which are portable but also perishable. Thus, the clay tablets used as writing surfaces in ancient Mesopotamia are heavy media while the papyrus sheets and scrolls used in ancient Egypt are light media. This way of understanding media is derived from Innis's earlier research on economic staples such as fur, fish, and timber.

Between 1948 and 1952, Innis produced a series of essays, addresses, and articles outlining a sweeping theory about the role of media in world history, in which as he put it, "sudden extensions of communication are reflected in cultural disturbances" (1951, p. 31). His most important and best known work is collected in *The Bias of Communication*, originally published in 1951, reissued in 1964 with an introduction written by McLuhan, and in 1991 with a new introduction written by Paul Heyer and David Crowley. In this book, Innis argues that media are used to communicate over time as well as over space, and that the physical properties of different media (e.g., heavy or light) determine their effectiveness at preserving knowledge or transmitting information over distances. Depending on the type of media that a given society has at its disposal, it may remain time-biased, as all traditional societies are, or become space-biased, and driven towards territorial expansion and empire. It follows that the empires of the ancient world struggled to maintain control of papyrus supplies, while modern colonial empires were built on paper, printing, and later telecommunications. On rare occasions a balance between time and space is found, which Innis associated with the flexibility of oral tradition. He also argued that media differ in terms of their scarcity or abundance, the complexity of the symbol systems employed, and the degree to which they make information accessible, and all of these factors may contribute to the development of a monopoly of knowledge. Typically, when a ruling class develops a monopoly of knowledge, those on the margins seek out and eventually find an alternate medium that allows them to break the monopoly, leading to political reform or revolution.

In 1950 Innis published *Empire and Communications*, and a revised edition appeared in 1972 with another introduction by McLuhan. This book makes a chapter by chapter survey of media in the ancient world, covering Mesopotamia, Egypt, Israel, Greece, and Rome. Another set of essays, *Changing Concepts of Time*, was completed shortly before his death in 1952, and has been reissued in 2004 with an introduction by James Carey. This volume represents Innis's attempt, "to elaborate the thesis developed in *The Bias of Communication* and

Empire and Communications in relation to immediate problems" (p. xxv), with Innis very much concerned with the relationship between intellectuals and politicians. *Changing Concepts of Time* incorporates *The Press: A Neglected Factor in the Economic History of the Twentieth Century*, which was previously published separately (Innis, 1949). Also of interest to media ecology scholars is the posthumous publication of his notes as *The Idea File of Harold Adams Innis* (1980). In all of these works, Innis points to the interrelationships between a variety of factors, including communication, language and culture, knowledge and education, transportation, time-keeping, political economy, military operations, and science and technology, all of which interact to produce both unique historical circumstances and discernible historical patterns. In this, he is both true to his economic roots, and points the way to an ecological approach to understanding human civilization. Innis has been the subject of a brief memoir by Eric Havelock (1982a), who was Innis's University of Toronto colleague before moving on to Yale University. Moreover, Paul Heyer has recently published a definitive biographical study, *Harold Innis* (2003).

Apart from McLuhan's own recognition of his debt to Innis, others tend to connect the two based on their common media ecology perspective. For example, in *History and Communications* Graeme Patterson (1990) presents an innovative integration of Innis's political economy with McLuhan's cliché-archetype dichotomy. In the similarly titled *Communications and History* Paul Heyer (1988) brings together Innis and McLuhan with the French post-structuralist Michel Foucault. Along the same lines, Judith Stamps, in *Unthinking Modernity* (1995), compares and attempts to integrate the Toronto School of Innis and McLuhan with the Frankfurt School as represented by Theodor Adorno and Walter Benjamin. In *Technology and the Canadian Mind* the postmodernist Arthur Kroker (1984) focuses on the common Canadian ground among McLuhan, Innis, and George Grant. And as previously noted, in *The Post-Industrial Prophets* William Kuhns (1971) links McLuhan and Innis together, along with Lewis Mumford, Siegfried Giedion, Jacques Ellul, Buckminster Fuller, and Norbert Wiener.

Against this trend, James Carey cautions against too close an identification between Innis and McLuhan in his influential work, *Communication as Culture* (1989), and a second collection of essays edited by his students and published under the title *James Carey: A Critical Reader* (1997). Favoring Innis's sociological approach, Carey has been particularly concerned with the political and eco-

nomic consequences of the communications revolution that began in 19th century America. Innovations in telecommunications, starting with the introduction of the telegraph, have resulted in increased control of space, enhancing nationalism, the homogenization of time (in the form of time zones), and social disturbances such as were experienced in the United States during the 1890s. Like Innis (and most other media ecology scholars), Carey is concerned with the preservation of community, which requires greater balance between time and space. Carey refers to a time-oriented (and cultural) perspective as a ritual view, which he contrasts to the transportation view that dominates in the field of mass communication (the transportation view has also been criticized by McLuhan, 1995; Nevitt, 1982; Ong, 1982; and Schwartz, 1974). Carey has referred to his brand of media ecology as American cultural studies, although a recent anthology with the title *American Cultural Studies* (Warren & Vavrus, 2002) indi-cates that this area is developing a different, albeit closely related identity. Carey's students have followed his lead in producing cultural analyses that emphasize the particular characteristics of specific media environments rather than the larger generalizations put forth by McLuhan, and Innis in the early essays in *The Bias of Communication*. For example, there is Carolyn Marvin's *When Old Technologies Were New* (1988), Kevin Barnhurst and John Nerone's *The Form of News* (2001), Steve Jones's *Rock Formation: Music, Technology, and Mass Communication* (1992), and Fredrick Wasser's *Veni, Vidi, Video: The Hollywood Empire and the VCR* (2001). Others have extended Carey's work on intellectual history, notably Daniel Czitrom who compares Innis favorably to McLuhan in *Media and the American Mind* (1983), and Joli Jensen who critques Neil Postman, Daniel Boorstin, Dwight Macdonald, and Stuart Ewen in *Redeeming Modernity* (1990).

4. The Toronto School

However the relationship between Innis and McLuhan is viewed, they are generally considered the two key members of the Toronto School, a group that encompasses a number of other significant scholars who have been associated with McLuhan. For example, the anthropologist Edmund Carpenter worked with McLuhan on the *Explorations* journal during the '50s, which for the first time indicated that an interdisciplinary field of study had been identified; together they also published the *Explorations in Communication* anthology (Carpenter & McLuhan, 1960). Carpenter added an intercultural dimension to McLuhan's media ecology, as can be seen in *They Became What They Beheld* (Carpenter & Heyman, 1970), an experimental book along the lines of *The Medium is the Massage*, and *Oh, What a Blow That Phantom Gave Me!* (Carpenter, 1973). The entire text of the latter book is included along with other supplementary material such as an interview with Carpenter on the DVD release of the documentary by John Bishop and Harald Prins also enti-tled *Oh, What a Blow That Phantom Gave Me!* (2003); the film incorporates footage shot by Carpenter circa 1969 showing the reaction of tribal peoples in New Guinea to their first experience with media such as pho-tography, sound recording, and film.

Carpenter left the University of Toronto and McLuhan in 1957, but rejoined McLuhan for his year at Fordham University (1967-1968). While in New York City, they met media producer Tony Schwartz, famous for pro-ducing the Daisy commercial for Lyndon Johnson's presi-dential campaign. Schwartz would go on to write two books combining McLuhan's perspective with the experi-ence of a media professional, *The Responsive Chord* (1974) and *Media: The Second God* (1981). Like McLuhan, Carpenter, and other media ecology scholars, Schwartz was interested in the acoustic sensibility of electronic media, and put forth the concept of resonance as an alternative metaphor to transportation. Rather than transferring infor-mation, Schwartz believed that media are most effective when they stimulate the recall of what audience members already have stored in their memories. This emphasis on meaning making on the part of the receiver all but removes content from the equation, leaving the medium as the most significant component in communication. Paul Ryan, who worked as McLuhan's assistant at Fordham and went on to become a well known video artist, published *Cybernetics of the Sacred* (1974), combining McLuhan and Norbert Wiener, and *Video Mind, Earth Mind: Art, Communica-tions, and Ecology* (1993), which also incorporates the semiotics of Charles Saunders Peirce.

Another of McLuhan's University of Toronto col-leagues, the physicist Robert K. Logan, published *The Alphabet Effect: The Impact of the Phonetic Alphabet on the Development of Western Civilization* in 1986, based on work that began in collaboration with McLuhan. A new version of the study, under the title *The Alphabet Effect: A Media Ecology Understanding of the Making of*

Western Civilization, is due out later this year. Logan has also followed up on Carpenter's notion that media are our "new languages" (see Carpenter & McLuhan, 1960) in his analyses of the computer and its effects on communication, thought, and behavior, *The Fifth Language: Learning a Living in the Computer Age* (1997) and *The Sixth Language: Learning a Living in the Internet Age* (2000). Logan incorporates complexity theory into his work on media ecology, as does Frank Zingrone, one of McLuhan's students (and co-editor of *The Essential McLuhan*) in *The Media Symplex* (2001). In this book, Zingrone argues that the electronic media provide a simplified image of reality as a counter to the increasing complexity of society brought on by technological innovation. The director of the University of Toronto's McLuhan Center, Derrick de Kerckhove, has also attempted to update McLuhan with *The Skin of Culture* (1995), *Connected Intelligence* (1997), and *The Architecture of Intelligence* (2001).

Eric McLuhan follows up on his father's work first with his literary analysis, *The Role of Thunder in Finnegans Wake* (1997), and then with his sequel to *Laws of Media*, *Electric Language: Understanding the Message* (1998), which includes analysis of the internet and applications of the tetrad. McLuhan's *Take Today* co-author, Barrington Nevitt, produced an accessible introduction to the media ecology perspective in *The Communication Ecology* (1982). Similarly, James Curtis's *Culture as Polyphony* (1978) does so by emphasizing the opposition between linear and nonlinear modes, and their relation to sight and sound. Curtis's *Rock Eras* (1987) drafts McLuhan as an aid to understanding popular music. Composer R. Murray Schafer is generally considered the founder of acoustic ecology, which includes the recording of music, voice, and ambient sound, along with aural performance and other aspects of the auditory environment, and his ties to McLuhan are readily apparent in his 1977 book, *The Tuning of the World*. Graphic designer and curator Ellen Lupton goes to the roots of McLuhan's work in her *Mechanical Brides: Women and Machines from Home to Office* (1993), while museum designer Edwin Schlossberg builds on McLuhan's comments about the active role that audiences take in *Interactive Excellence* (1998). Comics artist Scott McCloud draws heavily on McLuhan in his extraordinary introduction to visual communication in comic book/graphic novel form, *Understanding Comics* (1993); a sequel about comics in the digital age, *Reinventing Comics* (2000), supplements his original groundbreaking work. Visual communication is also the focus of psychologist Robert Romanyshyn's

Technology as Symptom and Dream (1989), especially McLuhan's insights about the visualism of print culture and perspective in art.

In *Art and Physics* (1991), physicist Leonard Shlain elaborates on McLuhan's insight about the parallel development of the visual arts and theoretical physics in the 20th century, both reflecting a nonlinear, electronic mindset. His second book, *The Alphabet Versus the Goddess* (1999), takes up McLuhan's arguments about the correspondence between left and right brain hemispheres and literate and oral modes of communication. Shlain connects these ideas to the study of gender (males tend to be characterized by left brain dominance, females by the right brain or a balance between the two). Bringing this to bear on the theory that goddess worship was overthrown in ancient Israel and Greece in favor of rule by masculine deities, he interprets this change as a consequence of the introduction of the alphabet. He continues his exploration of gender in *Sex, Time and Power: How Women's Sexuality Shaped Human Evolution* (2003). And, as previously mentioned, Donald Theall (1971, 2001) subjects his former mentor to critical assessment, but also extends McLuhan's arts and letter approach and calls for an "ecology of sense" in *Beyond the Word* (1995) and *James Joyce's Techno-Poetics* (1997).

One of the most comprehensive new extensions of McLuhan, one based in large part on his observation in *Understanding Media* that the content of a medium is another medium, is Jay David Bolter and Richard Grusin's *Remediation: Understanding New Media* (1999). Remediation is in fact the term Bolter and Grusin use to refer to the process whereby one medium takes another medium as its content. This can happen when a new medium remediates an older one (writing remediates speech, print remediates writing, word processing and hypertext remediate print), but also when an older medium remediates a new one (a TV commercial shows us a website, a motion picture displays a computer screen). Bolter and Grusin identify two logics of remediation, the first being immediacy, where the remediation is transparent and gives us the illusion of no mediation at all. The second is hypermediacy, where the remediation is readily apparent and more or less self-reflexive, possibly mixing multiple forms of mediation (as is often the case on a website), making us very aware of the presence of the technology. *Remediation* is divided into three parts, a general introduction to the theory of remediation; a set of case studies of different electronic media such as television, film, computer games, the web, and virtual reality; and a final section on how new media are altering the traditional concept of the self. *Remediation* incorporates postmodern approaches to

media ecology, and therefore has something in common with postmodernists influenced by McLuhan such as Jean Baudrillard (1981, 1983), Paul Virilo (1986, 1991, 1997), and Arthur Kroker, who combines McLuhan and Baudrillard in works such as *The Postmodern Scene* (Kroker & Cook, 1987), *Spasm* (Kroker, 1993), and *Digital Delirium* (Kroker & Kroker, 1997).

5. Ong

As a graduate student at Saint Louis University, Walter Ong was one of McLuhan's students, and McLuhan's influence on Ong is reflected in Ong's M.A. thesis on the Jesuit poet Gerard Manley Hopkins (included in Ong, 2002a; see also Ong, 1986), and his Ph.D. dissertation on the early modern French educational reformer, Peter Ramus, which was completed at Harvard University under the direction of Perry Miller. Ong's Ramus study, published in book form as *Ramus, Method, and the Decay of Dialogue* (1958), established Ong's reputation as an impeccable scholar, and serves as a model for research in media ecology and cultural history; it also influenced McLuhan's own thinking, as reflected in *The Gutenberg Galaxy* (1962). *Ramus, Method, and the Decay of Dialogue* provides a case study documenting the impact of print media on modes of thought, knowledge, and education. Ong documents the shift from the largely oral/aural modes of communication, consciousness, and culture associated with scribal culture, and towards an increasingly more dominant visualism. Like McLuhan, Ong calls our attention to the differences between the visual and the acoustic, and the role of media in altering the balance of the senses.

Ong developed a more sophisticated theoretical framework in *The Presence of the Word* (1967b), which in many ways complements McLuhan's *Understanding Media* (1964). In this book, Ong establishes the primacy of sound and speech in human life, introducing the concepts of primary orality as the orality that existed before writing, and secondary orality as the orality associated with the electronic media (and generally shaped by writing as well). In doing so, he traces the cultural transformations that have accompanied the shift from orality to literacy, from chirography to typography, and from print media to electronic communications. In contrast to McLuhan, who tends to emphasize the revolutionary impact that may accompany the introduction of new technologies, Ong presents an evolutionary model where oral/aural biases persist in residual form in literate cultures. Emphasizing how different media work in the establishment of stable cultures, *The Presence of the Word* helps us to understand media as evolving environments and homeostatic ecologies.

Four collections of essays supplement *The Presence of the Word*. The two earlier ones, *The Barbarian Within* (1962) and *In the Human Grain* (1967a) establish some of Ong's basic themes, such as personalism, the contrast between interior and exterior, and of course the distinctions between various media and modes of communication; many of the chapters in these works are better known through reprints in later collections (i.e., Ong, 1992-1999, 2002a). The later pair, *Rhetoric, Romance, and Technology* (1971) and *Interfaces of the Word* (1977), have been highly influential, bringing together discussions of communication, rhetoric, literary theory, systems theory, and media ecology. Also of interest is Ong's edited anthology, *Knowledge and the Future of Man* (1968), based on a symposium held at Saint Louis University, which includes contributions from both Ong and McLuhan, as well as comparative religion scholar Mircea Eliade.

Orality and Literacy (1982) has been Ong's most popular book, and it stands with *Understanding Media* (McLuhan, 1964) as one of the most frequently cited works in the media ecology literature. Written specifically to review, synthesize, and in many ways establish the field of orality-literacy studies, *Orality and Literacy* downplays the phenomenological approach that Ong employs in his previous works. Instead, the book places greater emphasis on the psychodynamics of orality and literacy, the characteristics of oral and literate communication and cognitive styles, and the vital role that memory and mnemonics play in oral societies. While the focus is clearly on the contrast between oral and literate cultures, Ong also discusses the universality of speech and language, the distinction between the alphabet and other writing systems, the shift from scribal copying to mechanical printing, and the secondary orality of electronic media. The publication of *Orality and Literacy* follows *Fighting for Life* (1981), Ong's media ecological study of masculinity, and precedes *Hopkins, the Self, and God* (1986), Ong's return to the topic of his M.A. thesis; his analysis of Hopkins is based on the orality-literacy perspective, as he shows how his poetry combines a literate mindset and sense of individualism with a romantic retrieval of oral poetic elements. As do other media ecology scholars from a variety of religious

backgrounds, Ong examines religion and spirituality on their own terms in a number of these books, and focuses on this topic in early works such as *Frontiers in American Catholicism* (1957) and *American Catholic Crossroads* (1959). His edited volume, *Darwin's Vision and Christian Perspectives* (1960) brings together his interest in theology and cosmology with his focus on evolution and evolutionary processes. In general, Ong's work on the history of culture, consciousness, and communication is informed by an evolutionary and biological perspective.

Many of Ong's essays have been reprinted in the four volumes of *Faith and Contexts* (1992-1999), and more recently in *An Ong Reader* (2002a), all of which have been edited by Thomas J. Farrell and Paul A. Soukup. *An Ong Reader* is particularly relevant for media ecology scholars as it includes many of Ong's key short works in this area, his later essays on the computer, information, and digital media, as well as his M.A. thesis and the "Why Talk?" interview conducted by Wayne Altree.

Farrell and Soukup also join together with Bruce Gronbeck to edit the first anthology about Ong, *Media, Consciousness, and Culture: Explorations of Walter Ong's Thought* (Gronbeck, Farrell, & Soukup, 1991). A second anthology has since appeared under the title *Time, Memory, and the Verbal Arts: Essays on Walter Ong's Thought* (Weeks & Hoogestraat, 1998). Farrell has also written the first full length study of Walter Ong's scholarship, *Walter Ong's Contribution to Cultural Studies: Phenomenology and I-Thou Communication* (2000), a detailed and definitive discussion of Ong's intellectual career. In this work, Farrell identifies Martin Buber as an important influence on Ong, in that Buber discussed the orality of Hebraic culture in contrast to the highly visual literacy of Hellenic culture; he also discusses the Jungian resonances in Ong's work. A more limited analysis, one that highlights Ong's role as a cultural historian and his use of the interface metaphor, can be found in Betty Youngkin's 1995 work, *The Contributions of Walter J. Ong to the Study of Rhetoric*.

6. Orality-Literacy Studies

While most discussions of the Toronto School focus on Innis and McLuhan, Eric Havelock was another foundational media ecology scholar who taught at the University of Toronto. While technically a colleague of Innis, the two had little or no interaction before Havelock left for Yale University, around the time that McLuhan arrived. Havelock's scholarship did influence Innis, McLuhan, Ong, and Postman, and he has frequently been closely linked to Ong as a specialist in orality-literacy studies. As a classics scholar, Havelock explained the transition from Homer to Plato as reflecting a shift from oral to literate culture. He maintains that the introduction of the Greek alphabet was the single most important event in human history, and the basis of western civilization, a position he shared with Innis and McLuhan, having in some ways influenced their thinking on the matter. (Ong, on the other hand, credits the Semites with the invention of the alphabet.)

Havelock's best known work is *Preface to Plato* (1963), much of which is devoted to a discussion of the orality of Homeric epic poetry. He explains how the *Iliad* and the *Odyssey* originated as songs produced and preserved without the benefit of writing, and how the epics' distinctive characteristics, such as use of formulas, meter, concrete imagery, anthropomorphic representations, emphasis on human action, and frequent repetition function as a means to preserve knowledge within collective memory. Thus, he describes Homeric diction as "a total technology of the preserved word," (p. 44), and the epics themselves as a tribal encyclopedia, a means of storing knowledge for the community, functioning in effect as the dominant medium of ancient Greek oral culture. Education, therefore, amounted to the memorization of the songs of Homer and other elements of the oral tradition, as it served as both a record of the past and a set of recommendations for future conduct. And Plato's attack on the poets can thus be understood as involving something much more vital than mere aesthetics: According to Havelock, Plato was advocating a change in the media environment of ancient Greece, from one dominated by oral poetry to one firmly rooted in literacy.

Havelock's *The Greek Concept of Justice* (1978) constitutes an important sequel to *Preface to Plato*, as well as a model of media ecology scholarship. Using the idea of justice as a case study, Havelock engages in philological analysis to trace the transition from the concrete, situational, and personified notion of justice associated with the oral mindset of Homer, to its increasing abstraction as we move through Hesiod and the pre-Socratics, to Plato. Havelock provides a more general discussion of writing and literacy in *Origins of Western Literacy* (1976), based on a series of lectures given at the University of Toronto. In this short book he presents a

concise and effective discussion of the differences between orality and literacy, and among the three main types of writing systems (logographic, syllabic, and alphabetic). He also explains that there are different types of literacies, and distinguishes between craft literacy, in which only a select minority know how to read and write, and only use literacy for utilitarian and generally vocational purposes, and social literacy. Social literacy requires a literature (not just written records, but the culture itself encoded in writing), a readership (reading for education and pleasure), an economic writing system (e.g., relatively few characters, like the alphabet, so that it is easy to learn), legible writing style (as opposed to the elaborate writing found in hieroglyphics or the calligraphy of the medieval manuscript), and schools (providing literacy education at an early age).

The four chapters that comprise *Origins of Western Literacy* are incorporated into *The Literate Revolution in Greece and Its Cultural Consequences* (1982b), along with a number of other previously published articles by Havelock on subjects such as Greek oral poetry, philosophy, and the Attic playwrights. Following Ong's publication of *Orality and Literacy*, Havelock summarized his own perspective on the special case of ancient Greece, and on orality and literacy in general in *The Muse Learns to Write* (1986). Also of interest to media ecology scholars is the anthology Havelock co-edited, *Communication Arts in the Ancient World* (Havelock & Hershbell,1978), and his translation of Aeschylus' *Prometheus Bound*, coupled with his commentary and published under the title of *The Crucifixion of Intellectual Man* (1950). Identified with writing, knowledge, and science, the myth of Prometheus speaks to the dialectic between nature and culture as well as orality and literacy. For Havelock, it raised issues concerning the relationship between the intellectual and the production of knowledge on the one hand, and the political leader and the exercise of power on the other. Innis, in *Changing Concepts of Time* (2004) cites *The Crucifixion of Intellectual Man* as an inspiration for his final work.

It should be noted that Havelock was not the first to write about oral cultures: Milman Parry is generally credited with the discovery of primary orality, as Havelock and Ong make clear; moreover, McLuhan begins *The Gutenberg Galaxy* by acknowledging his debt to Parry. Following his premature death, Parry's research was completed by his student Albert Lord, who published *The Singer of Tales* in 1960; Parry's own papers, edited by his son Adam, were published posthumously under the title of *The Making of Homeric Verse* (1971). Parry and Lord's

research included textual analysis of the diction and style of the Homeric poems, and field work studying the contemporary oral singers in Serbo-Croatia, which provided a working example of oral composition. Observing that the use of meter in oral poetry influences the content of the poetry, Parry states that

> Homer . . . assigned to his characters divinity, horsemanship, power, and even blond hair, according to the metrical value of their names, with no regard to their birth, their character, their rank, or their legend: except in so far as these things were common to all heroes. Except, that is to say, in so far as these things are interchangeable. If being 'divine', for example, has about the same value as being 'king' or 'horseman' or 'blameless' or 'strong' or any of the other qualities indicated by the generic epithet, then the poet was led by considerations of metre to stress one of these qualities for a given hero more than another. (p. 150)

In other words, Parry was essentially saying that the meter is the message. Havelock in turn used Parry and Lord's understanding of oral composition to establish a broader understanding of primary oral cultures, of how oral poetry functions within oral societies, and therefore of the effects of primary orality on consciousness and culture.

Jack Goody (1968) is generally considered to be the first to make reference to the Toronto School. As an anthropologist, he brings a cross cultural approach to orality-literacy studies, confirming and complementing the historical and literary research of Ong and Havelock. In his 1968 anthology, *Literacy in Traditional Societies* (1968), Goody follows McLuhan and Havelock in emphasizing the invention of the Greek alphabet, but in his best known work, *The Domestication of the Savage Mind* (1976) he broadens his scope to consider the impact of writing in general. He also proposes that orality-literacy makes for a better point of comparison than Claude Lévi-Strauss's traditional dichotomy of the savage or primitive and the civilized, as the latter only labels, while the former provides an explanation for cultural differences rooted in technology, not biology. Goody points to one of the most basic activities associated with writing, the making of lists, as a means of moving thought in the direction of greater abstraction through decontextualization. As writing takes language out of the context of physical presence and interaction, lists take words out of the context of sentences, separating subject from predicate, noun from verb and adjective.

In *The Logic of Writing and the Organization of Society* (1986), Goody mostly draws on historical data in

discussing the impact of writing on social institutions. He explains the role of writing in religion, and the shift from oral spirituality that is local and immanent in nature to the transcendence and universalism of literate religions, which also introduce the either/or thinking that goes along with dogma, orthodoxy, conversion, and heresy. Goody also discusses how the invention of writing was associated with the first medium of exchange, the activity of accounting, and the development of the first economic systems; how it made possible the development of centralized government and the state; and how it was necessary for the development of laws and legal systems. In *The Interface Between the Written and the Oral* (1987), Goody reviews the historical development of writing and the gradual shift between orality and literacy, distinguishing between media and modes of communication. Also of relevance to media ecology scholarship is Goody's most recent collection, *The Power of the Written Tradition* (2000).

One of the first anthropologists to discuss the role of orality and literacy across cultures was Dorothy Lee. In her highly influential *Freedom and Culture* (1959), she connects literacy to lineality in thought and perception; she also considers the impact of literacy in *Valuing the Self* (1976). Psychologist David R. Olson emphasizes the cognitive effects of writing and especially reading in *The World on Paper* (1994), and in his co-edited anthology, *Literacy and Orality* (Olson & Torrance 1991). Philosopher David Abram combines orality and literacy with phenomenology in *The Spell of the Sensuous* (1996). Communication scholar Catherine Kaha Waite draws on Ong and McLuhan and applies the phenomenology of orality-literacy to contemporary media in *Mediation and the Communication Matrix* (2003); her particular focus is on the role of the screen in the continuing transformation of the self. Media arts researcher Robert Albrecht explores the shift from primary to secondary orality in musical

experience in *Mediating the Muse* (in press). Rhetorician Kathleen Welch considers the transformations of the word as we move from orality to literacy to electricity in *Electric Rhetoric: Classical Rhetoric, Oralism, and a New Literacy* (1999). And legal expert Ethan Katsh has employed the orality-literacy perspective to explore the impact of electronic communication and digital media on the legal profession and the judicial system in *The Electronic Media and the Transformation of Law* (1989) and *Law in a Digital World* (1995).

The orality-literacy approach has proven particularly relevant to investigations into the nature of computer-mediated communication. For example, Jay David Bolter, a classics scholar who turned to the study of new media, incorporates the orality-literacy perspective into his study of hypertext, *Writing Space: The Computer, Hypertext, and the History of Writing* (1991), now in a second edition under the title *Writing Space: Computers, Hypertext, and the Remediation of Print* (2001). Orality-literacy also informs Bolter and Grusin's *Remediation* (1999). Likewise, literary theorist George Landow interprets hypertextuality through orality-literacy and deconstruction in *Hypertext* (1992) and *Hypertext 2.0* (1997). Similarly, English professor Richard Lanham combines Ong's perspective with postmodernism (while critiquing Postman's *Amusing Ourselves to Death*, 1985) in *The Electronic Word* (1993). Michael Heim brings Ong and Havelock together with Heidegger in his study of word processing, *Electric Language* (1987), which he follows up with *The Metaphysics of Virtual Reality* (1993). Brenda Danet draws on the orality-literacy perspective in her research on play and art in online communications in *Cyberpl@y* (2001), concluding that creative expression through e-mail, chat, and websites constitutes a new form of folk art. Orality-literacy perspectives also inform the anthology *The Emerging Cyberculture* (Gibson & Oviedo, 2000).

7. Media History

While orality-literacy studies cuts across different cultures and time periods, it does not include the full range of possibilities of human communication and mediation. For example, Merlin Donald posits a stage of media evolution prior to orality in *Origins of the Modern Mind* (1991); in this mimetic stage, body movement served as the major mode of communication. Speculation about the origins of language and symbolic communication, for example, Robin Dunbar's *Grooming, Gossip, and the Evolution of Language* (1996) also has its place in the field

of media ecology, as there is no absolute distinction between the evolution of media, of language, or that of the human species. Certainly, while orality-literacy studies generally begin with antiquity, they can be extended backwards into the prehistoric world, as John Pfeiffer does in *The Creative Explosion* (1982). His title refers to the sudden appearance of cave art and other forms of visual expression and technological innovation some 20-30,000 years ago. Pfeiffer argues that this marks the first appearance of mnemonics, and that the cave paintings represent

the first form of memory theater. Pfeiffer draws on Frances Yates's book, *The Art of Memory* (1966), an important work that presents the cultural history of visual mnemonic systems from ancient Greece to early modern Europe.

The history of writing is also a subject of great relevance for media ecology, and this includes the groundbreaking work of archeologist Denise Schmandt-Besserat, who unearthed the origins of writing in ancient Mesopotamia. Schmandt-Besserat has explained how writing developed through a series of innovations involving accounting procedures used by the ancient Sumerians, from clay tokens to clay envelopes to cuneiform, in a series of books and articles: *An Archaic Recording System and the Origin of Writing* (1978), *Early Technologies* (1979), "The Origins of Writing" (1986), the impressive two volume set *Before Writing* (1992), and the abridged version, *How Writing Came About* (1996). In demonstrating the common origins of writing, numerals, and coins, Schmandt-Besserat also confirms the arguments of Dorothy Lee, McLuhan, Carpenter, and others about the inherent linearity of writing.

Other scholars have produced surveys and taxonomies of the various writing systems that have been developed and evolved over the past 6,000 years. I. J. Gelb's classic work, *A Study of Writing* (1963), adds a developmental theory of writing that suggests a natural progression from logographic to phonetic writing, and from syllabic to alphabetic writing systems. Gelb coins the term "grammatology" to refer to the study of writing, which in turn inspires the deconstruction of writing initiated by Jacques Derrida, hence *Of Grammatology* (1976). Henri-Jean Martin has produced the definitive work on the subject, *The History and Power of Writing* (1994), which covers the impact of printing as well as writing. As noted above, Robert Logan's *The Alphabet Effect* (in press) traces the diffusion of alphabetic writing from ancient Israel, Greece, and Rome to India, Arabia, and the modern western world. Logan is particularly interested in the connection between the alphabet and the historical development of law and science.

Along with the study of writing systems, scholars such as Innis, McLuhan, and Ong have been interested in the unique characteristics of handwritten documents, scribal copying, and manuscript culture, as contrasted with the familiar world of print media. H. J. Chaytor set the mark for scholarship in this area with *From Script to Print* (1950), which emphasizes the study of scribal culture. Research on the printing press and print media generally incorporates some discussion of chirography for purposes of comparison, for example Lucien Febvre and Henri-Jean

Martin's key contribution, *The Coming of the Book* (1976). S. H. Steinberg's *Five Hundred Years of Printing*, originally published in 1955, has gone through a series of new editions and revisions, some posthumous, the most recent in 1996. Steinberg's study is particularly valuable for its account of the technological development of the Gutenberg press, its survey of the varieties of print media, and the role of print in establishing vernacular literature and fostering nationalism.

Elizabeth Eisenstein provides an exhaustive study of the printing revolution in her two volume *The Printing Press as an Agent of Change* (1979), in which she grapples with McLuhan's arguments about the effects of typography, moving from a skeptical position to one that ultimately confirms McLuhan's insights. Eisenstein details the development of printing and its effects in early modern Europe, and includes major case studies of the role of printing in preserving the Renaissance (which immediately precedes Gutenberg and is encoded and in effect enshrined in print) as a permanent historical break, in promoting the Protestant Reformation and establishing a permanent schism in western Christianity, and in allowing for the development of modern science (for example, the Copernican revolution began before the invention of the telescope, and was based on the new availability of printed astronomical records). Eisenstein's research has also been published in an abridged form under the title *The Printing Revolution in Early Modern Europe* (1983). David Kaufer and Kathleen Carley offer a communication and media ecology perspective on printing in *Communication at a Distance* (1993), arguing that the changes discussed by Eisenstein were more evolutionary than revolutionary.

Print media and literacy are not just a matter of historical research, as can be seen from Jonathan Kozol's study, *Illiterate America* (1986), and Daniel Boorstin's report, *Books in Our Future* (1984), in which he identifies a growing problem of aliteracy (referring to literates who choose not to read, an option made possible by the presence of electronic alternatives to print media). Certainly news and journalism are topics that once were exclusively associated with print media, and now cut across all manner of electronic media. Mitchell Stephens considers the entire range from orality to electricity in *A History of News* (1988), while Michael O'Neill discusses the impact of television news in promoting democracy in *The Roar of the Crowd* (1993). Friedrich Kittler addresses media history in a series of books, *Discourse Networks 1800/1900* (1990); *Literature, Media, Information Systems* (1997); and *Gramophone, Film, Typewriter*

(1999). Anthony Smith considers how the development of mass communications in the west dominates global news coverage in *The Geopolitics of Information* (1980a), and discusses the impact of the computer on newspapers in *Goodbye, Gutenberg* (1980b), on knowledge in *Books to Bytes* (1993), and on identity in *Software for the Self* (1996). Similarly, Argentinian theorist Alejandro Piscitelli draws on the historical perspectives of Ong, Innis, McLuhan, Goody, and Eisenstein in arguing that the television era has come to a close, rendered obsolescent by the Internet, in *Post/Televisión: Ecología de Los Medios en la Era de Internet* (1998). One of the most significant recent studies of the changing media environment has been produced by Ronald Deibert, a political scientist specializing in international relations. Deibert's *Parchment, Printing, and Hypermedia: Communication in World Order Transformation* (1997) is very much in the tradition of Harold Innis's studies of social organization, empire, and nationalism. Deibert use the terms medium theory and ecological holism to describe his media ecology of world order, tracing the changes as we move from medieval scribal theocracy to modern print-based nationalism to our emerging postmodern, electronically mediated world order.

Walter Benjamin is often associated with the Frankfurt School (see, for example, Stamps, 1995), although he was very much on the margins of that group, socially and politically. His own brand of Marxist criticism contains numerous media ecology insights, such as the following:

> During long periods of history, the mode of human sense perception changes with humanity's entire mode of existence. The manner in which human sense perception is organized, the medium in which it is accomplished, is determined not only by nature but by historical circumstances as well. (Benjamin, 1968, p. 222)

This quote is taken from Benjamin's often cited essay, "The Work of Art in the Age of Mechanical Reproduction," which was originally published in 1936 and is frequently reprinted. In this article, Benjamin's main concern is with printing, but specifically with lithography rather than typography. The mechanical reproduction of art, he argues, calls into question the concept of authenticity; continued innovations in image technology, i.e., photography and film, blur the distinction between original and copy, making authenticity even more problematic. He uses the term "aura" to refer to the sense of authenticity that is lost through the media of reproduction, at the same time maintaining that mass reproduction is ultimately democratizing.

Daniel Boorstin provides a conservative spin on Benjamin's argument in *The Image: A Guide to Pseudo-Events in America* (1978a), a revised edition of *The Image: Or What Happened to the American Dream* (1962). Rather than mechanical reproduction alone, Boorstin's agent of change is what he calls the Graphic Revolution, the series of innovations in communications that begins in the 19th century with the steam powered printing press and photography, and includes the invention of sound recording, the motion picture, radio, and television. According to Boorstin, our technologies have given us extravagant expectations about the world, and led us to replace reality with our now easily manufactured illusions. For example, in journalism the emphasis shifts from the gathering of news, based on real events, to the manufacture of news by journalists and public relations specialists, through interviews, publicity stunts, press releases, leaks, and other forms of pseudo-events (otherwise known as media events). Along the same lines, Boorstin argues that genuine heroes have been replaced by celebrities whose fame is artificially produced; this idea is further explored in Susan Drucker and Robert Cathcart's anthology, *American Heroes in a Media Age* (1994). He also discusses the distinction between the traditional activity of travel and the modern notion of tourism, and the dissolution of forms (a line of argument that anticipates such current phenomena as docudrama and edutainment). A similar critique is put forth by Christopher Lasch in *The Culture of Narcissism* (1978), where he diagnoses image culture as a psychoanalytic symptom denoting a surfeit of self-love; Lasch follows this with critical discussions of progress and liberalism in *The True and Only Heaven* (1991) and *The Revolt of the Elites* (1995). Kevin DeLuca's *Image Politics* (1999) provides a more sympathetic view of the use of publicity in the service of media activism, specifically environmentalism. Drawing on rhetorical criticism as well as McLuhan's media ecology, DeLuca details how groups like Greenpeace learned from McLuhan how to generate media coverage.

Jean Baudrillard gives Benjamin and McLuhan a postmodern turn in publications such as *Simulations* (1983) and *Simulacra and Simulation* (1994), arguing that our technologies have progressed so far that we now are able to create hyperreal simulations, artificial creations that are more real than real. Gary Gumpert provides a more concrete discussion in *Talking Tombstones and Other Tales of the Media Age* (1987), where he analyzes the ambiguities of electronic media in regard to the perception of time and space, and of perfection. Similarly, Steve Jones examines the question of authenticity in relation to sound

recording technology, digital sampling, and computer-generated music in *Rock Formation* (1992). Susan Sontag also draws on Benjamin and McLuhan in *On Photography* (1997), a meditation on the effects of the medium in which she comes to the following conclusion:

> Images are more real than anyone could have supposed. And just because they are an unlimited resource, one that cannot be exhausted by consumerist waste, there is all the more reason to apply the conservationist remedy. If there can be a better way for the real world to include the one of images, it will require an ecology not only of real things but of images as well. (p. 158)

Sontag's call for an ecology of images has been answered by Julianne Newton in her wide-ranging work,

The Burden of Visual Truth (2000), which considers the new technology of digital photography, in Ann Barry's *Visual Intelligence* (1997), and in Scott McCloud's *Understanding Comics* (1993) and *Reinventing Comics* (2000). Sontag herself has recently returned to the subject with *Regarding the Pain of Others* (2003). The issues originally raised by Benjamin are also reflected in critques such as Postman's *Amusing Ourselves to Death* (1985), Ian Mitroff and Warren Bennis's *The Unreality Industry* (1989), Mitchell Stephen's *The Rise of the Image, the Fall of the Word* (1998), Neal Gabler's *Life the Movie* (1998), and Arthur Hunt III's *The Vanishing Word* (2003). Finally, it is important to note that media history in turn influences the study of history itself, a point made by media ecologists such as Innis (1951), Eisenstein (1979), and Terence Ripmaster in *The Ecology of History* (1978).

8. Postman

As a doctoral student in the 1950s, studying about language and communication under Louis Forsdale at Columbia University's Teachers College, Neil Postman was introduced to Marshall McLuhan, who Forsdale frequently invited down to New York City to lecture. Postman wrote about McLuhan's relevance for English education as early as 1961 in a book commissioned by the National Council of Teachers of English, entitled *Television and the Teaching of English*. He also advocated language education as an alternative to traditional approaches to grade school English, the latter prescribing proper grammar, spelling, and elite culture, the former emphasizing the communication process or medium over content. Collaborating with his classmate from Teachers College, Charles Weingartner, Postman elaborated on this argument in *Linguistics: A Revolution in Teaching* (Postman & Weingartner, 1966). With the understanding that media constitute our new languages (Carpenter & McLuhan, 1960), Postman and Weingartner integrated the two arguments to produce their highly successful *Teaching as a Subversive Activity* (1969), which was particularly popular within the educational reform movement of the '60s. This book reflects McLuhan's criticism of print-based schools as outmoded and obsolescent, and calls for new modes of education better suited to the age of electronic media. In particular, Postman and Weingartner call for a curriculum based on the "Sapir-Whorf-Korzybski-Ames-Einstein-Heisenberg-Wittgenstein-McLuhan-Et Al. Hypothesis . . . that language is not merely a vehicle of expression, it is also the driver; and

that what we perceive, and therefore can learn, is a function of our languaging processes" (p. 101). *Teaching as a Subversive Activity* had a dramatic impact on the educational reform movement during the early '70s, and remains influential to this day. Postman and Weingartner produced two additional books on education, *The Soft Revolution* in 1971 (which included a prospectus for a graduate program in media ecology) and *The School Book* (which includes a discussion of McLuhan's relevance for educational reform) in 1973.

In addition to education, Postman emphasizes linguistics, semantics, and the study of interpersonal communication to a much greater extent than either McLuhan or Ong, as can be seen from his 1976 book, *Crazy Talk, Stupid Talk*. That same year, he began a 10 year term as editor of *ETC.: A Journal of General Semantics*, publishing a number of significant pieces on media ecology by scholars such as McLuhan, Eric Havelock, Gary Gumpert, Joshua Meyrowitz, and Paul Levinson. Postman's reputation as a media critic was established after 1979, the year he published *Teaching as a Conserving Activity*. Reversing himself from the position he had taken with Weingartner in *Teaching as a Subversive Activity* (1969), Postman concludes that schools need to counter the effects of television and the electronic media by preserving the values and methods associated with print-based literacy. His primary point of comparison is the school as opposed to television, arguing that they are competing forms of education. But it is in this book that Postman also identifies the key opposition between the word (both oral and literate, but reaching

its highest form in print culture) and the image (which television makes predominant). This argument can be contrasted to McLuhan and Ong's emphasis on sense perception and the contrast between the ear and eye, as Postman instead stresses language and symbolic form. This line of inquiry is then continued in *The Disappearance of Childhood* (1982), in which Postman argues that the concept of an extended childhood is a construction of print culture that has been destroyed by the leveling effect of the televised image. Postman opens *The Disappearance of Childhood* with a memorable remark on the human medium: "Children are the living messages that we send to a time we will not see" (p. 1). The same line of inquiry culminates in *Amusing Ourselves to Death* (1985), which is one of the most frequently cited works in the media ecology literature, along with McLuhan's *Understanding Media* (2003a) and Ong's *Orality and Literacy* (1982). In *Amusing Ourselves to Death* Postman argues that our image culture trivializes serious discourse, e.g., news, politics, religion, and education. Each of these three books contains basic summaries of the media ecology perspective (although usually without using the term), under headings such as "the medium is the metaphor" and "media epistemology."

For the remainder of his career, Postman continued to be an outspoken critic of television (e.g., Postman, Nystrom, Strate, & Weingartner, 1987; Postman, 1988; Postman & Powers, 1992), but he also became known as a neo-Luddite after the publication of *Technopoly* in 1992. In this book, Postman distinguishes between three different types of culture, tool-using where technology is limited, technocracy where technology is on the rise but still in competition with other social institutions, and technopoly where technology monopolizes the culture. Although he does not make the connection here, these three cultures roughly correspond to the oral, print, and electronic media environments. Criticizing the uncritical acceptance and worship of technology in contemporary America, Postman argues that we tend to consider only what innovations are supposed to do, and never take into account what they will undo, that is, their negative effects. And noting that the problem that we face today is not scarcity of information but information overload, he suggests that we think about whether the "problem" that a new technology is supposed to solve is really a problem in the first place. If not, he believes that we ought to consider that the innovation, whose full effects will not be known until after it is widely adopted, may in fact be unnecessary. The reason why it is hard to say no to technology is that in a technopoly there are no other values, no competing system of beliefs, no ruling idea to set against the technological imperative. In *The End of Education* (1995), Postman suggests that without such values, beliefs, ideas, myths, or narratives, there is no basis for a public school system. He provides suggestions for new narratives, one being the history of communication, media, and technology. In his final book, *Building a Bridge to the Eighteenth Century* (1999), Postman advocates the retrieval of another narrative and set of values, that of the Enlightenment and print culture. In her book, *Redeeming Modernity*, Joli Jensen (1990) has criticized Postman as being an anti-modernist. It would be more accurate, however, to view him as opposing the postmodern and in favor of the conservation of the modern (Strate, 1994, 2003; see also Gencarelli, 2000).

9. The New York School and Communication Studies

It is possible to refer to a New York School both in the specific terms of Postman and his New York University colleagues and students, and in the more general terms of the New York City area academics and intellectuals who have been influenced by McLuhan. This more general and geographic notion of a New York School might begin with Louis Forsdale at Columbia University's Teachers College during the 1950s. (We could reach even further back to include Susanne Langer and Lewis Mumford, but they are discussed in other sections instead). One of the distinguishing characteristics of the New York School is its strong connection to the field of communication, either by way of adoption, as was the case for Postman, Forsdale, and many others, or by specialization.

Henry Perkinson, a colleague of Neil Postman at New York University, was introduced to media ecology and communication studies through his interactions with Postman. Taking issue with Postman's pessimism about media and technology, Perkinson developed an approach to media history that placed greater emphasis on human agency and defended the notion of human progress. Best known for his work on the history and philosophy of education, Perkinson emphasizes Karl Popper's philosophy of fallibalism, which stresses that we improve our situations through criticism, which leads to the recognition and correction of error. In his three books on communication, Perkinson argues that the introduction of a new medium provides new ways of encoding reality, which in turn

allows us to recognize inadequacies and sources of error that had previously been ignored. By recognizing and addressing these problems, human life improves, progress occurs, and things get better. In *Getting Better: Television and Moral Progress* (1991) Perkinson argues that the introduction of television gave us a dominant medium that encodes the world audiovisually and analogically, and therefore emphasizes relationships. With our new found sensitivity to human relationships, situations that seemed tolerable when encoded in print, such as racial and gender inequalities, stand revealed as morally inadequate, leading to demands for change, protest movements, and ultimately a more moral society. The result is a new postmodern morality characterized by egalitarianism. In *How Things Got Better: Speech, Writing, Printing, and Cultural Change* (1995) Perkinson reviews media history to show how each major innovation in communication led to improvements in the human condition. In *No Safety in Numbers: How the Computer Quantified Everything and Made People Risk-Aversive* (1996), Perkinson's argument changes somewhat. Arguing that the computer encodes the world in numerical terms, he concludes that this has led to the identification of new risks, which people then try to eliminate. Due to the ascendancy of postmodern egalitarian morality, however, Perkinson believes that we unreasonably require the elimination of any risk that is identified, making us a risk-aversive society, a characteristic that extends beyond our concerns for health and safety, influencing politics, economics, and education and scholarship in negative ways.

Paul Levinson, a student of Neil Postman's, is also influenced by Karl Popper's philosophy, and the editor of a festschrift for Popper, *In Pursuit of Truth* (1982). Developing a theory of media evolution that he first presents in *Mind at Large* (1988), Levinson argues that human beings function as technology's environment, selecting out characteristics that most resemble our experience of the world. Based on this view, which he terms "anthropocentric," Levinson champions technological progress and media innovation in two collections of essays, *Electronic Chronicles* (1992) and *Learning Cyberspace* (1995). He continued to substantiate his ideas about media evolution in his study *The Soft Edge: A Natural History and Future of the Information Revolution* (1997). McLuhan is another of Levinon's major influences, and his *Digital McLuhan* (1999) surveys many of McLuhan's major concepts, showing how they apply to the Internet, digital technologies, and the contemporary electronic media environment. While maintaining his positive evaluation of cyberspace technologies, Levinson warns against neglecting other technologies

devoted to the physical world, especially transportation technologies, in *Realspace* (2003). His latest work is a case study of mobile telephony, entitled *Cellphone* (2004).

Gary Gumpert was based in Queens College of the City University of New York for many years, where he was, for a time, a colleague of Charles Weingartner. As a communication scholar, Gumpert has long advocated bridging the gap between interpersonal and mass communication as areas of study. Traditionally, the study of media was exclusively the province of mass communication scholars, while specialists in interpersonal communication limited themselves to researching face-to-face to communication. McLuhan and other media ecology scholars represent a third alternative, as the study of media transcends its specific use for mass communication or interpersonal purposes. Gumpert championed McLuhan's third way, and pioneered the study of mediated interpersonal communication, collaborating with his Queens College colleague Robert Cathcart on three editions of the *Inter/Media* anthology (1979, 1982, 1986), and with Sandra Fish on *Talking to Strangers: Mediated Therapeutic Communication* (1990). James Chesebro, who also taught at Queens College, follows up on the interpersonal media approach in *Computer-Mediated Communication* (Chesebro & Bonsall, 1989) and *Analyzing Media* (Chesebro & Bertelsen, 1996), as does Susan B. Barnes in *Online Connections* (2001) and *Computer-Mediated Communication* (2003).

Gumpert explores the topic further in *Talking Tombstones* (1987), and has gone on to collaborate with his former student and colleague Susan Drucker in the study of communication and social space, with the understanding that media generate a new kind of space while traditional physical places function as media in their own right. Thus, the introduction of the electronic media constitute a shift from physical space to electronic space. They have applied this approach in a series of anthologies covering the study of gender and public space in *Voices in the Street* (Drucker & Gumpert, 1997), communication and immigration in *The Huddled Masses* (Gumpert & Drucker, 1998), the regulation of cyberspace in *Real Law @ Virtual Space* (Drucker & Gumpert, 1999), and communication and baseball in *Take Me Out to the Ballgame* (2002). The coupling of media ecology and communication and social space can also be found in the two editions of *Communication and Cyberspace: Social Interaction in an Electronic Environment* (Strate, Jacobson, & Gibson, 1996, 2003).

The study of social space was pioneered by the anthropologist Edward T. Hall, who introduces the term

proxemics in *The Hidden Dimension* (1966), referring to the human use of space, from the distance we maintain in interpersonal interaction to our use of furniture, our architecture, and our urban development. He also studies the human use of time in *The Dance of Life* (1983), differentiating between monochronic time in which the preferred mode of activity is doing one thing at a time in sequence (which McLuhan associates with print media and mechanical culture), and polychronic time, which allows for what we today call multitasking (which McLuhan associates with orality and electronics). In paying special attention to space and time, Hall's work parallels that of Innis and Mumford, and his first book, *The Silent Language* (1959) is an important building block in the media ecology intellectual tradition. Here, in addition to considering space and time, he discusses the idea that organisms extend themselves through technology, like Mumford (see below) framing this as an activity found in the animal kingdom rather than exclusive to human beings:

> In order to exploit the environment all organisms adapt their bodies to meet specialized environmental conditions. A few examples: the long neck of the giraffe (adapted to high foliage of trees), the teeth of the saber-toothed tiger, toes of the tree sloth, hoof of the horse, and man's opposable thumb. Occasionally organisms have developed specialized extensions of their bodies to take the place of what the body itself might do and thereby free the body for other things. Among these ingenious natural developments are the web of the spider, cocoons, nests of birds and fish. When man appeared with his specialized body, such extension activities came into their own as a means of exploiting the environment.
>
> Today man had developed extensions for practically everything he used to do with this body. The evolution of weapons begins with the teeth and the fist and ends with the atom bomb. Clothes and houses are extensions of man's biological temperature-control mechanisms. Furniture takes the place of squatting and sitting on the ground. Power tools, glasses, TV, telephones, and books which carry the voice across both time and space are examples of material extensions. Money is a way of extending and storing labor. Our transportation networks now do what we used to do with our feet and backs. In fact, all man-made material things can be treated as extensions of what man once did with his body or some specialized part of his body.
>
> Materials and the rest of culture are intimately entwined. . . . The relationship between materials

and language is particularly close. Not only does each material thing have a name, but language and materials are often handled by man in much the same way. It is impossible to think of culture without language or materials. (pp. 56-57)

Hall's discussion of technology, language and culture moved McLuhan to adopt the notion that media are human extensions for *Understanding Media* (2003a). Hall also states that "culture is communication" (p. 97), which parallel's McLuhan's "the medium is the message" and is echoed by Carey's (1989) "communication as culture." Moreover, Hall examines three types of cultural communication, the formal, the informal, and the technical. Based on the understanding that culture encompasses both verbal and nonverbal communication, he goes on to compare culture to language, setting out a structure of culture that parallels the structure of language. In *Beyond Culture* (1976), Hall returns to the topic of extensions, stating that "all of culture is a complex system of extensions" (p. 40); in other words, all of culture is a complex system of technologies or media. Along the same lines, he argues

> The study of man is a study of his extensions. It is now possible to actually see evolution taking place, an evolution that takes place outside the organism and at a greatly accelerated pace when compared to intrinsic evolution. Man has dominated the earth because his extensions have evolved so fast that there is nothing to stand in their way. The risk, of course, is that by enormously multiplying his power, man is in the position of being able to destroy his own biotope—that part of the environment that contains within it the basic elements for satisfying human needs. Unfortunately, because they do have a life of their own, extensions have a way of taking over. (p. 38)

Hall stresses the role of both environment and context in cultural and intercultural communication in *Beyond Culture* (1976), distinguishing between high context and low context cultures. In high context cultures, less is communicated by the source, more is expected of the receiver in terms of prior knowledge, and it is considered inappropriate to ask questions; such cultures parallel McLuhan's concept of cool media, Ong's orality, and Mumford's organic ideology (see below). In low context cultures, the source tends to spell everything out, the receiver is not expected to know or pick up what is going on, and asking questions is not out of line; such cultures parallel McLuhan's concept of hot media, Ong's literacy, and

Mumford's machine ideology (see below). The role of context in culture and nonverbal communication is also addressed in Ray Birdwhistell's *Kinesics and Context* (1970), and media ecology itself has been characterized as eschewing the popular research method of content analysis in favor of *context* analysis.

Paralleling the notion that culture is communication, members of the Chicago School of sociology introduced the idea that communication is the underlying basis (or medium) of society and our sense of self. This perspective, known as symbolic interaction, can be traced back to George Herbert Mead, whose lecture notes were published posthumously under the title *Mind, Self and Society* (1934). These ideas were elaborated by Hugh Duncan in works such as *Communication and Social Order* (1962), and *Symbols in Society* (1968), and notably by Erving Goffman. In his best known work, *The Presentation of Self in Everyday Life* (1959), Goffman argues that communication is a matter of playing a role, which requires us to project a definition of the situation. The effectiveness of our role-playing, which in turn determines whether other individuals (who are also playing roles) accept our definition of the situation, depends in part on our ability to maintain a barrier between what Goffman terms the front and back regions. The front region is the equivalent of the stage on which the performance occurs, while the back region is the equivalent of the backstage area where performers can rest and act out of character; it is also the equivalent of rehearsal time where performers can work on their performances. When the barrier is not maintained, the performance is undermined if not destroyed. As Joshua Meyrowitz points out in *No Sense of Place* (1985), situations, like social space and cultural contexts, can be viewed as a type of medium. Goffman's work focuses on face-to-face situations in publications such as *Asylums* (1961), *Behavior in Public Places* (1963), *Interaction Ritual* (1967), and *Frame Analysis* (1974), but he also considers traditional forms of mediated communication such as print and broadcasting in his later work, such as *Gender Advertisements* (1979) and *Forms of Talk* (1981).

In addition to being a symbolic interactionist, Goffman is also linked to Hall, Birdwhistel, and other scholars collectively known as the Palo Alto Group, a "school" inspired by Norbert Wiener's (1950, 1961, 1964) cybernetics. The central figure in the Palo Alto Group is Gregory Bateson, whose work cuts across cybernetics, systems theory, ecology, biology, anthropology, psychiatry, communication, and semantics. In his collected essays, entitled *Steps to an Ecology of Mind* (1972), Bateson proposes "a new way of thinking about *ideas* and about those aggregates of ideas which I call 'minds.' This way of thinking I call the 'ecology of mind,' or the ecology of ideas" (p. xv, emphasis in the original). He goes on to explain:

> The questions which this book raises are ecological: How do ideas interact? Is there some sort of natural selection which determines the survival of some ideas and the extinction or death of others? What sort of economics limits the multiplicity of ideas in a given region of the mind? What are the necessary conditions for stability (or survival) of such a system or subsystem. (pp. xv-xvi)

This clearly anticipates Richard Dawkin's concept of the meme, a self-replicating idea, based on an analogy with the gene, introduced in *The Selfish Gene* (1989), and further explored by Douglas Rushkoff in *Media Virus* (1994b), Richard Brodie in *Virus of the Mind* (1996), and Susan Blackmore in *The Meme Machine* (1999). Bateson also anticipates the study of neural networks pioneered by neurobiologist Gerald Edelman and presented in books such as *Neural Darwinism* (1987) and *Bright Air, Brilliant Fire* (1992), which has been the subject of a movement within computer science and artificial intelligence. Bateson's approach is indeed rooted in information theory, as put forth by Wiener's colleagues at the Massachusetts Institute of Technology, Claude Shannon and Warren Weaver in *The Mathematical Theory of Communication* (1949). Bateson (1972) famously defines information as "a difference which makes a difference" (p. 453), which is a good way of describing media ecology's main concern as well, occupying a middle ground between the universalism of modernist theoretical formations and the particularism of many contemporary cultural theorists. Bateson continues to explore the common ground between psychology and biology as systems in the recently reprinted *Mind and Nature: A Necessary Unity* (2002), while his coauthored book *Communication* (Ruesch & Bateson, 1951) remains influential in both the field of communication and the practice of psychotherapy.

Bateson was associated with the Mental Research Institute in Palo Alto, California, founded by Don Jackson in 1959, and whose early staff included Don Weakland, Richard Fisch, and Paul Watzlawick. Watzlawick, alone and in collaboration with others, built upon Bateson's foundation new approaches to therapy (e.g., brief therapy, family therapy), and established a number of key concepts in communication theory. The major work produced by Watzlawick is *Pragmatics of Human Communication* (1967), co-authored by Janet Bavelas (née Beavin), and Don Jackson. It is here that the first axiom of communication, "one cannot not communicate," is put forth. Here too,

the important contrast is drawn between digital and analogic codes of communication, a binary opposition derived from computing that allows for a broad division between means or media of communication: digital would include most forms of language as well as all forms of number, while analogic encompasses most types of nonverbal communication, including pictures and music. Moreover, the authors distinguish between two levels of communication, the content level, on which plain communication occurs, and the relationship level, which involves communication about communication. The distinction between content, which we generally pay attention to, and relationship, which we tend to ignore and therefore becomes an invisible environment, can be understood as another aspect of the distinction between content and medium. In other words, relationships are a type or aspect of media, and different media represent different types of relationships. Experimental psychologist Stanley Milgram's famous obedience to authority experiments illustrate the power of the relationship level. Along with the book *Obedience to Authority* (1974), the Milgram anthology *The Individual in a Social World* (1992) is relevant to the field of media ecology, as is his collaboration with R. Lance Shotland, *Television and Antisocial Behavior* (1973). For Watzlawick, the study of relationships is based on systems theory, and he presents his perspective on systems, which he associates with group theory in mathematics, in *Change* (1974), co-authored by John Weakland and Richard Fisch. Watzlawick also argues for the social construction of reality in *How Real is Real?* (1976), and has returned to many of these same themes in subsequent works, *The Situation is Hopeless, But Not Serious* (1983), *Ultra-Solutions* (1988), and *Münchhausen's Pigtail* (1990).

In *Towards a Science of Media Ecology* (1973), Chistine Nystrom draws a parallel between the development of media ecology on the one hand, and cybernetics and systems theory on the other, as both represent holistic, ecological approaches. Joshua Meyrowitz, who studied under Gumpert, Postman, and Nystrom, uses the concept of information systems to bridge the media ecology of McLuhan and the symbolic interactionism of Goffman in his influential work in theory building, *No Sense of Place* (1985). Meyrowitz explains that media of communication and face-to-face situations in real physical places are both information systems that can be analyzed in terms of patterns of access to information, and barriers that prevent information from being disseminated. Concentrating on the shift from the typographic to the electronic media environment, Meyrowitz argues that whereas print media requires varying degrees of literacy, and therefore impos-

es various barriers to information access, television and other electronic media have broken down the barriers and created a vast shared information environment. This in turn has led to changes in social roles and relationships that were based on particular pattern of access. Thus, while barriers to information about the opposite sex helped differentiate gender roles during the print era, the high degree of access to such information in the electronic age has led to a blurring of the boundaries in a variety of ways. It has also resulted in the paradox of all sorts of minority groups demanding the equal right to be recognized as a minority. Along the same lines, the strong distinction between childhood and adulthood that developed within print culture has been undermined by the electronic media, and the inability to maintain an effective back region has broken down hierarchies and undermined political leadership and authority as we move from typography to television. Meyrowitz introduces the term medium theory here, which can be understood as referring to the theory that the medium is the message. Medium theory is therefore best understood as the adaptation of media ecology to a social scientific framework.

Meyrowitz is not alone in combining symbolic interaction with media ecology. Other sociologists trained in the symbolic interactionist tradition have explored the areas of communication and media, notably Carl Couch in *Constructing Civilizations* (1984), *Social Processes and Relationships* (1989), and *Information Technologies and Social Orders* (1996); David Altheide in *Creating Reality* (1976), *Media Power* (1985), *An Ecology of Communication* (1995), and *Creating Fear* (2002); Robert Snow in *Creating Media Culture* (1983); and Altheide and Snow together in *Media Logic* (1979) and *Media Worlds in the Postjournalism Era* (1991). Mark Poster adapts medium theory to poststructuralism, applying Baudrillard, Derrida, Lyotard, and Foucault to computers and television in *The Mode of Information* (1990), and following up with *The Second Media Age* (1995). Psychologist Kenneth Gergen focuses on the impact of interpersonal media such as the telephone and e-mail in *The Saturated Self* (1991). Following Watzlawick, Gergen argues that we define ourselves through our relationships, and within each relationship we form a distinct role or self. As electronic technologies have led to a sharp rise in the number of interpersonal contacts we make and keep up with, and the frequency of our interactions, the number of roles and selves that we maintain increases as well. This results, Gergen argues, in the postmodern breakdown of the self or decentering of the subject (a development that Poster emphasizes as well).

Systems theory offers another building block for media ecology, one rooted in Norbert Wiener's (1950, 1961, 1964) cybernetics, and established by Ludwig von Bertalanffy in works such as *Robots, Men, and Minds* (1967) and *General System Theory* (1969), and by Ervin Laszlo in a work originally entitled *The Systems View of the World: The Natural Philosophy of the New Developments in the Sciences* (1972); a revised edition is published under the title *The Systems View of the World: A Holistic Vision for our Time* (1996). Jeremy Campbell has produced a popular summary of cybernetics, information theory, and the systems approach that incorporates media ecology's emphasis on communication, entitled *Grammatical Man* (1982). The systems concept of autopoiesis or self-organization was introduced by the Chilean biologists Humberto Maturana and Francisco Varela in *Autopoiesis and Cognition* (1980), and explained for the general reader in *The Tree of Knowledge* (1992). Their view that self-organization involves closure against the system's environment supports Watzlawick's position on the social construction of reality. Maturana and Varela's approach to systems theory provides the basis for the work of the German sociologist, Niklas Luhmann. In studies such as *The Differentiation of Society* (1982), *Ecological Communication* (1989), *Social Systems* (1995), *Art as a Social System* (2000a), and *The Reality of the Mass Media* (2000b), Luhmann puts forth a view of society as a system whose parts are not individuals or institutions, but acts of communication. Drawing on Ong, Havelock, and Eisenstein, Luhmann sees media history as a process that generates increasing amounts of information, which in turn leads to the development of an increasingly more complex society. Complexity, in this instance, refers to the process by which systems generate their own internal subsystems (e.g., legal, political, economic, and educational subsystems), each of which becomes relatively autonomous within the context of the larger system. Emphasizing the role of binary coding in maintaining the boundaries of the subsystems, and the social system as a whole, Luhmann sees the mass media as constructing a simplified and self-referential conception of the environment.

Parallel to the work of Maturana and Varela, the Nobel Prize-winning chemist and physicist, Ilya Prigogine provides the groundwork for the new study of complexity, emphasizing that order emerges out of chaos, at least in systems far from equilibrium, which Prigogine terms dissipative systems. (From a media ecology perspective, chaos would be the medium, and order the message.) Prigogine discusses his theories in works such as *Order Out of Chaos* (1984) and *The End of Certainty* (1997), both of which are collaborations with Isabelle Stengers. The study of complexity has been further elaborated upon by many others, notably the biologist Stuart Kauffman, whose books include *The Origins of Order* (1993), *At Home in the Universe* (1995), and *Investigations* (2000). Kauffman emphasizes evolution as a natural outcome of complex systems. The phenomenon of emergence as a characteristic of complex systems is the subject of a popular book by Steven Johnson entitled *Emergence: The Connected Lives of Ants, Brains, Cities, and Software* (2001); Johnson has also written on computers in *Interface Culture* (1997). Two recent books link complexity with the study of social networks, including Stanley Milgram's famous Small World Theorem: *Sync: The Emerging Science of Spontaneous Order* (2003) is written by mathematician Steven Strogatz, and *Six Degrees: The Science of a Connected Age* (2003) is written by his former student, sociologist Duncan Watts. And Fritjof Capra has produced a synthesis of the concepts of systems, complexity, networks, and ecology in *The Web of Life* (1996) and *The Hidden Connections* (2002), following up on his earlier work on the nonlinear worldview of contemporary physics, *The Tao of Physics* (1975) and *The Turning Point* (1982).

Some of the preliminary work of integrating these ideas into the mainstream of the media ecology intellectual tradition has already been undertaken by physicist Robert Logan in *The Fifth Language* (1997) and *The Sixth Language* (2000), and by Frank Zingrone in *The Media Symplex* (2001). N. Katherine Hayles has also made major contributions in this area with *How We Became Posthuman* (1999) and *Writing Machines* (2002).

10. Mumford, Technics, and Ecological History

Kuhns makes Lewis Mumford the first futurist that he discusses in *The Post-Industrial Prophets* (1971), Carey (1997) identifies Mumford (along with Innis) as a major influence on McLuhan, and Nystrom (1973) goes so far as to single out Mumford's *Technics and Civilization* (1934) as media ecology's "founding work" (p.10). This is despite the fact that Mumford did not foreground communication or media in his writings, although neither did he

ignore them as he addressed topics such as culture, art, architecture, the city, and of course technics or technology. Given the fact that McLuhan and many other media ecology scholars treat the terms "technology" and "technics" as more or less equivalent to "medium" and "media," it is quite possible to refer to Mumford as a media theorist, or medium theorist (Meyrowitz, 1985). Also of no small significance is the fact Mumford had quite a bit to say about ecology and environments, and described his work as "ecological history" according to Donald Miller's (1989, p. 84) biography. This theme runs through the approximately 30 books he published between 1922 and 1982 (see Strate & Lum, 2000).

Whether or not it is considered the founding work, *Technics and Civilization* (1934) has been very influential, having set the stage for subsequent media ecological inquiry. For one, it is a pioneering work in the history of technology. But beyond providing a detailed account of the evolution of technology, Mumford puts forth a theory of history in which different ages or epochs are defined by different technological ecologies or complexes. Rather than the more popular conception that posits a great divide brought on by the Industrial Revolution, Mumford emphasizes the evolution of the machine and machine civilization over the course of "three successive but *over-lapping and interpenetrating phases*" (Mumford, 1934, p. 109; emphasis in the original). Each phase is defined by its characteristic tools, techniques, materials, and sources of energy. The first, which he refers to as the eotechnic phase (about A.D. 1000 to 1750), is described as a water-and-wood complex, during which machine technology did not upset the ecological balance, while allowing for a relatively high degree of creativity, versatility, and autonomy among craftsmen. The second era, which he refers to as the paleotechnic phase (after 1750 and into the 20th century), is described as a coal-and-iron complex, during which industrialization caused major ecological damage, and created the most inhuman of working conditions (Mumford singles out coal mining in this regard). Workers in the factories were transformed into interchangeable human parts of the machine in this most dehumanizing of cultures, and all aspects of life, including art, came to be patterned after the machine. The third epoch, which he refers to as the neotechnic phase (beginning in the 20th century), is described as an electricity-and-alloy complex, and in 1934 Mumford was cautiously optimistic about its potential to restore ecological balance and reverse the effects of the previous phase. He wrote at length about electricity's decentralizing characteristics, about its organic nature and, with it, the possibility that the machine can be made to fol-low the pattern of life, to serve human beings rather than be served by them. Overall, he viewed the history of technology as one in which a mechanical ideology had replaced an organic one, and would hopefully be replaced in turn by a retrieval of or reversal back into organic ideology via electricity.

While Mumford's early optimism dissolved following the Second World War, his initial assessment served as the basis for McLuhan's discussion of electricity and the electronic communications in *Understanding Media* (2003a; see Carey, 1997). Moreover, various other ideas popularized by McLuhan can be found in *Technics and Civilization*, such as the idea that technologies are extensions of the biological, that communication media are extensions of our sense organs and that they can alter our perceptions, that the content of a medium is another medium, that the printing press played a key role in the mechanization of the west (although Mumford argued that it played a secondary role, amplifying the effects of the mechanical clock), and that technology is an invisible environment (see Carey, 1997; Kuhns, 1971). In this book, Mumford anticipates systems theory, introducing the term "technical syncretism" (p.107) which is akin to the concepts of synergy, emergence, or the idea that the whole is greater than the sum of its parts. And he anticipates cybernetics in his discussion of the mechanical clock, a technology that he identifies as mainly being used to control and coordinate human activity. Mumford traces the invention of the clock back to the Benedictine monks of the 12th and 13th centuries, where it was driven in part by the desire to maintain regularity in the routine of the monasteries, to keep track of or signal the canonical hours. Ultimately, it became a means to impose order on human conduct and to regulate human actions within the monastic walls. This invention, Mumford observed, "helped to give human enterprise the regular collective beat and rhythm of the machine; for the clock is not merely a means of keeping track of the hours, but of synchronizing the actions of men" (pp. 13-14). And as it diffused outside of the monastery walls, it became the center of urban life, so that "the regular striking of the bells brought a new regularity into the life of the workman and the merchant. The bells of the clock tower almost defined urban existence. Time-keeping passed into time-serving and time-accounting and time-rationing" (Mumford, 1934, p. 14). Thus Mumford sees the clock as the technology that set the stage for all subsequent mechanization, industrialization, the rise of capitalism, modern science, and the shift to the paleotechnic period.

In *Art and Technics*, a short book based on a Columbia University lecture series and published in 1952, Mumford argues that our tendency to see art and technology as very dif-

ferent, and perhaps opposite areas of activity is both recent and mistaken. Looking back to the original meaning of *tekhne* as relating to both arts and crafts, he in effect suggests that the separation between technics, aesthetics, and semiotics is a false one. Invoking such authorities as George Herbert Mead, Ernst Cassirer, Susanne Langer, and Johann Huizinga, Mumford argues that what makes our species unique is not tools, industry, or labor, but rather language, art, and play. And he acknowledges the close relationship between technology and biology: "Man's technical contrivances have their parallel in organic activities exhibited by other living creatures: bees build hives on engineering principles, the electric eel can produce electric shocks at high voltage, the bat developed its own radar for night flight long before man" (p.17). Mumford's interest in the arts extended to literature, as can be seen in his early works, *The Golden Day: A Study in American Experience and Culture* (1926), and *Herman Melville* (1929). But it was in the study of architecture in particular that he gained distinction, writing for *The New Yorker* magazine for over 30 years as their architectural critic, and publishing books such as *Sticks and Stones: A Study of American Architecture and Civilization* (1924), *The Brown Decades: A Study of the Arts in America, 1865-1895* (1931), *The South in Architecture* (1941), and *From the Ground Up* (1956a). Architecture exemplifies the wedding of art and technology, and by extension so does the city, a point that Mumford made early on in *The Culture of Cities* (1938), and in subsequent works such as *City Development* (1945), *The City in History* (1961), and *The Urban Prospect* (1968). In fact, Mumford was a pioneer of urban studies as well as technology studies and media ecology.

In *The City in History* (1961), Mumford argues that in studying technology we tend to focus on tools, weapons, and the like, overlooking the container as technology. For Mumford, this reflects a gender bias, as he suggests that tools and weapons are phallic extensions while containers are extensions of the feminine:

in woman the soft internal organs are the center of her life: her arms and legs serve less significantly for movement than for holding and enclosing, whether it be a lover or a child; and it is in the orifices and sacs, in mouth, vulva, vagina, breast, womb, that her sexually individualized activities take place.

Under woman's dominance, the neolithic period is pre-eminently one of containers: it is an age of stone and pottery utensils, of vases, jars, vats, cisterns, bins, barns, granaries, houses, not least great collective containers like irrigation ditches and villages. The uniqueness and significance of this contribution has too often been

overlooked by modern scholars who gauge all technical advances in terms of the machine. (pp.15-16)

Thus, the agricultural revolution is also a revolution in container technology, one that leads to further advancements in human dwellings and settlements, and ultimately to the city. Mumford (1961) refers to the city as the "maternal enclosure" (p.15), and "a container of containers" (p. 16). Urban enclosure and centralization made possible forms of control and coordination inconceivable in tribal cultures, leading to what Mumford argues is the original machine:

The many diverse elements of the community hitherto scattered over a great valley system and occasionally into regions far beyond, were mobilized and packed together under pressure, behind the massive walls of the city. Even the gigantic forces of nature were brought under conscious human direction: tens of thousands of men moved into action as one machine under centralized command, building irrigation ditches, canals, urban mounds, ziggurats, temples, palaces, pyramids, on a scale hitherto inconceivable. As an immediate outcome of the new power mythology, the machine itself had been invented: long invisible to archaeologists because the substance of which it was composed—human bodies—had been dismantled and decomposed. The city was the container that brought about this implosion, and through its very form held together the new forces, intensified their internal reactions, and raised the whole level of achievement. (p. 34)

Thus, Mumford argues that the first machines were organic, consisting of the centralized organization and coordination of human labor; only later would their fallible and fragile human parts be replaced by more reliable artificial ones. This is a theme that Mumford would expand on in *The Myth of the Machine* (1967, 1970).

In many ways, Mumford's two-volume history of technology and culture, *The Myth of the Machine: I. Technics and Human Development* (1967), and *The Myth of the Machine: II. The Pentagon of Power* (1970) is his magnum opus, although some find it overly polemical in its critique of technology (and its criticism of McLuhan). Here we find Mumford elaborating on his arguments about containers as technology, and the biological roots of technical activity:

In any adequate definition of technics, it should be plain that many insects, birds, and mammals had made far more radical innovations in the fabrica-

tion of containers, with their intricate nests and bowers, their geometric bee hives, their urbanoid anthills and termitaries, their beaver lodges, than man's ancestors had achieved in the making of tools until the emergence of *Homo sapiens*. In short, if technical proficiency alone were sufficient to identify and foster intelligence, man was for long a laggard, compared with many other species. The consequences of this perception should be plain: namely, that there was nothing uniquely human in tool-making until it was modified by linguistic symbols, esthetic designs, and socially transmitted knowledge. At that point, the human brain, not just the hand, was what made a profound difference; and that brain could not possibly have been just a hand-made product, since it was already well developed in four-footed creatures like rats, which have no free-fingered hands. (p.5)

In *The Myth of the Machine* (1967, 1970) Mumford also uses the term megamachine to refer to the invisible machine based on the control and coordination of human activity in the ancient world, under the direction of an autocratic ruler such as a pharoah, and achieved through the use of communication technology:

> If one single invention was necessary to make this larger mechanism operative for constructive tasks as well as for coercion, it was probably the invention of writing. This method of translating speech into graphic record not merely made it possible to transmit impulses and messages throughout the system, but to fix accountability when written orders were not carried out. Accountability and the written word both went along historically with the control of large numbers; and it is no accident that the earliest uses of writing were not to convey ideas, religious or otherwise, but to keep temple records of grain, cattle, pottery, fabricated goods, stored and disbursed. (Mumford, 1967, p. 192)

In the second volume of *The Myth of the Machine, The Pentagon of Power* (1970), Mumford argues that modern megamachines have emerged in the 20th century, first in totalitarian societies such as the Soviet Union and Nazi Germany, but also in the United States due to the coupling of the military-industrial complex with communications technology. To counter this, Mumford (1970) continued to call for a return to the organic: "If we are to prevent megatechnics from further controlling and deforming every aspect of human culture, we shall be able to do so only with the aid of a radically different model derived directly . . . from living organisms and living complexes (ecosystems)" (p. 395). Mumford was a social critic and activist who opposed nuclear weapons (see, for example, *In the Name of Sanity,* 1954) and uncontrolled urban expansion and highway construction (see, for example, *The Highway and the City*, 1963). And, much like Ong, Postman, and other media ecology scholars, he was a devoted humanist and personalist (see, for example, *The Condition of Man*, 1944, and *The Transformations of Man*, 1956b).

Mumford credited Patrick Geddes with being his major intellectual influence (Carey, 1997; Miller, 1989; Novak, 1995). A Scottish biologist, Geddes's work ranged from botany, ecology, and paleontology to sociology, demographics, economics, anthropology, religious studies, and urban studies; his publications include *City Development* (1904) and *Cities in Evolution* (1915). For Mumford, the power of Geddes's ideas stemmed from his biological, evolutionary, and ecological perspective:

> Trained as a biologist in the laboratory of Thomas Huxley, Geddes became interested in relationships existing throughout the natural environment— plant, animal, and human. Geddes' notion of a "human ecology" was important in shaping both Mumford's method of historical analysis and the scope of his interests. In fact, Mumford claims that Geddes went further than any other philosopher "in laying the ground for a systematic ecology of human culture." (Novak, 1995, p. 25)

Geddes's human ecology was picked up by members of the Chicago School of sociology, notably Robert E. Park, Earnest W. Burgess, and Roderick D. McKenzie, and he also had a major influence on the work of Harold Innis (Carey, 1989). Geddes's also engaged in technological history (he introduced the terms "paleotechnic" and "neotechnic" which Mumford adapted for his own history of technics), and he was one of the first to argue for the revolutionary potential of electric technology (Carey, 1989). The economist Thorstein Veblen was another scholar who influenced both Mumford (Miller, 1989) and Innis (Stamps, 1995). Veblen went beyond economics to draw on linguistics, folklore, history, philosophy, anthropology, and sociology in *The Theory of the Leisure Class* (1899) and lesser known works such as *The Engineers and the Price System* (1921). Veblen combined technology studies with a search for socialist alternatives to Marxism, but Karl Marx too can be seen as putting forth some of the first theories about technological development and history in the 19th century, in *The German Ideology* (Marx & Engels, 1972) and *Capital: A Critique of Political Economy* (1967), for example.

Whatever the contributions of Marx, Veblen, and Geddes to the development of the media ecology intellectu-

al tradition, Mumford's importance is clear; as noted above, he influenced McLuhan's thought in significant ways (e.g., 2002, 2003a), and the same is true for Innis (1950, 1972) and Postman (e.g., 1979, 1982, 1985, 1992). Mumford's influence also can be seen in the works of Siegfried Giedion (another one of Kuhn's post-industrial prophets), in books such as *Space, Time and Architecture* (1947) and *Mechanization Takes Command: A Contribution to Anonymous History* (1948). Similarly, there is Lynn White, Jr.'s historical study of technics, *Medieval Technology and Social Change* (1962) and *Medieval Religion and Technology* (1978). Mumford's ecological approach to technology is also reflected in the historical studies produced by the late Librarian of Congress Emeritus Daniel Boorstin, such as *The Republic of Technology* (1978b), and his trilogy, *The Discoverers* (1983), *The Creators* (1992), and *The Seekers* (1998). Jay David Bolter's *Turing's Man* (1984)

picks up on Mumford's historical approach in its argument that each era has a particular "defining technology," and Bolter extends Mumford's analysis by discussing the clock as a technological ancestor of the computer. David Landes' book, *Revolution in Time: Clocks and the Making of the Modern World* (2000) expands on Mumford's analysis of the clock. William Mitchell addresses the familiar Mumfordian themes of technology and the city in his trilogy, *City of Bits* (1995), *e-topia* (1999), and *Me++: The Cyborg Self and the Networked City* (2003); he also discusses art and visual communication in *The Reconfigured Eye: Visual Truth in the Post-Photographic Era* (1992). And Scott Eastham combines Mumford and McLuhan, along with Buckminster Fuller, in *The Media Matrix* (1990), emphasizing the concept of container technology; recently he has also come out with a critical analysis of genetic engineering entitled *The Biotech Time-Bomb* (2003).

11. Ellul and Technology Studies

The most radical of Kuhns's (1971) post-industrial prophets is the French social critic Jacques Ellul. Ellul rarely addresses the effects of individual technologies, instead focusing on technology at the highest level of abstraction, as a system, worldview, and way of life; the term he uses in this context is *la technique*. In what many consider his major work, *The Technological Society* (1964), Ellul argues that we have entered a historical phase in which we have given up control over human affairs to technology and the technological imperative. According to Ellul, technology has become autonomous and automatic, self-augmenting or expanding at an ever increasing rate, and encompassing every sector of human society. It dominates the natural world and has replaced religion and even science as our governing ideology. Except that technology is not really an ideology, he argues, in that it represents no set of ideas or values other that itself. Efficiency is the only thing that matters in a technological system, so all other considerations are subordinated to efficiency, if not eliminated outright. Ellul continues his argument in *The Technological System* (1980), where he refers to technology as an environment and ecology, and like Mumford (1970) is critical of McLuhan's stance on technology. And he returns to it once again in *The Technological Bluff* (1990), where he critiques computers and technological networks.

Apart from his three major technology books, Ellul also followed up *The Technological Society* with *Propaganda: The Formation of Men's Attitudes* (1965), focusing on propaganda as a particular type of technology

or technique, one whose aim is to control human behavior so that we are integrated into the technological system. Here he discusses different categories of propaganda, including the propaganda of integration (which aims at keeping the individual satisfied with the status quo) and agitation (whose purpose is to move the individual to action); sociological propaganda (a subtle form that works through entertainment, advertising, schools, the arts, religion, etc.) and political propaganda (the most obvious type of propaganda); and horizontal propaganda (through peer groups) and vertical propaganda (coming from authorities). Ellul notes that literacy and mass communications technologies are vital for propaganda, for without a means of delivering the messages, there is no way for propaganda techniques to influence populations. This line of inquiry continues into *The Political Illusion* (1967), where Ellul discusses the need to maintain the illusion that public opinion controls political decision making in order to maintain legitmacy. He argues that this illusion is used to counter the reality that government decisions need to be based on the technical criterion of efficiency, which in turn requires the use of propaganda techniques to direct public opinion to support those decisions and maintain the illusion of popular support and sovereignty.

In *The Humiliation of the Word* (1985), Ellul argues that our audiovisual technologies and the image culture they have given rise to also contribute to the technological society and the degradation of the human condition by undermining the role of verbal communication. Much like

Postman, Ellul defends the word against the image, and criticizes the loss of rational discourse. But Ellul also combines sociology here with theology, as he works from a Christian perspective as a member of the French Reformed Church. Ellul has published numerous works on theology and ethics in addition to being a religious activist. Among the most significant theological works translated into English are *The Presence of the Kingdom* (1951), *The Meaning of the City* (1970), *The Ethics of Freedom* (1976), and *Anarchy and Christianity* (1991). Moreover, several interview books have been published where Ellul explains his sociological and religious perspectives, *Perspectives on Our Age* (1981), *In Season, Out of Season: An Introduction to the Thought of Jacques Ellul* (1982), and the posthumously published *Jacques Ellul on Religion, Technology, and Politics* (1998). Also posthumously published is a collection of articles entitled *Sources and Trajectories: Eight Early Articles by Jacques Ellul that Set the Stage* (1997). Clifford Christians, who is associated with James Carey and American cultural studies, has written about Jacques Ellul from a communication perspective in *Jacques Ellul and Democracy's "Vital Information" Premise* (1976) and is co-editor of, *Jacques Ellul: Interpretive Essays* (Christians & Van Hook, 1981).

Along with Mumford, Giedion, Ellul, Innis, and McLuhan, Kuhns (1971) also includes two other post-industrial prophets, Buckminster Fuller and Norbert Wiener. Fuller was an inventor and architect as well as a scholar and critic, and unlike Mumford was generally a proponent of technology. He coined terms such as "synergy," which refers to the systems theory concept that the whole is greater than the sum of its parts, and "tensegrity," a contraction of tension and integrity. Tensegrity represents the combination of push and pull forces that serve as an alternative to typical methods of construction, and Fuller's geodesic dome is an example of tensegrity at work. These concepts are discussed in *Synergetics: The Geometry of Thinking* (Fuller & Applewhite, 1975). Fuller also coined the term "spaceship earth," often used as a synonym for McLuhan's "global village," and devoted a book to the topic, *Operating Manual for Spaceship Earth* (1971). And following McLuhan, Fuller joined with Jerome Agel and Quentin Fiore to produce a book along the lines of *The Medium is the Massage*, entitled *I Seem to Be a Verb* (Fuller, Agel, & Fiore, 1970).

Wiener, who coined the term cybernetics as the science of control, finds common ground between electronic technology and biology in that both can be viewed as information systems based on feedback loops. He has written about cybernetics in a more technical volume entitled *Cybernetics: Or Control and Communication in the Machine and Animal* (1961), and a more popular variation, *The Human Use of Human Beings: Cybernetics and Society* (1950); he also takes up the subject of science and religion in *God and Golem, Inc.: A Comment on Certain Points Where Cybernetics Impinges on Religion* (1964). Wiener and his fellow pioneers in information theory, Claude Shannon and Warren Weaver (1949), form the basis of James Beniger's history of 19th and early 20th century technology and techniques, *The Control Revolution* (1986). Beniger argues that the increasing complexity of industrialization led to the development of numerous information technologies to control and coordinate human and machine activity, long before the current information age began. N. Katherine Hayles has also drawn on information theory to examine *How We Became Posthuman* (1999), as well as how writing has been transformed in *Writing Machines* (2002), another book patterned after *The Medium is the Massage*.

Along with Mumford and Ellul, Peter F. Drucker is one of the most prolific media ecology scholars, whose work ranges across philosophy, political science, economics, sociology, and management, the latter a field he invented. Although Kuhns (1971) does not include him in his survey, Drucker is most certainly a futurist and post-industrial prophet. For example, he was one of the first to identify the fact that assembly line production was being obsolesced by electronic technologies, in works such as *The Future of Industrial Man* (1942), and *Landmarks of Tomorrow* (1959). He continued to discuss the impact of new technologies and identify effects such as the creation of knowledge industries and knowledge workers in *The Age of Discontinuity* (1968), and later in *The New Realities* (1989) and *Post-Capitalist Society* (1993). Drucker considers the impact of technology on business in *Technology, Management & Society* (1970), but looks at the corporation as essentially a technology in its own right in *The Concept of the Corporation* (1946). He refers to his approach as social ecology in *The Ecological Vision* (2000), a collection of essays on technology, business, economics, government, and culture. And Drucker discusses his relationship to McLuhan in *Adventures of a Bystander* (1979), a semi-autobiographical work.

Ivan Illich represents one of the more critical voices in technology studies in works such as *Tools for Conviviality* (1973) and *H2O and the Waters of Forgetfulness: Reflections on the Historicity of "Stuff"* (1985). Like Postman and Weingartner, Illich was part of the educational reform movement of the '60s and '70s, through works such as *Deschooling Society* (1971), and he

also took a leadership position in the environmentalist movement with *Energy and Equity* (1974). His radical critique extended to medical establishment, i.e., *Medical Nemesis* (1975), and professional specialization in general, i.e., *Disabling Professions* (1977). And he has collaborated with Barry Sanders to provide a sustained critique of the alphabet, the basis of schooling, in *ABC: The Alphabetization of the Popular Mind* (Illich & Sanders, 1989); in a subsequent work, *A is for Ox: Violence, Electronic Media, and the Silencing of the Written Word*, Sanders (1994) has advocated a balance between orality and literacy in response to the electronic media. Like Drucker and Illich, Jeremy Rifkin also combines technological criticism with economic analysis in works such as *Time Wars* (1987), *Beyond Beef* (1992), *The End of Work* (1995), *The Biotech Century* (1998), *The Age of Access* (2000), and *The Hydrogen Economy* (2002). Jerry Mander's *Four Arguments for the Elimination of Television* (1978) offers a polemical critique specifically directed at televison as a medium, and a more general one aimed at modern technology in *In the Absence of the Sacred: The Failure of Technology and the Survival of the Indian Nations* (1991). Also, postmodernist Jean-Francois Lyotard has written about the impact of technology, specifically in undermining common culture in *The Postmodern Condition* (1984), and more generally in *The Inhuman* (1991). Edward Tenner provides a more measured approach in surveying the unanticipated and negative effects of innovations in *Why Things Bite Back* (1996), and the sequel, *Our Own Devices* (2003).

Political scientist Langdon Winner follows Ellul's lead in arguing that technological innovation is not neutral, but rather constitutes an invisible form of political decision-making, in *Autonomous Technology* (1977), *The Whale and the Reactor* (1986), and *Democracy in a Technological Society* (1992). Similarly, Donald Wood, in *Post-Intellectualism and the Decline of Democracy* (1996) and *The Unraveling of the West* (2003) has built on Postman's concept of technopoly, arguing that we have moved into a postmodern period characterized by technological determinism and what Wood terms post-intellectualism. This in turn has threatened and undermined democracy in the U.S. and western civilization in general. Educational policy likewise has surrendered to the technological imperative, despite a record of broken promises about revolutionizing pedagogy, as Margaret Cassidy reveals in her historical study, *Bookends: The Changing Media Environment of American Classrooms* (2004), based on a dissertation completed under Postman. Likewise, Paul Thaler argues that television technology

has altered the dynamics of the legal system and undermined our system of justice in *The Watchful Eye* (1994), based on research conducted under Postman, and his study of the O. J. Simpson trial, *The Spectacle* (1997). Cheryl Pawlowski, another of Postman's former students, critiques the impact of television on the family in *Glued to the Tube* (2000). Arthur Hunt III extends Postman's arguments about visual technology from the perspective of a conservative evangelical Christian in *The Vanishing Word* (2003). Critiques similar to Postman's have also been produced by Neil Gabler, *Life the Movie* (1998), and Mitchell Stephens, *The Rise of the Image, The Fall of the Word* (1998). Katherine Fry discusses the mythic frame that broadcast journalists use to interpret natural disaster reporting in *Constructing the Heartland: Television News and Natural Disaster* (2003). Jack Lule discusses this same tendency as it applies to news in general in *Daily News, Eternal Stories: The Mythological Role of Journalism* (2001). To counter the negative effects of electronic and audiovisual media on the journalism profession, Jay Rosen advocates an activist, public journalism in *What are Journalists For?* (1999), in an argument that parallels his mentor, Neil Postman's proposals for schooling in *Teaching as a Conserving Activity* (1979).

The computer has been the focus of a number of technological critiques, from Joseph Weisenbaum's early warning, *Computer Power and Human Reason* (1976), to Theodore Roszak's neo-Luddite treatise, *The Cult of Information* (1994). Stephen Talbott's *The Future Does Not Compute* (1995) warns against the computer's capacity for abstraction from reality, a trend that he traces back to Renaissance art in an argument reminiscent of Ong's and McLuhan's discussions of visualism. Drawing on Postman, Mark Slouka also warns about the divorce from reality brought on by the computer and the Internet in his *War of the Worlds* (1996). Technorealist David Shenk uses an ecological metaphor to talk about information overload in *Data Smog* (1997), which was followed up by *The End of Patience* (1999). Alternately, some media ecology scholars have studied how people interact with technology, such as Sherry Turkle in *The Second Self* (1984) and *Life on the Screen* (1995), and Susan B. Barnes in *Online Connections* (2001) and *Computer-Mediated Communication* (2003). Likewise, Casey Man Kong Lum provides an ethnography of how groups interact with karaoke technology in *In Search of a Voice* (1996), in which he uses media ecology theory to interpret his data.

Many of the issues regarding the interaction between individuals and technologies are examined by Don Ihde, who engages in the philosophy of technology from a phe-

nomenological approach in works such as *Technics and Praxis* (1979), *Existential Technics* (1983), *Technology and the Lifeworld* (1990), *Instrumental Realism* (1991), and *Bodies in Technology* (2002). Ihde also shares Ong's and McLuhan's emphasis on sense perception, as can be seen in *Sense and Significance* (1973), *Listening and Voice* (1976), and *Expanding Hermeneutics: Visualism in Science* (1998). Ihde's approach is based, in part, on the philosophy of Martin Heidegger, who addresses the topic directly in *The Question Concerning Technology* (1973). Carl Mitcham is another contemporary scholar specializing in the philosophy of technology, whose *Thinking Through Technology* (1994) examines in detail various conceptions of technology and its effects. Also, David Rothenberg in *Hand's End* (1993) mixes philosophy with ecology in pondering the relationship between technology and nature.

Popular writer Howard Rheingold has explored the effects of technology, and especially the computer, in a series of books, *Tools for Thought* (1985), which explores the personal computer revolution, *Virtual Reality* (1991), which focuses on computer-generated media environments, and *The Virtual Community* (1993), which surveys the use of online communications to establish a sense of community within the internet environment. His most recent work, *Smart Mobs* (2003), looks at personal communications technology, such as the cell phone, as devices for the coordination of group activities, such as protests. Similarly, former *Wired* magazine editor Kevin Kelly looks at the computer and related technology's growing autonomy in *Out of Control: The Rise of Neo-Biological Civilization* (1994). Rand Institute analysts John Arquila and David Ronfeldt have also contributed to the scholarhsip on networks, with an emphasis on their role in war, terrorism, crime, and politics, in a series of books, including *The Advent of Netwar* (1996), *In Athena's Camp* (1997), *The Emergence of Noopolitik* (1999), *Swarming and the Future of Conflict* (2000), and *Networks and Netwars* (2001), as well as Ronfeldt's case study, *The Zapatista "Social Netwar" in Mexico* (1998). And Douglas Rushkoff has produced a series of highly original works in media ecology, including *Cyberia* (1994a), an exploration of cyberculture; *Media Virus* (1994b), a discussion of how media spread ideas using the biological metaphor of the virus or meme; and *Playing the Future* (1996), an examination of youth culture in the digital age. While these three studies take an optimistic view of new media, in *Coericion* (1999) Rushkoff warns against the use of longstanding persuasive techniques coupled with information technologies employed to manipulate consumers and citizens. Rushkoff champions the notion of open source technology, both as a technology and an approach to religion in *Nothing Sacred* (2003a), his proposal for reform Judaism, and to politics in *Open Source Democracy* (2003b).

12. Formal Roots

It is possible to trace the roots of the media ecology intellectual tradition back to antiquity, and thereby to begin at the beginning after a fashion, with the Book of Genesis: "In the beginning God created the heaven and the earth. Now the earth was unformed and void, and darkness was upon the face of the deep; and the Spirit of God hovered over the face of the waters. And God said: 'Let there be light.' And there was light" (1:1-3). In this way, the first form or medium to be introduced into the unformed world is God's speech act, which precedes and announces the second form, light. Language is presented as the original and ideal form, which is reflected in turn in the New Testament's Gospel of John: "In the beginning was the Word, and the Word was with God, and the Word was God" (1:1). And sound takes precedence over light, just as orality precedes literacy. That the ear is given precedence over the eye is consistent with the criticism of the image in favor of (and accomplished through) the word that recurs throughout the Jewish *Holy Scriptures*. For example, the 115th Psalm of David (2-8) reads:

> Wherefore should the nations say:
> 'Where is now their God?'
> But our God is in the heavens;
> Whatsoever pleased Him He hath done.
> Their idols are silver and gold,
> The work of men's hands.
> They have mouths, but they speak not;
> Eyes they have, but they hear not;
> Noses have they, but they smell not;
> They have hands, but they handle not;
> Feet have they, but they walk not;
> Neither speak they through their throat.
> They that make them shall be like unto them;
> Yea, every one that trusteth in them.

And the Second Commandment of Moses states: "Thou shalt have no other gods before Me. Thou shalt

not make unto thee a graven image, nor any manner of likeness, of any thing that is in heaven above, or that is in the earth beneath, or that is in the water under the earth" (Exodus 20:3-5). This general iconoclasm is strongly linked to a critique of technology, "the work of men's hands," a theme that also appears, for example, in the story of the Tower of Babel and the description of Egyptian bondage in Exodus.

What is probably the first secular discussion in the media ecology intellectual tradition appears in Plato's *Phaedrus* (1973), where Socrates presents a brief criticism of technological innovation through the parable of the Egyptian God Theuth and the Pharoah Thamus. In this dialogue, Socrates also provides a concise critique of writing (which is compared unfavorably to speech and memory), and a sustained critique of rhetoric (which is the product of writing). Similar commentary also appears in Plato's *Seventh Letter* (see Plato, 1973), where he suggests that the motives for writing as opposed to speaking have much to do with the desire for honor and renown, what we would today refer to as publicity, rather than knowledge and understanding.

Aristotle too adds a building block with his *Rhetoric* (1954), where he defines rhetoric as "the faculty of observing in any given case the available *means* of persuasion" (p. 24, emphasis added), insofar that *means* is synonymous with *medium*, and rhetoric refers to the study of a category of technique. Artistotle's *Physics* (1969) is also of importance, as it discusses the four types of causes: efficient cause (which we think of as the only real type of cause, as in the cause-and-effect of modern scientific thought), material cause (the material basis that is at the root of economics-trained theorists such as Marx and Innis), formal cause (based on pattern or "blueprint," which is very much in line with McLuhan's thinking, especially in *Laws of Media*), and final cause (the oak as the final cause of the acorn, a biological approach that Campbell, 1982, associates with a systems view).

Media ecology also has roots in literature, which should come as no surprise given that McLuhan, Ong, and Postman all were English professors originally. It follows that they and others have found media ecological insights in modern fiction, from Shakespeare and Cervantes to Mary Shelley, Samuel Butler, Edward Bellamy, George Orwell, and Aldous Huxley (see, for example, McLuhan, 1964; McLuhan & Watson, 1970; Ong, 1986, 2002a; Postman, 1970, 1985). In particular, media ecology scholars such as Marshall McLuhan (1969; McLuhan & Fiore, 1968), Eric McLuhan (1997), and Donald Theall (1995, 1997) have cited and studied James Joyce, with particular attention given to the word play in *Finnegans Wake*. Along

with literature, literary criticism constitutes a portion of the field's roots, with the New Criticism of I. A. Richards of particular influence on McLuhan, Ong, and Postman. Richards collaborated with Charles Ogden, the inventor of Basic English (a version of the language stripped down to 850 words in order to facilitate international communication) on *The Meaning of Meaning* (Ogden & Richards, 1923), where they discuss the structure and function of language and symbolic communication. Symbols, they argue, may reflect some aspect of reality, but they may also refract what is real due to the inherent bias of the symbolic form or medium involved:

> We have spoken . . . of reflection and refraction by the linguistic medium. These metaphors if carefully considered will not mislead. But language, though often spoken of as a medium of communication, is best regarded as an instrument; and all instruments are extensions, or refinements, of our sense organs. The telescope, the telephone, the microscope, the microphone, and the galvanometer are, like the monocle or the eye itself, capable of distorting, that is, of introducing new relevant members into the contexts of our signs. And as receptive instruments extend our organs, so do manipulative instruments extend the scope of our motor activities. When we cannot actually point to the bears we have dispatched we tell our friends about them or draw them; or if a slightly better instrument than language is at our command we produce a photograph. The same analogy holds for the emotive uses of language: words can be used as bludgeons or bodkins. But in photography it is not uncommon for effects due to the processes of manipulation to be mistaken by amateurs for features of the objects depicted. Some of these effects have been exploited by experts so as greatly to exercise the late Sir Arthur Conan Doyle and his friends. In a similar fashion language is full of elements with no representative or symbolic function, due solely to its manipulation; these are similarly misrepresented or exploited by metaphysicians and their friends so as greatly to exercise one another— and such of the laity as are prepared to listen to them. (p. 98)

In referring to language as an instrument, Ogden and Richards are categorizing "the linguistic medium" as a technology. Their early reference to media as extensions of the senses no doubt had an effect on Richards's student, McLuhan. In this book with Ogden, and on his own in works such as *Practical Criticism* (1929), and *The Philosophy of Rhetoric* (1936), Richards stresses the value of rhetorical criticism and metaphor analysis, the role of the

reader or audience in interpreting messages, and the centrality of context in determining the meaning of content.

Through the literary criticism of I. A. Richards, we can trace the roots of media ecology back to the pragmatism and semiotics of Charles Saunders Peirce (1991). Peirce's emphasis is on the pragmatics of communication, and specifically on how meaning is made. In his semiotics, he identifies three different types of signs, i. e., index, icon, and symbol, and with them the concomitant notion that different signifiers are associated with different signifieds. This prepares the way for McLuhan's focus on different types of media, and the idea that each medium has its own bias or message, as Aquiles Esté explains in *Cultura Replicante* (1997). Along the same lines, Paul Ryan presents an applied synthesis of Peirce and McLuhan in *Video Mind, Earth Mind* (1993). Also influential are the studies of symbolism, language, and logic carried out by Alfred North Whitehead and Bertrand Russell, notably in their three volume *Principia Mathematica* (1925-1927). Of particular relevance for both symbol systems and general systems is the theory of logical types, which distinguishes between different levels, i.e., the members of a group and the group itself—these two levels correspond to the content and relationship level of communication discussed by Watzlawick et al. (1967), and to the levels of content and medium or environment. Ludwig Wittgenstein extended Whitehead and Russell's line of inquiry with his *Tractatus Logico-Philosophicus* (1961), and his famous observation, "whereof one cannot speak, thereof one must be silent" (p. 189), is very much a statement about the ways in which a medium defines and delimits its messages. Wittgenstein's struggle with understanding the medium of language is reflected in this early work, and in his *Philosophical Investigations* (1963) where he comes to view language as a game, thereby emphasizing medium over meaning. Douglas Hofstadter returns to the theory of logical types in *Gödel, Escher, Bach* (1979), using the term recursion to refer to self-reference, a concept now commonplace in computer programming.

Certainly in line with Peirce's pragmatism is the practical, and often prescriptive system of general semantics, founded by Alfred Korzybski; his magnum opus, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics*, was originally published in 1933, with a fifth edition in print as of 1993. General semantics was popularized by S. I. Hayakawa's *Language in Thought and Action*, originally published as *Language in Action* in 1939; a fifth edition co-authored by his son, Alan Hayakawa was published in 1990. Among the numerous other works explaining and elaborating on Korzybski's system are economist Stuart Chase's *The Tyranny of Words* (1938) and speech pathologist Wendell Johnson's *People in Quandries* (1946). Following Whitehead and Russell, Korzybski is concerned with the relationship between language and the reality it is believed to represent, and argues that there are sources of error inherent in language itself, especially as expressed through Aristotelian logic. Bertalanffy's (1969) general system theory took its name from general semantics, whose departure from Aristotle's linear logic anticipates the nonlinearity of systems and the phenomenon of emergence. Postman incorporated general semantics into his media ecology approach, as he wrote about symbolic ecology, the semantic environment, and language as a medium.

Along with general semantics, the philosophy of Susanne Langer was of great importance to Postman and the New York school of media ecology. Langer represents a key transitional figure, as she broadens the definition of symbol to include art, music, ritual, and even sense perception in her key work, *Philosophy in a New Key* (1957):

> The abstractions made by the ear and the eye—the forms of direct perception—are our most primitive instruments of intelligence. They are genuine symbolic materials, media of understanding, by whose office we apprehend a world of *things*, and of events that are the histories of things. (p. 92; emphasis in the original)

This basic type of symbolism she terms presentational, as opposed to what she calls discursive symbols, a category that includes language and mathematics, and is associated with rationality, the ability to form statements that are propositional (can be evaluated empirically), and broken down into discrete units (e.g., words, numbers). Each type of symbol or medium has its own bias, so that while discursive symbols are well suited for producing logical statements, "language is a very poor medium for expressing our emotional nature" (p. 100). Presentational symbols, on the other hand, cannot be used to form propositions that can be proven true or false, cannot be broken down into distinct units, but are well suited to understanding and conveying feeling and emotion. Presentational and digital symbols correspond to Watlawick et al.'s (1967) analogic and digital codes, but Langer goes beyond this polarity to argue that

> there may well be many special regions, to one or another of which the medium of one art is more suited that that of another for its articulate expression. It may well be, for instance, that our physical orientation in the world—our intuitive awareness of mass and motion, restraint and autonomy, and all characteristic feeling that goes with it—is the

preëminent subject matter of the dance, or of sculpture, rather than (say) of poetry; or that erotic emotions are more readily formulated in musical terms. I do not know, but the possibility makes me hesitate to say categorically, as many philosophers and critics have said, that the import of all the arts is the same, and only the medium depends on the peculiar psychological or sensory make-up of the artist, so that one man may fashion in clay what another renders in harmonies or in colors, etc. The medium in which we naturally conceive our ideas may restrict them not only to certain forms but to certain fields, howbeit they all lie within the verbally inaccessible field of vital experience and qualitative thought. (p. 258)

In this tentative and roundabout fashion, Langer is essentially saying that the medium is the message. She more fully and definitively explores the particular meaning of different forms or media in the sequel to *Philosophy in a New Key*, *Feeling and Form* (1953), and in her three volume *Mind: An Essay on Human Feeling* (1967, 1972, 1982). Alexander Durig produces an interesting application of Langer and Peirce's thought in *Autism and the Crisis of Meaning* (1996). Howard Gardner's theory of multiple intelligences, as discussed in works such as *Frames of Mind* (1983) and *Multiple Intelligences* (1993) is also related back to the distinctions Langer and Pierce make among different symbol systems or codes.

Naturally enough, some of the foundational work on the medium of language comes from linguistics as well as philosophy. In particular it was Edward Sapir and Benjamin Lee Whorf who set the stage for later media ecology scholars with their linguistic relativism, the idea that different languages are associated with different worldviews. Edward Sapir's popular book, *Language: An Introduction to the Study of Speech* (1921), expresses a number of ideas very basic to the media ecology intellectual tradition in his section on language and literature:

Languages are more to us than systems of thought transference. They are invisible garments that drape themselves about our spirit and give a predetermined form to all its symbolic expression. When the expression is of unusual significance, we call it literature. Art is so personal an expression that we do not like to feel that it is bound to predetermined form of any sort. The possibilities of individual expression are infinite, language in particular is the most fluid of mediums. Yet some limitation there must be to this freedom, some resistance of the medium. In great art there is the illusion of absolute freedom. The formal restraints imposed by the material—paint, black and white, marble, piano tones, or whatever it may be—are not perceived; it is as though there were a limitless margin of elbow-room between the artist's fullest utilization of form and the most that the material is innately capable of. The artist has intuitively surrendered to the inescapable tyranny of the material, made its brute nature fuse easily with his conception. The material "disappears" precisely because there is nothing in the artist's conception to indicate that any other material exists. For the time being, he, and we with him, move in the artistic medium as a fish moves in the water, oblivious of the existence of an alien atmosphere. No sooner, however, does the artist transgress the law of his medium than we realize with a start that there is a medium to obey.

Language is the medium of literature as marble or bronze or clay are the materials of the sculptor. Since every language has its distinctive peculiarities, the innate formal limitations—and possibilities—of one literature are never quite the same as those of another. The literature fashioned out of the form and substance of a language has the color and the texture of its matrix. The literary artist may never be conscious of just how he is hindered or helped or otherwise guided by the matrix, but when it is a question of translating his work into another language, the nature of the original matrix manifests itself at once. All his effects have been calculated, or intuitively felt, with reference to the formal "genius" of his own language; they cannot be carried over without loss or modification. Croce is therefore perfectly right in saying that a work of literary art can never be translated. Nevertheless literature does get itself translated, sometimes with astonishing adequacy. This brings up the question whether in the art of literature there are not intertwined two distinct kinds or levels of art—a generalized, non-linguistic art, which can be transferred without loss into an alien linguistic medium, and a specifically linguistic art that is not transferable. I believe the distinction is entirely valid, though we never get the two levels pure in practice. Literature moves in language as a medium, but that medium comprises two layers, the latent content of language—our intuitive record of experience—and the particular conformation of a given language—the specific how of our record of experience. Literature that draws its sustenance mainly—never entirely—from the lower level, say a play of Shakespeare's, is translatable without too great a loss of character. If it moves in the upper rather than in the lower level—a fair example is a lyric of Swinburne's—it is as good as untranslatable. Both

types of literary expression may be great or mediocre. (pp. 221-223)

Whereas Sapir created the theoretical framework, Whorf fleshed out the concept of linguistic relativism, particularly through his studies of the languages of Native Americans such as the Hopi and Navajo, as reported in *Language, Thought, and Reality* (1956).

Dorothy Lee also championed this approach in *Freedom and Culture* (1959) and *Valuing the Self* (1976), in addition to exploring orality-literacy distinctions. *They Have a Word For It: A Lighthearted Lexicon of Untranslatable Words and Phrases* (1988), a popular book by Howard Rheingold, is rooted in the Sapir-Whorf Hypothesis (which is also known as the Sapir-Whorf-Lee Hypothesis and the Sapir-Whorf-Korzybski Hypothesis). Linguistic relativism, broadened to include all forms of cultural communication, forms the basis of anthropologist Edward T. Hall's perspective on culture and communication, and that of his fellow anthropologist, Edmund Carpenter.

According to Louis Forsdale in *Perspectives on Communication* (1981), McLuhan's understanding of media is essentially an extension of the Sapir-Whorf Hypothesis, and Forsdale's students, Neil Postman and Charles Weingartner, were trained in linguistics, made it the subject of their first book, and incorporated it into their subsequent work. While the field of linguistics turned its back on relativism due to the influence of Noam Chomsky who in effect argues that all languages constitute a single medium (see, for example, *Language and Mind*, 1972), the two perspectives are not mutually exclusive. We can, after all, consider radio and television to be two different media, but both electronic media. No doubt, given the vagaries of academic fashion, sooner or later linguistics will experience a relativism revival.

Perhaps the contemporary successors to Sapir and Whorf are George Lakoff and Mark Johnson, who specialize in the study of metaphor. Their perspective is that metaphor is much more than a literary or rhetorical device, but rather an intrinsic element of language that has a strong influence on the way we view and experience the world. They established this perspective in *Metaphors We Live By* (1980), and followed up with a study of poetic metaphor, *More Than Cool Reason* (1989), and *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought* (1999). As the title implies, they see the human body as the basis for metaphor (and mind), as it is our primary point of comparison. Johnson also studies this in *The Body in the Mind* (1987), and Lakoff in *Women, Fire, and Dangerous Things* (1987), where he discusses how categories in thought are based on associations rather than abstractions. The study of metaphor figures prominently in the work of Richards, Langer, McLuhan, Postman, and other media ecologists. Raymond Gozzi, Jr. has combined the Lakoff and Johnson approach with McLuhan and Postman's media ecology in *The Power of Metaphor in the Age of Electronic Media* (1999). In addition to presenting numerous case studies of popular metaphor in contemporary American culture, Gozzi argues that metaphor has resurfaced as a dominant mode of communication in the electronic media environment, having been suppressed in literate cultures. This is a positive development in Gozzi's estimation, as he considers metaphor to represent the creative side of language. The same is true of neologism, and Gozzi explores this basic form of linguistic creativity as a reflection of the United States as a technological society in *New Words and a Changing American Culture* (1990). Additionally John Fraim provides an intercultural examination of media and symbolism in *Battle of Symbols* (2003), John McWhorter (2003) critiques the decay of formal language in the television era in *Doing Our Own Thing*, and Marc Leverette adds a study of mythic symbolism in *Professional Wrestling* (2003).

The relationship between language and consciousness, and the extent to which thought is based on the medium of speech, has been explored by Russian psychologists Lev Vygotsky in *Thought and Language* (1986) for example, and by Alexander Luriia in works such as *Language and Cognition* (1981). Frank Dance has championed the role of language and speech as the basis of human communication in anthologies such as *Human Communication Theory: Original Essays* (1967) and *Human Communication Theory: Comparative Essays* (1982), and in the influential text he co-authored with Charles Larson, *The Functions of Human Communication* (1976). Influenced by Walter Ong's writings on orality and paralleling Gumpert and Cathcart's inter/media approach, Dance employs the traditional opposition between mediated and face-to-face communication, but in effect argues that speech is the primary medium for human consciousness and culture, as well as communication. For the French anthropologist, Claude Lévi-Strauss, the structure of our symbolic forms mirrors the structure of our minds, a point he discusses at length in *Structural Anthropology* (1967). In particular, the bilateralism of brain and body is mirrored in the structure of language, which he believes to be based on binary oppositions (e.g., good and evil, life and death, nature and culture). As he explains in works such as *The Raw and the Cooked* (1969), this is also the structure of myth as a symbolic form, whose purpose it is to mediate contradictions. This requires a third term to perform the

function of mediation of opposites. While mediation here is used in a somewhat different sense, Lévi-Strauss does deepen our understanding of mediation as the function carried out by a medium. Moreover, his notion that fire is the mediating agent that transforms nature (the raw) into culture (the cooked) suggests the basic unity of fire as *technology*, as *symbol* (mediating term), and as the defining characteristic of *culture*. It is also worth noting that the poststructuralism of literary theorist Jacques Derrida, as put forth in texts such as *Speech and Phenomena* (1973), *Of Grammatology* (1976), and *Writing and Difference* (1978) is based on an understanding of writing as a medium, distinct from speech. Ong is critical of Derrida's deconstruction approach because it universalizes writing as the basis of all signification, rather than attending to the differences between speech and writing, not to mention other forms of communication. Derrida's fellow poststructuralist, Michel Foucault, deals with the rise of visualism, a theme common to Ong and McLuhan, in works such as *Discipline and Punish* (1977), where he emphasizes surveillance and power. Elsewhere, in *The Order of Things* (1971) and *The Archeology of Knowledge* (1972) for example, he discusses the relationship between knowledge and power, as products of discourse.

Regis Debray, the Communist revolutionary turned media theorist, provides an original approach to media ecology, or as he puts it, mediology. Discussed in depth in *Media Manifestos* (1996), he offers mediology as an alternative to semiology, replacing signification with mediation. The concern, then, is less with the medium as a discrete object or phenomenon, and more with its function. In this way, Debray combines the perspective of McLuhan and other media ecology scholars with the French intellectual tradition of Ferdinand de Saussure (i.e., *Course in General Linguistics*, 1983). Debray followed up on his main work in *Media Manifestos* with *Transmitting Culture* (2000), while an earlier book, *Teachers, Writers, Celebrities* (1981) is a study of how the intellectuals of France have been defined by different forms of communication. Much like Boorstin's (1978a) analysis of the hero-celebrity dichotomy, Debray demonstrates that French intellectuals seek out the dominant medium in order to gain and maintain their status, and as that medium changes, they themselves are remade in the new medium's image. Although quite independent of Debray, Bolter and Grusin's (1999) concept of remediation is not unrelated to Debray's mediation, as both refer to processes akin to signification. And along similar lines, Lev Manovich employs a film-based approach in *The Language of New Media* (2001), which echoes Carpenter's call to understand the "new languages of media" (Carpenter & McLuhan, 1960).

Camille Paglia's media ecology approach is highly original, but like McLuhan rooted in literary criticism and art history. In her major study, *Sexual Personae: Art and Decadence from Nefertiti to Emily Dickinson* (1990), she argues for the persistence of paganism within the Christian culture of the west, much as Ong discusses the residual orality present in literate culture. Drawing on Nietzsche, Paglia views this residual paganism as characterized by the binary opposition of Apollo and Dionysus. For example, she writes:

> Art makes *things*. There are . . . no objects in nature, only the grueling erosion of natural force, flecking, dilapidating, grinding down, reducing all matter to fluid, the thick primal soup from which new forms bob, gasping for life. Dionysus was identified with liquids—blood, sap, milk, wine. The Dionysian is nature's chthonian fluidity. Apollo, on the other hand, gives form and shape, marking off one being from another. All artifacts are Apollonian. Melting and union are Dionysian; separation and individuation are Apollonian. (p. 30)

The opposition between Apollonian and Dionysian is one of art vs. nature, and therefore technology vs. biology. It also is one of thing or artifact vs. liquid or medium, matter vs. energy, and Progress and evolution vs. cyclical time. The Apollonian is allied with the visual, while Dionysian is allied with the aural, so that the opposition is one of literacy vs. orality, and of light vs. dark, silence vs. sound, and tragedy vs. comedy. The opposition extends to the sky vs. the earth and the chthonian; the obsessive, the voyeur, and idolatry vs. ecstasy; cold logic vs. emotion; objectification vs. identification; individuation vs. the group; and the aristocratic, monarchist, and reactionary vs. the rabble and the democratic.

In terms familiar within information and systems theory, the Apollonian represents order and the Dionysian chaos. And the Apollonian symbolizes the masculine while the Dionysian stands for the feminine. This last pair is of particular significance, as gender and sexuality are among Paglia's main concerns. Thus she views the recurrence of certain character types, roles, or personae in the history of western art and literature as extensions of our biology, including our sexuality. In this, she draws on both Goffman's symbolic interaction and Freud's depth psychology. Paglia followed up her main work with two collections of essays, *Sex, Art, and American Culture* (1991) and *Vamps and Tramps* (1994), as well as an analysis of Alfred Hitchcock's *The Birds* (1998).

Freud himself addressed the topics of culture and technology as it relates to psyche and self, particularly in

his last works, *The Future of an Illusion* (1961) and *Civilization and its Discontents* (1962). Like Paglia, Janice Hocker Rushing and Thomas Frentz combine gender studies and psychoanalysis, in this case employing a Jungian approach, in *Projecting the Shadow* (1995). Analyzing several motion pictures, mostly in the science fiction genre, they argue that the cyborg theme is one in which technology corresponds to the unconscious element Jung called the Shadow. From Rushing and Frentz's perspective, the technological Shadow tends to be rejected and repressed as something artificial and other, whereas it needs to be confronted and ultimately integrated into consciousness in order to achieve psychological growth.

For Johann Huizinga, the essence of human culture, be it art or craft, communication or technics, is play, hence *Homo Ludens* (1955). And art history as much as literary criticism represents one of the building blocks of media ecology. Studies of art and perception have a special significance for the field, notably Ernst Gombrich's *Art and Illusion* (1960) and *The Sense of Order* (1984). Examinations of the biology of sense perception are also of great value, such as can be found in *The Morning Notes of Adelbert Ames, Jr.* (Ames & Dewey, 1960), and R. L. Gregory's *The Intelligent Eye* (1970) and *Eye and Brain* (1973). Based on the psychology and biology of the senses, we can understand that perception is an active process, one that is learned, based on experience with the outside world. It is a process in which we build up a set of assumptions and presumptions about the world, build an instinctive theory about the world, and then use it to interpret subsequent sensory data that we take in. Perception is dependent on the structure of our nervous system and sensory organs, so that the visual world of human beings is different from that of dogs, or bees, for example, and the same would be true of their auditory, olfactory, gustatory, and tactile worlds (see Hall, 1966, for a discussion of different senses of space). Perception is also altered by our technologies, which may play a role in training our senses in certain ways, as reading trains our eyes to focus on a fixed point relatively close in distance (a habit of perception that McLuhan thought connected to perspective in art and other phenomena). Perception occurs internally as well as externally, so that both perception and cognition are functions of the nervous system, which itself can be seen as an evolutionary extension of the circulatory system (which serves as a rudimentary information system in addition to its other functions). This is one of the main points of neuroscientist Antonio Damasio in books such as *Descartes' Error* (1994), *The Feeling of What Happens* (1999), and *Looking for Spinoza* (2003). It follows that internal processing forms the basis of external perception, which in turn provides the basis of consciousness, which Damasio views as a process of displaying images internally. The idea that the mind is entirely a product of biology leads Damasio to echo Langer in placing great emphasis on feeling and emotion in the working of the brain, as opposed to rationality. Through the work of scholars such as Damasio, as well as Edelman (1987, 1992), we can understand the brain, nervous system, and the body itself as a medium.

13. Conclusion

Ultimately, we can turn to books such as Albert Einstein's *Relativity, the Special and the General Theory* (1954), and Werner Heisenberg's *Physics and Philosophy* (1958) to understand the physical universe as a medium. Such a course would be entirely in keeping with Postman and Weingartner's discussion of the "Sapir-Whorf-Korzybski-Ames-Einstein-Heisenberg-Wittgenstein-McLuhan-Et Al. Hypothesis" (p. 101), which could be updated to include Stephen Hawking's *A Brief History of Time* (1998). Einstein's physics is as much about relationships, and therefore the process of mediation, as Martin Buber's philosophy, as expressed in *I and Thou* (1970), for example. Farrell (2000) discusses in detail how Buber contributed to Walter Ong's own understanding of media ecology, and it is therefore not surprising to find Ong (2002b) explaining the relationship between these macro and micro level relationships:

> Knowledge of the relationships between the microcosm (the human being) and the macrocosm (the universe), which has for ages been a major concern of philosophy at least in the West, has grown circumstantially as never before. These relationships have become urgent, consciously or subconsciously, so that they are now discussed not only in scientific literature but also through the popular media. The result has been enforcement of a general sense of cosmic holism more detailed and intense than ever before imaginable.
>
> Earlier thought had maximized distinctions; ecological thinking maximizes connections, relationships. The ecological state of mind was

rooted initially in biology, but when we speak of our age as the "ecological age" we are referring to its attention to interconnections that are far more generalized than simply biological connections. We live in an age of countless conspicuous interconnections. (p. 7)

The interconnection between the two environments Ong refers to as microcosm and macrocosm is the interconnection between the human medium and the universe as medium, and therefore between moral theology and cosmology.

It is therefore not surprising that Neil Postman (2000) concludes that, "as I understand the whole point of media ecology, it exists to further our insights into how we stand as human beings, how we are doing morally in the journey we are taking" (p. 16). Postman stresses the humanism of media ecology, while Ong emphasizes personalism, the philosophy of the human person, which is also the philosophy of human relationships. Media ecology itself is the product of human relationships, and in this essay I have endeavored to review the field of media ecology by following links through a network of intellectual relationships. In doing so, I have represented the field in broad terms in order to show the range of possibilities that this intellectual tradition encompasses. As a metadiscipline, and in a tradition reaching back to Aristotle's *Rhetoric*, media ecology intersects with all other disciplines and fields of inquiry. Of course, it would be possible to take a significantly narrower view of media ecology than I have here, and many scholars working from this perspective do so. But McLuhan, Ong, and Postman all rejected academic specialization and the hardening of the categories that institutions of higher education are heir to. Their scholarship is characterized by ecological concern and an open-systems approach, imagination and playfulness, and vision and humanity, and these traits, I believe, are exactly what we need as we come to terms with the enormous challenges and complexities of the 21st century.

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