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**MASS MEDIA AND MEDIA COMPLEX ADAPTIVE SYSTEMS:
TOWARDS A COMPLEX METHODOLOGY**

by

CAMERON KENNEDY, B.A.

**A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfillment of
the requirements for the degree of**

Master of Journalism

School of Journalism and Communication

Carleton University

Ottawa, Ontario

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submitted by Cameron Kennedy, B.A.
in partial fulfillment of the requirements for
the degree of Master of Journalism

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Abstract

Media organization, interaction, and development are central questions in journalism and mass communications research. Scientific work by Holland (1995) and others in the "postmodern sciences" (Lyotard 1988) on complexity theory and complex adaptive systems (*cas*) suggests an approach that runs counter to modernism's renewed emphasis on normative models and the public sphere. Drawing on Deleuze (1994) and his collaborations with Guattari (1987), this thesis contrasts modernism's mass media image with that of complex adaptive systems, or media *cas*, in order to undermine assumptions that influence canonical media theory. Characterized by decentralized agents that interact with and adapt to their environment, I construct models of media *cas*, which though problematic, may serve to analyze methods to measure the elusive concept of media complexity. Complexity theory's disregard for the boundaries enforced on media by the modernist project suggests it is an approach complementary to postmodernism, although their objectives are different.

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For Trish,
the totally smartest, prettiest and naked dachshund I know.

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CHAPTER 1: INTRODUCTION

Towards a Complex Methodology

Universally it is admitted that the press is the chief means of contact with the unseen environment. And practically everywhere it is assumed that the press should do spontaneously for us what primitive democracy imagined each of us could do spontaneously for himself, that every day and twice a day it will present us with a true picture of all the outer world in which we are interested.¹

Walter Lippmann recognizes in *Public Opinion* the “image of thought” that dominates journalism and mass communications scholarship.² Characterized by the assumption that “everybody knows . . .” media are stable, even static, agents that promote the good, the true, and the democratic, this representative “mass media image” is the theoretical foundation for the four theories of the press (Siebert, Peterson, and Schramm 1956), the Frankfurt School and subsequent political economic theories (Adorno and Horkheimer 1973; Herman and Chomsky 1988), the public sphere (Habermas 1989), and cultural studies (Hall 1986). The answer to “What role, if any, do media play in society?” being predetermined, journalism and mass communications scholars have adopted a theoretical program with two stages. First, they concoct simple, abstract models that describe how media should operate within the parameters presupposed by the

¹ Walter Lippmann 1965: 203.

² Gilles Deleuze 1994: 129. Deleuze introduces “the image of thought” in *Difference and Repetition* to attack philosophy’s fundamental presumption that everyone knows what is meant by terms like “thinking” and “being.” I borrow his term to subvert the traditional “image of media” which assumes we understand what “media” are and the function they perform in society.

image. In the second stage, scholars identify unconventional media behavior as being anything that falls outside the image's inflexible boundaries, with the sensational, the aberrant, and fascist, or more simply, erroneous. The identification of error spurs a search for scapegoats such as class, race, gender, religion, culture, or politics to explain the origins of the negative behavior. When this process is complete media have been transformed into a mass media — a static, Newtonian institution unable to adapt or evolve. Closed off from such messy segments as class, gender, race, religion, culture, and politics, the mass media are at rest, an equilibrium that functions as a frictionless conduit that receives and distributes information, which is free from distortion, bias, and diversity, to society at large. In other words, the mass media is Claude Shannon's perfect wire.³

What the mass media image and the theories founded upon it fail to explain, however, is how and why media always manage to subvert categorization. For every time scholars think they've got the role of the media pinned down, men like *Hustler* publisher Larry Flynt or entertainer Jesse "The Body" Ventura arrive on the scene and transform themselves, one, from what many consider a shameless pornographer to ruthless Republican foe, the other from glamorous grappler to governor of Minnesota.⁴ These "schizophrenic"

³ Claude Shannon is the founder of information theory, which analyzes the effect of distortion on the transmission of messages.

⁴ In a move to mimic well-heeled political insider, Matt Drudge, the Flynt Report is now available online at www.flyntreport.com. Drudge dispenses his inside information at www.drudgereport.com.

activities, and all the so-called aberrant, sensational, or even fascist activities they engage in every day, are important because they not only challenge scholars' best efforts to establish presuppositions, representations and categories, but also hint at the existence of alternative media images.⁵ One such alternative image is that of media as complex adaptive systems, or media *cas* (Holland 1995). Media *cas* are thermodynamic systems replete with messy segments — molar and molecular agents, smooth and striated spaces, cooperative and competitive games, adaptation and evolution. Adaptation is crucial because it allows media *cas*, unlike their stagnant mass media counterpart, to evolve beyond categories, subvert presuppositions, and exceed pre-imposed limitations that would stifle diversity, productivity, and growth. Media *cas* are in constant flux while they zigzag from one form to another, and another, and another, building endless chains of rhetorical social roles. Moreover, if thought and schizophrenia are multiplicities, as Deleuze (1994) suggests, then we can also analyze the mass media and media *cas* as multiplicities. This thesis draws on the diverse disciplines of complexity theory, philosophy, journalism and mass communications research, game theory, cognitive psychology, and information theory, to illuminate the complex media emerging or excluded from the Marxist mass media monolith, to explore the subsequent mass media and media *cas* multiplicities, discard the deductive models associated with the mass media image

⁵ Deleuze juxtaposes “thought” with “schizophrenia” in *Difference and Repetition* to suggest the existence of an alternative image. See Gilles Deleuze 1994: 148.

in favor of internal, inductive ones, and finally, to liberate media from the images which imprison them.⁶

Theoretical Concerns

Three issues problematize the establishment of an alternative image: (1) journalism and mass communication scholars' aforementioned dedication to representation and a resistance to postmodernism; (2) a lack of clear and consistent interdisciplinary alternatives; and (3) the compatibility of complexity theory and postmodernism. Although these issues arise time and again in the chapters that follow, it is useful to outline them here. On the first point, even a brief review of journalism and mass communications scholarship reveals an overwhelming faith that the media is an Eden, an eternal yet unchanging garden of truth that excludes us because of our predilection for greed or a gluttony for tasteless things. Lippmann (1965) disputes the capability of media "to supply spontaneously the truth which democrats hoped was inborn," and Jensen (1990) argues that "prevailing conceptualizations of media-in-society truncate our ability to teach, write, and talk about this central component of our common life," but they are the minority. The vast majority of "popular" theoretical scholarship anthologized in journalism and mass communications textbooks argues that the so-called "true" image of the media is inherently benevolent and stable. Positive

⁶ Gilles Deleuze 1994: XVII.

feedback reinforces the image's grip on scholarship while it chokes off divergent discourses.⁷ Thus, it is not surprising that objectivity (Tuchman 1978; Schiller 1981; Edgar 1991) and ethics (Thayer 1980; Besley and Chadwick 1991) dominate the theoretical terrain and show no sign of abating. The implicit acceptance of the mass media image by so many scholars ensures that it is extremely difficult to identify dissenting voices.

The recent political economy vs. cultural studies debate is a good example of a theoretical illusion that has captured the academic community's attention. Scholars clustered around the political economy banner identify capitalism and class conflict with sin, or in Deleuze's words, error, because they fall beyond the boundaries of the mass media image. They claim a capitalist media: (1) signals the advent of a totalitarian "culture industry" (Adorno and Horkheimer 1973); (2) promotes cultural suicide (McDonald 1944 and 1962; Boorstin 1972); (3) compromises our health (Postman 1985); (4) threatens our access to information (Herman and Chomsky 1988); or (5) co-opts reporters with the allure of sensationalism (Kurtz 1994). Scholars such as McQuail (1991), Curran (1991a and 1991b), and Dahlgren (1995) may differ methodologically from the likes of Adorno and Horkheimer since they try to rehabilitate media by focusing on their

⁷ Brian Arthur uses VHS and Beta VCRs as an example of positive feedback. Although Beta was the better technology, people purchased more VHS machines, which prompted others to also purchase VHS machines, and video stores to cater to VHS customers. By the end of the decade, Beta had all but disappeared. VHS still flourishes, despite the insurgence of Laser Discs, and more recently, the advent of DVD technology. See Mitchell Waldrop 1993: 35-36.

positive contributions to society. Theoretically, however, their interest in normative media models and reassessments of the Habermasian public sphere is little different from political economy's insistence that the media should be "an instrument of popular will."⁸

Proponents of cultural studies such as Grossberg (1995) or Hall (1986), on the other hand, analyze the impact of cultural attributes such as race, religion, and gender on the media. However, they also assume the mass media image as the foundation for their theoretical inquiries. The "debate" contests only which concept is more aberrant, capitalism and class conflict, or a general cultural classification such as race or religion. In this respect, Carey (1995) suggests quite correctly that the debate is moot since cultural scholars are just as guilty as their economic counterparts of embracing the Marxist fascination with generalization and laws "applied to everyone and no one."⁹ While it first seems tempting to take up cultural studies against political economy, closer inspection reveals they are essentially two sides of the same coin.

One alternative that stands out on the journalism and mass communication theoretical landscape is postmodernism. There are, however, few discourses as maligned or misunderstood. Criticized for prioritizing games over political economy (Harms and Dickens 1996), or simply going too far (Hall 1986), postmodernism elicits a volatile reaction from all quarters. Baudrillard (1980)

⁸ James Curran 1991b: 91.

⁹ James Carey 1995: 85.

and MTV (Chen 1986; Fiske 1986 and 1991) have certainly garnered a lion's share of scholar's attention in this respect, although those who would cast Baudrillard's lot in with the Frankfurt School (Chen 1991) jeopardize his postmodernist status. However, there is more to postmodernism than the "hyperreal " and music television. Beyond the occasional reference to "desiring production," "schizo" or "rhizome," media scholarship has largely ignored Gilles Deleuze and his collaborations with Félix Guattari. When critics such as Harms and Dickens (1996) do mention Deleuze and Guattari, there is a tendency to lump them together with Foucault, Derrida, and Baudrillard, among others. This is unfortunate, because their philosophy and its penchant for colourful scientific metaphors offer a rich and rewarding approach to media studies. Influenced by the multiplicities of space and duration (Bergson 1911; Deleuze 1991), the juxtaposition of thought and schizophrenia (Deleuze 1994), and later, the arboreal and the rhizomatic (Deleuze and Guattari 1987), spawn a demanding literature that rejects the theoretical retreat to totalizing systems that characterizes Western philosophy. This denial of primacy, which extends to the postmodern project itself, encourages a "semantic complexity" since it forces Deleuze and Guattari and other scholars to define "postmodernism" differently and use vastly different terminology depending on the context of their arguments.¹⁰ The complexity of postmodernism in general and Deleuze and Guattari in particular, is appealing but not without its own problems since "complexity" is a concept just as elusive as

¹⁰ Dick Hebdige 1986: 79.

any other in postmodernism. This leads to the second problematic issue — interdisciplinary scholarship's consistent failure to engage with scientific discourse and consequently, complexity.

In his response to Nerone (1987), Schiller (1987) concludes "it is difficult to think of a body of current, serious research in social and cultural history that propounds evolutionary theory, or even that relies consciously on evolutionary metaphor."¹¹ Schiller's observations are difficult to refute because consistent attempts to analyze the implications of evolution, or any other scientific theory in the field of journalism and mass communications, for that matter, have been few and far between. This is not to say scholars have ignored interdisciplinary approaches entirely. More often than not, articles drawing parallels between scientific theory and media theory have had little in common except a scientific perspective.¹² Another trend in media scholarship is to engage the sociological equivalents of scientific theories, such as organization theory (Aldrich and Mueller 1982; Hawley 1984), rather than confront science on its own terms. The result on both accounts is an eclectic collection of articles that provide little in the way of a point of departure for future research.

Chaos and complexity theories try to answer some of the questions raised by the theory of evolution. They are also the most recent scientific paradigms to

¹¹ Dan Schiller 1987: 411.

¹² To compare Nadin (1986) with Cappella (1991), or Dimmick and Rothenbuhler (1984) and Blaukopf (1985), for example, leads to a fruitless search for common ground.

attract interdisciplinary scholars who want to substantiate or subvert the underpinnings of journalism and mass communication theory. Chaos theory, with its tenets of self-similarity, scaling, and sensitive dependence on initial conditions, has inspired something of a scientific revival in literary and media scholarship. In the hands of scholars such as Hayles (1991), Rice (Date unavailable), and Rushkoff (1996), chaos theory is used to explore the hidden complexity of literary texts or media organizations, and to transform apparent nonsense into order.¹³ Unfortunately, these scholars fail to realize that chaos and complexity are completely irreconcilable since, in mathematical terms, a chaotic system has a complexity equal to zero. When a scholar invokes chaos theory to study the complexity of television content, for example, he implies all television programs are nothing but static. This incorrect, even absurd, conclusion is clearly not what the scholar had in mind, and yet an uncritical acceptance that chaos and complexity are one and the same persists. Chaos theory opens many new avenues for scientific inquiry in fields such as meteorology and medicine, but it has proven inadequate in such fields as literary criticism or media studies.

Journalism and mass communications scholars, on the other hand, have largely ignored complexity theory. The product of an interdisciplinary interest in living systems, complexity incorporates two complementary approaches. The first analyzes the composition, interaction and adaptation mechanisms of

¹³ Deleuze and Guattari (1987) make a similar mistake when they tentatively adopt chaos theory in general and fractals in particular as mathematical descriptors for their notion of smooth space (see Chapter Five).

biological organizations, which Holland (1995) defines as a complex adaptive system, or *cas*. The second, which interests Nobel laureate Murray Gell-Mann (1994a), measures the effective complexity of these complex adaptive systems and in this respect, is closely related to Shannon's information theory.¹⁴ While media scholars seem to prefer chaos theory, with the possible exception of an unrelated study on the complexity of international relations (Hendrickson 1989), complexity appears in such diverse fields as HIV/AIDS research and immunology (Perelson 1994), and the transmission and evolution of culture (Feldman, Cavalli-Sforza and Zhivotovsky 1994). Complexity theory's interdisciplinary connections and its interest in system development through agent interaction make it an appealing avenue by which to challenge journalism and mass communications' insistence on normative media theory.

The third issue addressed by this thesis is the relationship between complexity theory and postmodernism. At first glance, the juxtaposition of postmodernism and complexity theory, Gilles Deleuze and John Holland, seems contradictory. After all, postmodernists reject Marxism's totalitarian, teleological, and utopian impulses (Hebdige 1986), as well as science's search for a unified theory (Hawking 1996). However, there are at least two lines of thought on this issue. On the one hand it is difficult if not impossible to reconcile complexity with the postmodern project. After all, Holland is still a scientist who

¹⁴ Although it is favored by Gell-Mann, effective complexity is just one of many complexity measures. Others include crude (Gell-Mann 1994a) and self-dissimilarity (Wolpert and Macready 1997).

accepts that a measure of objective truth exists, and that complexity theory is just the latest attempt to create a universal system.¹⁵ Postmodernists fervently deny these positions, both for themselves and their project. Lyotard (1988), on the other hand, would argue that complexity theory is a “postmodern science” concerned with “undecidables, the limits of precise control,” and “conflicts characterized by incomplete information,” that produces “not the known, but the unknown.”¹⁶ When analyzed in this light a number of important similarities between complexity theory and the work of Deleuze and Guattari appear. For example, Holland and Deleuze and Guattari share a similar conception of organizations. In Waldrop (1993) Holland emphasizes that control within complex networks like *cas* is highly dispersed because it is not preordained. Instead, it develops out of the cooperation and competition of agents. This mimics the disillusionment of postmodernists in general and Deleuze and Guattari in particular, with “bureaucratically organized centers” and programs “formulated by an elite and disseminated through a hierarchical chain of command.”¹⁷ Furthermore, it is ironic that one of the main criticisms leveled against postmodernism is its “playful” nature (Harms and Dickens 1996), and yet

¹⁵ Knoespel (1991) issues a similar warning to those scholars who would draw parallels between chaos theory and postmodernism in general, and deconstruction in particular. However, as we shall see in Chapter One, even in his cautious embrace of chaos theory as a “destabilizing ally,” Knoespel follows Hayles (1991) into the chaos vs. complexity trap.

¹⁶ Jean-François Lyotard 1988: 60. Noteworthy is Lyotard’s inclusion of “fracta,” or more precisely, fractals, in the complete paragraph. I am paraphrasing here so not to confuse the characteristics of complexity with those of chaos theory.

¹⁷ Dick Hebdige 1986: 82.

complexity theory suggests that play and games are a fundamental component in the development of biological organisms. Finally, complexity theory suggests that the evolution of an ant hill or a newspaper like *The Globe and Mail* has more in common with Deleuze and Guattari's conception of the "rhizomatic" than with either Newton's linear hypothesis or the Marxist preference for monochromatic representation. After all, evolution is a product of adaptation which in both the ecological and literary sense has more in common with parody, simulation, pastiche, allegory and other postmodern tropes than it does with originality. Although the stark difference of their respective projects makes union unlikely, complexity theory and postmodernism are complementary readings that advocate the liberation of humanity and media from their witting recourse to false gods.

Organization of the Thesis

Divided into nine chapters, this interdisciplinary thesis draws on sources from the fields of complexity theory, journalism and mass communications, Continental philosophy, game theory, cognitive psychology, and information theory. Chapter Two, Order out of Chaos, introduces the science of complexity theory and its more prominent cousin chaos theory in order to avoid the conceptual and terminological errors that problematize the work of other scholars interested in science and the media. The chapter begins with an examination of the scientific and philosophical landscape of Ludwig Boltzmann, Jules Poincaré, and Henri Bergson that first nurtured chaos', and then complexity's, growth. The second and third sections will define chaos and complexity, respectively. The

chapter considers the “popular” texts of Prigogine and Stengers (1985), Gleick (1988), and Waldrop (1993), as well as the more technical contributions of Edward Lorenz (1997), John Holland (1995), and Murray Gell-Mann (1994a) in order to define and differentiate chaos and complexity theories.

With the difference and similarities between chaos and complexity clarified, Chapter Three, *Interdisciplinary Eclectics*, questions the impact of interdisciplinary work in general and chaos and complexity theories in particular on journalism and mass communications scholarship. Divided into three sections, the first section reviews the eclectic assortment of interdisciplinary articles published by leading journalism and mass communications journals in the last twenty years. Organization theory stands out from the sparse collection, interesting since its “systematic” approach resembles that of complexity theory. Hence the section considers three critical lines, including Herbert Spencer’s structural formalism (Hassard 1993), dialectical ecology (Benson 1977; Aldrich and Mueller 1982; Kaul and McKerns 1984) and organizational ecology (Delacroix and Carroll 1982 and 1983; Carroll 1988). However, fundamental differences of opinion on the role of elements such as the environment or adaptation suggests organization theory and complexity theory are not complementary.

Communications ecology (Altheide 1995) and self-organization (Johnson *et al* 1998) are two of the more successful interdisciplinary approaches considered in section two. Altheide’s ecology of communication, in which society generates and adapts to novel media, especially to technological sources such as the

Internet, is an important step in the reorientation of media scholarship towards a complex methodology. Johnson (1998) carries Altheide's analysis one step further, suggesting the Internet will significantly enhance the self-organization of *cas*, although his conclusions are somewhat problematic considering the current instability of the Internet.

Finally, section three examines works embracing chaos and complexity theories. Hayles (1991), Rushkoff (1996) and Paulos (1996) are critical here, although their findings do not inspire confidence in interdisciplinary research. The authors, with the possible exception of Paulos, do not appreciate the differences between chaos and complexity, and ultimately fail to draw any connections among chaos, complexity, and media.

Chapter Four, *The Establishment of Mass Media*, introduces the concept of multiplicities and appropriates the "image of thought" (Deleuze 1994) to construct and critique the "mass media" image that dominates journalism and mass communications scholarship. Although its origins are unclear, Siebert, Peterson, and Schramm (1956) canonized the image, which can then be traced through Adorno and Horkheimer (1973), Postman (1985), Herman and Chomsky (1988), and finally Kurtz (1994). Political economy's discomfort with capitalism and consequently its negative view of media are counter-balanced by a renewed interest in repositioning media as a positive democratic force. Although they differ methodologically from their political economy counterparts, the construction of normative frameworks (McQuail 1991), or the redeployment of public spheres (Curran 1991a and 1991b), results only in more rigid boundaries

than in the past, enforcing an equilibrium that dashes any hope that media can become more than they already are.

With the limitations of the mass media image outlined, Chapter Five, *The Emergence of Media Cas*, tackles the alternative image, that of media as complex adaptive systems, in order to distinguish media *cas* from the mass media multiplicity. Divided into three sections, the chapter introduces two components common to all *cas*, agents and niches, and analyzes the striking parallels between Holland's thought and the notions of segmentarity and space advanced by Deleuze and Guattari (1987). In section two, the chapter examines how diversity, aggregation, non-linearity, and flows (Holland 1995) create conditions suitable for the emergence of media patterns. Emergence (Holland 1998) is a fundamental characteristic of complex systems but it is often difficult to recognize since complex adaptive systems are always changing. Nevertheless, the section uses five criteria established by Holland (1998) to propose that news, sensationalism and objectivity are emergent media patterns. Although some scholars insist that democracy is also an emergent phenomenon, Schudson (1978) and Nerone (1989) among others dispute this point. Indeed, evidence of such a democratic pattern is scant. Finally, the chapter concludes with a comparison of the mass media and media *cas* multiplicities.

The games agents play are the theme of Chapter Six, *Strategy, Power and Control*. Journalism and mass communications scholars are fascinated by the reporter-source relationship (Charron 1989; Murphy 1987 and 1989; Russell 1994), but have largely ignored game theory, despite the availability of

conversational approaches that do away with formal equations and axioms. Holland (1995), on the other hand, argues that power and control emerge from the cooperative and competitive games agents play. In addition to an introduction to game theory, this chapter analyzes the emergence of strategy and status in media *cas*. Other complexity scholars are producing a substantial body of literature on the emergence of cooperation and competition in games based on the Prisoner's Dilemma. To this end, the chapter analyzes the strategies Canadian media agents employ and how those strategies may change in the aftermath of the APEC scandal. While games based on the Prisoner's Dilemma can analyze the emergence of cooperation and competition in media *cas*, they are silent on the appearance of other persistent patterns, such as status. Quint and Shubik's (1997 and 1998) axiomatic approach is of limited appeal, but they do raise many interesting questions about the subjective status of reporters, editors and other media agents. To this end, the chapter proposes an elementary framework to help media scholars understand status as an emergent phenomenon.

Chapter Seven, Models and Metaphors, examines how complex adaptive systems create internal models of their environment, and how complexity research models this process. It seems straightforward enough to argue that media *cas* are composed of agents who interact or play games to improve their performance: yet the mechanics behind adaptation and evolution are still subject to intense analysis. With this goal in mind, the chapter is divided into three sections. The first section introduces the basic concepts such as induction, q-morphism, and parallelism. Holland *et al* (1986) argue complex adaptive systems use induction to adapt to

their environment. They build “internal models” of their environment from the limited information they collect from their environment and apply these rules to novel situations. Holland conceives these rules as having the construction “IF . . . THEN,” which allows for parallelism. Successful rules (those that perform well but not necessarily the best) are then organized into q-morphisms.

The second section examines two models — the adaptive plan (Holland 1975) and constrained generating procedures (Holland 1998) — in order to determine whether they are also applicable to the study of media *cas*. Holland’s (1975) adaptive plan is a formal description of adaptation, a model that could provide scholars with a useful tool to model the transformation of strategy, status or other structures in limited information environments. While such models can be quite complicated, the adaptive plan illustrates that media *cas* are not simply looking for rules that work in one environment; rather they want rules that are robust, that is, rules that perform well in many novel environments. In order to find effective rules more quickly, the adaptive plan uses metaphor and other tropes to leap and zigzag through sets of infinite possibilities. Constrained generating procedures (*cgps*), on the other hand, are Holland’s (1998) latest attempt to model complex adaptive systems proper. Although similar to the adaptive plan, constrained generating procedures emphasize models that generate emergent behavior, such as checkers and chess. However, like the adaptive plan before it, *cgps* encounter problems when they are used to model media and other complex adaptive systems with ill-defined transition functions, or rules.

Finally the chapter analyzes the role of metaphor and other tropes in complexity studies and postmodernism. In a sense, the adaptation Holland (1975) describes is similar to Deleuze and Guattari's (1987) distinction between the arborescent and the rhizome, evolution and becoming. Adaptation is by necessity nomadic, rhizomatic, always becoming, since it must generate endless strings of media structures that are consistently displaced in favor of those that are more effective. It is not surprising then that the mass media image cannot account for perpetually novel media which are always fluctuating from one model to the next, always becoming more than they already are.

While the previous chapters analyze the characteristics of complex adaptive media, Chapter Eight, Complexity, focuses on the media's coverage of complex adaptive systems and determines whether such coverage can be used to measure the complexity of such systems. Divided into three sections, section one attempts to define complexity, an increasingly difficult task since there are so many different measurements, including Kolmogorov, crude, effective, Logical Depth, and self-dissimilarity. All, however, trace their origin back to information theory (Shannon 1949) and the subjective values of information and entropy. Complexity is also a subjective value that floats between those two poles. Section two distinguishes deterministic complexity measure from statistical complexity measures in order to focus on effective complexity, a statistical measure proposed by Gell-Mann (1994a). In addition to defining effective complexity and analyzing some of its limitations, the chapter considers the work of Hendrickson (1989) on the relation between the complexity of international affairs perspectives

and media consumption. Finally, the chapter concludes by investigating whether the schema of media agents can be used to measure the effective complexity of the complex adaptive systems they cover. The results are not promising.

Although they produce thousands of schema based messages daily, most media agents build poor models of the complex adaptive systems they observe because they don't distinguish regular patterns from the irregular or incidental. Therefore, the schemas are not an effective complexity measure of other *cas*; rather they are a measurement of the media agent's ignorance.

In spite of breaking into the social sciences and journalism and mass communication, the study of complex adaptive system and complexity measures are still scientific disciplines and this imposes certain limitations on this thesis. I will borrow much of my terminology from the scientific disciplines where complexity studies developed and from Deleuzian metaphors, rather than attempt to reorganize journalism and mass communications scholars' creative descriptions of the "complex" and of "complexity." Moreover, the interdisciplinary nature of complex systems analysis and complexity studies has produced a sizeable and diverse body of literature and theory. This thesis is a first attempt to analyze media *cas*; thus and so it concentrates on the work of Holland and Gell-Mann while ignoring the molecular debates best left to the scientific community. This thesis does not engage memetics, a concept developed by Richard Dawkins

(1989) and alluded to by Rushkoff (1996).¹⁸ Finally, while the scientific concepts may appear daunting, this is not a mathematical thesis. Equations, with the possible exception of those in Chapter Seven, are used sparingly if at all.

¹⁸ The study of memes. A meme is “a contagious information pattern that replicates by symbolically infecting human minds and altering their behavior, causing them to propagate the pattern . . . Individual slogans, catch-phrases, melodies, icons, inventions, and fashions are typical memes.” See Glenn Grant 1995: 3.

CHAPTER 2: ORDER OUT OF CHAOS

Introduction

Chaos and complexity are theoretical tools that help scientists understand the development of order and life in the universe. They share a common background that can be traced back to the foundation of thermodynamics in the early 1800s and an interest in complicated systems that Newton's linear equation could not hope to penetrate. For a time even the terms "chaos" and "complexity" were interchangeable but this is no longer the case. Although many scholars, scientific and otherwise, still do not differentiate between them, chaos is not complex, nor does it exhibit any complexity.

Divided into three sections, this chapter introduces chaos theory and complexity theory, analyzes their common background, and contrasts their theoretical underpinnings. The goal of this chapter is twofold: (1) to prepare for the critique of interdisciplinary work in the following chapter; and (2) to prepare the ground for the media *cas* multiplicity. Section one examines selected scientific and philosophical debates from the 19th and early 20th Century that fostered the formulation of chaos theory in the 1960s and complexity theory in the late 1980s. Specifically, the chapter analyzes scientific and philosophical responses to the shift from classical Newtonian dynamics to thermodynamics embodied in the work of Boltzmann, Poincaré, and Bergson. These individuals grapple with and define many of the elementary concepts, such as irreversibility, entropy and its relationship to probability, and sensitive dependence on initial

condition, that later scholars exhume and adopt as their own. Boltzmann's inability to reconcile thermodynamics and dynamics was not a complete failure; many scientists still consider his famous entropy equation an important step. In hindsight, Poincaré's contributions underscore some of the most basic principles of chaos theory, while Bergson reveals science's limitations. Philosophically, Bergson's shift from dialectics to multiplicities also profoundly affected the work of later continental philosophers such as Gilles Deleuze.

Section two and three examine chaos theory and complexity theory proper. Though their origins are not novel, chaos and complexity theory are quite recent advances compared to thermodynamics, and have a tendency to create a great deal of terminological confusion. On the one hand, there is chaos theory, the study of systems that appear to be random but are governed by precise laws. Complexity theory, on the other hand, is interested in the organization and interaction of systems that adapt to their surroundings, as well as the measurement of such a system's complexity. However, it seems even a fundamental work like Prigogine and Stengers (1985) creates confusion when it mixes and matches chaos and complexity with "adaptive organization," "self-organization" and "dissipative structures." Another concern is the isolated nature of the disciplines. Public exposure to chaos and complexity is often limited to science books that "crack a bestseller list," such as Gleick's (1988). Though it is dangerous to take many of his assumptions at face value, Gleick is still an accessible introduction to chaos theory. Waldrop (1993) provides a good introduction to complexity theory, and leads naturally to John Holland's more technical works on adaptation

(1975/1986), and complex adaptive systems (1995/1998). Finally Murray Gell-Mann (1994a) provides insight into the measurement of complexity. This terminological baggage must be unpacked, examined and contextualized before we understand why media are complex adaptive systems and how scholars can measure their complexity.

Thermodynamics

Complex and chaotic motion is everywhere. However, up until the winter of 1961 when meteorologist Edward Lorenz accidentally discovered a hidden order in his weather simulation program, disorder was confined to the margins of scientific inquiry. Newton's deterministic vision of the cosmos and the equations he used to measure it may have revolutionized scientific inquiry but not without making concessions. For a brief moment, scientists could divide a system into segments, measure them, and then use those calculations to predict the state of the system at any given instance in the past or future. As long as the world operated like clockwork, Laplace and scientists like him seemed content to ignore what they believed to be the messy, inconsequential effects of friction, turbulence, and other forces that were difficult if not impossible to quantify. Soon however, scientists challenged the assumptions and boundaries that Newtonian dynamics imposed. They formulated the theory of thermodynamics, replete with its own buzz words such as "the arrow of time," "heat death," and "entropy."

It is important to understand that chaos theory, and now complexity studies, are not recent scientific developments, but the latest stage in almost two

hundred years of research into the question of motion. For example, Prigogine and Stengers (1985) argue that 1811 heralded the birth of the “science of complexity” when the French Academy of Sciences honored Jean-Joseph Fourier for his study of the propagation of heat in solids.¹⁹ However, another scholar could choose a different date in the 1800s depending on his preference for the work of Sadi Carnot, William Thompson or Rudolf Clausius, scientists all interested in the motion of heat. In any case it appears that by the 1800s science was on the cusp of a new era and on a cruel divide between dynamic and thermodynamic conceptions of the universe.

Thermodynamics signals the first significant step away from deterministic dynamics and embodies the most basic elements of chaos and complexity theory in its definition:

The aim of the theory [of thermodynamics] is not to predict the changes in the system in terms of interactions among particles; it aims instead to predict how the system will react to modifications we may impose on it from the outside.²⁰

Thermodynamics, chaos theory, and complexity all attempt to describe how systems react to changes imposed from outside. When scientists recognized the impact of exterior forces on system function, however, they also introduced what is perhaps thermodynamics’, and now complexity theory’s most important yet difficult concept — entropy. Since Rudolf Clausius coined the term in 1865, scientists and philosophers alike have struggled to define entropy, often referred

¹⁹ Ilya Prigogine and Isabelle Stengers 1985: 104.

²⁰ Ilya Prigogine and Isabelle Stengers 1985: 106.

to as “the arrow of time” or “heat death,” and its effects on inorganic and organic systems alike. The second law of thermodynamics proposes that “the entropy of an isolated system always increases, and that when two systems are joined together, the entropy of the combined system is greater than the sum of the entropies of the individual systems.”²¹ Under this definition, non-isolated, or open, systems are subject to the effects of entropy, which is an ever-increasing quantity that can be measured. Another way of describing this process is to say entropy embodies “the impossibility of certain processes” and a “growing molecular disorder . . . towards states of increasing probability.”²² This distinguishes between two types of systems: (1) the reversible, like the isolated, frictionless motion of objects that Newton’s equations describe; and (2) the irreversible, like a glass ornament that breaks against a hardwood floor and as a consequence “forgets” its initial state. Thermodynamic systems, unlike their circular, dynamic counterparts, flow in only one direction since they are subject to the arrow of time. As energy bleeds from an irreversible system due to the effects of friction, turbulence, or other outside forces, order begins to break down and the system may expire. Entropy insures that we don’t have to watch helplessly as glass fragments collate and reassemble ornaments.

²¹ Stephen Hawking 1996: 108.

²² Ilya Prigogine and Isabelle Stengers 1985: 124.

Entropy is a difficult concept to grasp because of its association with the mathematics of probability. An effort will be made to analyze the relationship between entropy, probability, information theory, complexity, and media *cas* in Chapter Eight, Complexity. But the basic components will be examined here. Boltzmann was one of the first scientists to recognize the relationship between entropy and probability, although his primary goal was the reconciliation of thermodynamics with dynamics. He ultimately failed to reconcile the two theories but his work on entropy and probability, enshrined in his famous equation, is still of central importance.²³ Entropy's relationship to probability originates in irreversibility. Consider our glass ornament from the previous example. A flawless ornament resting safely on a table has a perfect order. However, this order is always at the mercy of entropy and it is thus possible to imagine the same ornament smashed into a perfectly fine powder in which all the glass particles are exactly the same size and shape. This perfect state of utter disorder occurs when entropy is at a maximum. It is important to remember, however, that no matter how much we smash the ornament it will reach a state that only resembles our perfect powder. If the ornament falls on the floor and shatters, entropy takes over and prohibits the pieces from reassembling. Suppose someone then steps on the ornament and crushes it further. Each time the

²³ Ilya Prigogine and Isabelle Stengers 1985: 123-124. In Boltzmann's equation, $S = k \lg P$, entropy is denoted by the letter S , and is equal to k , a universal constant, and the log of P , which designates complexions, or the number of ways of achieving a given distribution.

ornament is broken into smaller and smaller pieces approaching fine powder, its entropy approaches the maximum. As the entropy of the ornament increases, however, the probability that the appearance of the ornament resembles that of a perfect fine powder also increases. If we conduct this ornament-smashing experiment a thousand times and record the results, the probability that we will observe powder states approaching the perfect state will also approach the maximum, or 100 per cent. As will be seen later, Boltzmann's equation has serious repercussions on the utility of communication since messages, just like our glass ornament, are subject to the effects of entropy and exhibit a tendency to break down and shift towards states of increasing disorder as they travel.

While scientists critiqued dynamic and thermodynamic models of the universe, others approached the theoretical blind spots in dynamics and thermodynamics from novel angles. At the turn of the century the French mathematician Jules Henri Poincaré shared Boltzmann's fascination with probability, specifically the relationship between chance and determinism. Though Poincaré's efforts did not directly influence the formulation of chaos theory, his ideas do precede the work of Lorenz by over fifty years and he often appears in chaos texts as a kind of forgotten forefather of the discipline. Lorenz goes so far as to suggest that Poincaré "must have recognized the chaos that was inherent in the equations with which he worked so intimately."²⁴ The similarity between Poincaré's thought and developments in chaos and complexity hinge on

²⁴ Edward Lorenz 1997: 120.

his interest in chance and its expression in everyday life. Our longing to distinguish sharply between planned events and those that occur by chance seems to be an integral component of human nature. The media *cas* supports this need when it juxtaposes coverage of scheduled news conferences with late-breaking reports of a “freak accident” or “the tornado that touched down out of the blue.” Poincaré suggests, however, that these determined and chance events are really the same thing since they are “reconciled by long term unpredictability.”²⁵ According to Poincaré, we embrace chance because we don’t know, and more often than not can never determine, the initial condition or conditions that caused the accident, because they are too small or happened too far in the past. Poincaré concludes that many events and systems are subject to this “sensitive dependence on initial conditions.” Simply stated, sensitive dependence is “a very small cause, which escapes us, determines a considerable effect which we cannot ignore, and we then say that this effect is due to chance.”²⁶ Years later, sensitive dependence became the cornerstone of chaos theory after Lorenz arrived at a similar conclusion in 1961 during his analysis of artificial weather — though he adopted a much more colorful term, the Butterfly Effect, to describe the

²⁵ David Ruelle 1991: 48.

²⁶ David Ruelle 1991: 48.

phenomenon.²⁷

While Poincaré reached his conclusions within a scientific framework, his counterpart Henri Bergson challenged scientific approaches to the problems of motion and existence. Bergson (1911) argued that society needed a new approach to understanding existence because “all our beliefs in objects, all our operations on the systems that science isolates, rest in fact on the idea that time does not bite into them.”²⁸ Though Bergson may have rejected the science of his day in favor of an unrealized “Bergsonian intuition,”²⁹ his understanding of duration and his subsequent orientation towards the multiplicities of duration and space do bear important similarities to “sensitive dependence on initial condition” presented by Poincaré and later advanced by chaos theory.

Briefly, Bergson’s thought develops along two interwoven lines. Scientifically, Bergson rejects the Newtonian preoccupation with isolated time events in favor of an inquiry grounded in the concept of duration, or time as experienced by consciousness.³⁰ Duration is the key to understanding the flow of human existence and history because incidents or decisions that stand out or

²⁷ The phrase comes from the chaotic pattern Edward Lorenz observed in his experiments, which formed the shape of a butterfly’s wings. The effect is often described as “a butterfly flapping its wings in China can create a hurricane in New York.” See Douglas Rushkoff 1996: 15. However this definition can be misleading. A better explanation is that “a very small cause, which escapes us, determines a considerable effect which we cannot ignore, and we then say that this effect is due to chance.” See David Ruelle 1991: 48.

²⁸ Henri Bergson 1911: 8.

²⁹ Ilya Prigogine and Isabelle Stengers 1985: 91.

³⁰ Alan Lacey 1995: 88.

appear disconnected from others in their environment are in fact connected through duration.³¹ Our attention focuses on certain events rather than others, Bergson writes, “because they interest it more, but each of them is borne by the fluid mass of our whole physical existence.”³² Philosophically, Bergson rejects the generality inherent in Hegel’s dialectic, the juxtaposition of the One and the Multiple.³³ The alternative, Bergson proposes, is a philosophy of multiplicities, in which duration and space are just two of many. Duration and space are multiplicities characterized by difference in kind and heterogeneity, on one hand, and differences in degree and homogeneity on the other.³⁴

From a modern perspective, Bergsonian duration is also a kind of “sensitive dependence,” a sensitive dependence on the “conditions of experience.” These conditions not only link events together in a harmonious chain but also inform the character of those events. In *Matter and Memory*, Bergson searches for “experience at its source,” a theme Deleuze (1990) later develops. Deleuze emphasizes the movement towards the conditions of experience housed in duration so as “to rediscover what differs in kind in the composites that are given to us and on which we live.”³⁵ Furthermore, Bergson foreshadows the

³¹ Henri Bergson 1911: 3.

³² Henri Bergson 1911: 3.

³³ Gilles Deleuze 1991: 43.

³⁴ Just as Deleuze would do after him, Bergson uses the dualism of duration and space as a template for other dualisms, such as quality — quantity, heterogeneous — homogeneous, continuous — discontinuous, memory — matter, recollection — perception, contraction — relaxation, and instinct — intelligence. See Gilles Deleuze 1990: 21.

³⁵ Gilles Deleuze 1990: 26.

contributions of scientists such as Lorenz and Mandelbrot in not only recognizing that a “sensitive dependence” is at work in human experience but also that the “initial condition” is elusive or even indeterminable since “even a superhuman intelligence would not have been able to foresee the simple indivisible form which gives to these purely abstract elements their concrete organization.”³⁶

Scientific inquiry during the 19th Century formed the groundwork for the discovery of chaos and complexity in the 20th. Newton’s clockwork universe transformed humanity and its perceptions of the universe, which in turn spawned other scientific revolutions in such diverse fields as astronomy and chemistry. However, dynamics raised many questions that it could not answer since it operated in a frictionless world, a closed system in which energy was a constant. The theory of thermodynamics and its famous second law initiated a new age of scientific discovery. Rather than omit friction and turbulence, scientists began to factor them into their equations as entropy, insisted on irreversible processes, and on an increasing probability that the universe would slowly dissolve into a dilute uniformity. Meanwhile other scientists and philosophers introduced alternative approaches at the turn of the century. Poincaré glimpsed the chaos beyond when he erased the boundary between chance and deterministic events. Bergson too made significant steps towards complexity when he insisted on an appreciation of duration, the interconnectivity of events that elude perception, and an orientation

³⁶ Henri Bergson 1911: 6.

towards dualism and multiplicity. However, in spite of thermodynamics' embrace of friction and turbulence, their origin and physical properties remained unknown.

Chaos Theory

Since its discovery in 1961 chaos theory has captured the imagination of scientists and general public alike. Technical, beautiful, mysterious, chaos is just the latest stage to provide scientists with a jumping-off point for future discoveries. And yet, over thirty years after its discovery, chaos theory still manages to generate confusion, and complexity theory's appearance on the scientific horizon in the early 90s has only aggravated the situation. Many scientific texts, including Prigogine and Stengers (1985) and Gleick (1988), use terms like "chaotic," "complex," and "complexity" interchangeably or in combinations that blur important distinctions between the two disciplines. Part of the problem is the nature of the field itself because readers must choose between technical explanations and complicated mathematical equations or definitions hedged in layman's terms. *Chaos: Making a New Science* is a good example of this problem. For many readers, Gleick (1988) is their first introduction to chaos theory; yet he declines to define it explicitly, opting for the power of metaphor instead. Chaos becomes "clouds . . . once fuzzy and detailed, structured and unpredictable," while the complicated mathematics of fractal geometry becomes a list of patterns and shapes; again, "clouds, the paths of lightning, the microscopic

intertwining of blood vessels, the galactic clusterings of stars.”³⁷ Even Gleick’s description of Poincaré’s sensitive dependence on initial condition borders on the poetic:

It [chaos] traced a strange, distinctive shape, a kind of double spiral in three dimensions, like a butterfly with two wings. The shape signalled pure disorder, since no point or pattern of points ever recurred. Yet it also signalled a new kind of order.³⁸

More problematic, however, are Gleick’s references to complexity, such as “it [chaos] makes strong claims about the universal behavior of complexity,” or “[chaos] generated complexity: richly organised patterns, sometimes stable and sometimes unstable . . .”³⁹ Not only are these claims open to debate, as we shall see when we define complexity theory later in this chapter, but Gleick doesn’t attempt to define “complexity” himself.

Prigogine and Stengers (1985) provide another problematic introduction to chaos theory. A Continental text often cited during the interdisciplinary invocation of chaos theory, though curiously ignored by Gleick (1988) in his historical narrative, *Order Out of Chaos* is a very different kind of book from that of Kellert (1994) or Lorenz (1997). It does not, contrary to our expectations, explicitly embrace chaos theory, but instead reassesses the philosophy of science in light of the discovery of an unexpected complexity in nature.⁴⁰ In this respect, the English title *Order out of Chaos* is somewhat misleading. Prigogine and

³⁷ James Gleick 1988: 3 and 4.

³⁸ James Gleick 1988: 30.

³⁹ James Gleick 1988: 5 and 43.

⁴⁰ Ilya Prigogine and Isabelle Stengers 1985: 2.

Stengers adopt “chaos” here, not in the sense of “chaos theory,” but in its more general sense of disorder. Moreover, the complexity to which the authors refer is pretty simpleminded. When they describe the reorganization of thermodynamic systems that are far from equilibrium, they use self-organization and dissipative structures. However, these terms have more in common with their chaos theory counterparts than with complexity theory. To complicate matters further, Prigogine and Stengers define these transitions from order to disorder and back again as an evolution, and hence, their evolutionary paradigm.⁴¹ As we shall see in Chapter Seven, Prigogine and Stengers’ evolutionary paradigm is at odds with that of Holland and Deleuze. The problem with its construction is that throughout *Order Out of Chaos*, the authors use “system” in a general sense to signify both inorganic systems such as the flame of a Bunsen burner in a high school laboratory or a complicated inorganic chemical reaction, and organic systems such as a square kilometer of tropical forest in the Amazon Basin or a herd of caribou migrating across the Canadian tundra. A reaction such as the chemical clock the authors describe is clearly an open system; yet it is improper to define its transitions as an evolution. When they apply heat to the chemicals they may indeed rearrange themselves into an ordered configuration but they do so unconsciously. The chemicals are incapable of adaptation or becoming because they do not learn anything from their experiences with the Bunsen burner and will

⁴¹ Ilya Prigogine and Isabelle Stengers 1985: 298.

produce the same order regardless of how many times the experiment is conducted.

Another factor that could mislead academics is that while Prigogine won the Nobel Prize in 1977 for his work on dissipative structures, these structures are not central to *Order Out of Chaos*. The authors' primary theme is the effect of time on science, both in the empirical sense as well as on the historical relationship between the sciences and the humanities. In this respect, the French title *La Nouvelle Alliance* (1979), is a better indication of Prigogine and Stengers' intention of a double reconciliation: (1) that of the science and the humanities; and (2) thermodynamics, which they define as the science of complexity, and dynamics, which stands in for simple, elementary behavior.⁴²

What is chaos theory? Stephen Kellert uses more technical language than does Gleick (1988), and defines chaos as "the qualitative study of unstable a-periodic behavior in deterministic nonlinear dynamical systems."⁴³ For the purpose of this paper, however, I shall borrow Edward Lorenz's definition of chaotic systems, and by extension, chaos theory. Edward Lorenz argues that a rock rolling down a hill or waves breaking against the beach are examples of chaotic systems "whose variations are not random but look random . . . ones that appear to proceed according to chance even though their behavior is in fact determined by precise laws."⁴⁴ Lorenz's definition is useful for two reasons: (1) it

⁴² Ilya Prigogine and Isabelle Stengers 1985: 209.

⁴³ Stephen Kellert 1994: 1-2.

⁴⁴ Edward Lorenz 1997: 4.

is not overly technical; and (2) it emphasizes chaos theory's relationship to probability and to motion governed by precise laws, for it is these laws that differentiate a chaotic system from a complex adaptive system.

Chaotic systems exhibit sensitive dependence on initial conditions and reflect our fascination with determinism and chance. Thus chaos theory is not concerned with disorder and mayhem in the traditional sense; rather it describes the hidden order in systems that appear to be random, an order that would be difficult if not impossible to measure using Newton's equations. The key, however, is measure. Take for example a cold mountain stream: chaos theory tells us that though the stream may appear to fluctuate randomly as turbulence shatters its uniformity, the fluctuations are the product of an initial condition or conditions beyond the scope of our senses and instruments. In this sense, there is an order to the fluctuations that we can measure and plot on a graph. The stream's turbulence may appear chaotic, but it also exhibits fleeting moments of stability and order. The motion of the stream bifurcates at a stable rate, shifting from instability to stability at a measurable periodicity. However, with the proper instruments it is possible to measure those fluctuations and model them on a computer to produce a fractal.

Complexity Theory

In spite of its ability to find order where none previously existed, chaos theory, like dynamics and thermodynamics before it, has its own limitations. Scientists like John Holland and Murray Gell-Mann, among others, have

recognized that while chaotic systems seem complicated the mechanics and the math behind them are fairly stable:

Chaotic dynamics were complex, all right: think of the way a leaf seems to flutter at random in a steady breeze. But the complexity was pretty simpleminded. There is one set of forces – from the wind, in the case of the leaf. Those forces can be described by one set of mathematical equations. And the system just blindly follows those equations forever. Nothing changes, and nothing adapts.⁴⁵

Chaotic systems may produce order but this order is always the same and does not change unless the forces applied to the system change. A leaf on a tree or Prigogine's chemical reactions produce the same order each time the force, in this case a light spring breeze or the heat from a burner, is applied. Chaos may produce dissipative, orderly structures, but the structures will always be static. They will never evolve or adapt to become anything more.

The static order of chaos creates a fundamental boundary on its range of application. While chaos has proven useful in the studies of chemical reactions and other non-living systems, it has more difficulty explaining the non-linear dynamics of living systems. Systems like the stock market or the mass media are similar to chaotic systems in that they too are composed of agents that can reorganize themselves into emergent structures. They differ from chaotic systems, however, because their agents are alive and have a tendency to react to the environment, to learn from experience and adapt, something a static chemical reaction cannot do. To summarize:

⁴⁵ Mitchell Waldrop 1993: 131.

Complex, self-organizing systems are adaptive, in that they don't just passively respond to events the way a rock might roll around in an earthquake. They actively try to turn whatever happens to their advantage . . . every one of these complex, self-organizing, adaptive systems possesses a kind of dynamism that makes them qualitatively different from static objects such as computer chips or snowflakes, which are merely complicated. Complex systems are more spontaneous, more disorderly, more alive than that.⁴⁶

Complex systems are not static or chaotic, but exist at "the edge of chaos . . . a shifting zone between stagnation and anarchy, the one place where a complex system can be spontaneous, adaptive, and alive."⁴⁷ To study the complex is to peer into the origins, evolution, and meaning of life. As previously mentioned, one of the leaders in the study of complex systems is John Holland. Formally, Holland identifies three characteristics all complex adaptive systems share: (1) they are composed of and generate diverse agents, which can be *cas* themselves and occupy niches within the environment; (2) they interact with their environment and engage in games of mutual cooperation and competition with other *cas*; and most important of all (3) they adapt to their environment by creating "internal models" based on their experiences, and robust structures that help them when they encounter novel environments.⁴⁸ Although the three

⁴⁶ Mitchell Waldrop 1993: 11

⁴⁷ Mitchell Waldrop 1993: 12.

⁴⁸ John Holland 1995: 10-40. Holland's framework is more formal than mine. He breaks the common qualities of *cas* into seven basics, which includes four properties (Aggregation, Nonlinearity, Flows, and Diversity) and three mechanisms (Tagging, Internal Models, and Building Blocks). For the sake of simplicity, I have condensed his framework into three qualities and will elaborate on his more specific requirements as they come up in later chapters.

following chapters deal with these characteristics and their relationship to the media *cas* in greater detail, I will introduce them here briefly.

First, *cas* are composed of and generate diverse agents which occupy environmental niches.⁴⁹ The character of an agent is system dependent. For example, agents in the human *cas* include DNA, genes, cellular structures, cells, tissues, organs, etc, while the media *cas* is composed of readers, viewers, listeners, reporters, editors, publishers, and newspapers, to name just a few.⁵⁰ Furthermore, Holland identifies four properties all agents share: diversity, aggregation, nonlinearity, and flows. The short lists of agents in human and media *cas* hint at their diversity, while aggregation not only helps us categorize agents as reporters or editors but also hints at emergent behavior within such groups beyond the capability of a single agent. Nonlinearity represents the thermodynamic property of the *cas* and flows to the length of time it takes for agents to interact. Taken together, these four properties suggest that power and control in the *cas* are highly dispersed, arising from competition and cooperation rather than imposed from above by a master agent.⁵¹

The second attribute of a complex adaptive system is that its agents engage in mutual cooperation and competition in pursuit of ill-defined, if not perpetually elusive, goals. When agents play games they receive a payoff, which

⁴⁹ Holland adopts "agent" because it is also used in game theory.

⁵⁰ It should be noted that the Murray Gell-Mann definition of agents differs slightly from that of Holland, in that he argues that agents that compose a *cas* may also be *cas* themselves. See Murray Gell-Mann 1994b: 17.

⁵¹ Mitchell Waldrop 1993: 145.

could be money — although its exact nature again depends on the system under observation. The agents in a complex adaptive system interact with others, possibly trying to get the better of them, yet it is important to remember that any payoff they ultimately receive is always subject to the actions of other agents. Tagging is an important mechanism in this respect since it helps agents distinguish friend from foe. The media *cas* is replete with examples of cooperation and competition. At one level, a reporting agent may play cooperative games with sources or public relations practitioners for information. At the same time, the reporter competes with other reporting agents for positions, respect or fame. Conrad Black's recent purchase of *The Financial Post* suggests competition and cooperation at another level. In this case, the payoff is a share of the Canadian newspaper market.

The final attribute of *cas* is that they are cognitive in that they recognize, learn and adapt to their respective environments. A *cas*' cognitive ability, especially at the cellular level, is often inductive. This means that it builds internal models of its environment based on its experiences with other agents operating in the environment.⁵² These fluid models, which are organized into hierarchies, help us recognize and adapt to the actions of other agents, who are also building models. If a reporter has a bad experience with a source or public relations representative, for example, he might make it a rule to avoid dealing with that source in the future, or even avoid that particular PR firm entirely.

⁵² Mitchell Waldrop 1993: 146.

These rules of thumb are quite common and we use many of them every day to make our lives easier, so much so that we hardly notice when we refine our rules to account for new information. Here, flexibility is a fundamental property because the adaptive plan must meet the challenges of a perpetually novel environment. To accomplish this goal, *cas* rely on tools like analogy and rhetorical figures, such as metaphor. These tools help the media *cas* leap and zigzag from castigating one public relations representative, to all PR representatives in that particular firm, and then to all public relations firms.

The identification of a complex adaptive system's basic characteristics is an important step in the reorientation of media theory towards complex systems analysis. However, these basics shed little light on the quantitative complexity of a given *cas*. To solve this problem, we must turn to the work of Gell-Mann (1994a). As we shall see in Chapter Eight, Complexity, Gell-Mann's effective complexity originates in information theory (Shannon 1949). Briefly, Gell-Mann argues that the complexity of a *cas* is the length of the schema, or internal models, generated by another observer *cas* to describe that system. The complexity of a given *cas* then is an entirely subjective measure, dependent on the knowledge of the observing *cas* and the level of detail recorded. More importantly however, it is careless to assume that systems that seem complex or complicated have a high complexity value and vice versa, since the actual complexity measurement of systems like newspapers, radio and television stations is still subject to inquiry and debate. The function of the media *cas* is important here because it is the paramount observer *cas*, transmitting millions of messages each and every day.

Taken individually or as a whole, these messages produce a model of its environment, in this case, the world at large. Whether we can use the models created by the media *cas* to measure the complexity of other worldly *cas*, however, is debatable because news agents, which include not only reporters but also editors and the media outlets for which they work, can be unreliable observers.

Thus far we have considered chaos theory, complex adaptive systems, and complexity from a purely scientific perspective in order clearly to differentiate among them, stopping only briefly to hint at their possible application to media theory. This is not to say, however, that the media or their critics have entirely ignored the implications of the complex on our daily lives. The terms complex and complexity crop up frequently in the media and in news coverage. A recent Wal-Mart commercial, for example, claims the manufacture of a particular brand of squeegee is extremely complex while, DeVry, a technical school located throughout the United States and Canada, offers an education package that will prepare you for jobs in the complex world. However, there is a substantial difference between describing a system as complex and understanding its complexity. Many media critics fail to make this differentiation despite the relative popularity of such terms in print, radio and television.

CHAPTER 3: INTERDISCIPLINARY ECLECTICS

Introduction

Despite the potential benefits, media scholars tend to avoid theoretical engagements with scientific fields such as physics, biology and chemistry. Perhaps this is for the best considering the unpromising results thus far. The few who transcend the linguistic and methodological barriers erected to distinguish the arts from the sciences must confront a number of problems, of which two are important here. First, pursuing a novel interdisciplinary course does not guarantee that other scholars will follow. Journalism and mass communications literature demonstrates that this occurs all too often, resulting in an eclectic assortment of books and articles that lack a theoretical cohesiveness. While the ideas forwarded by Nadin (1986) or Pavitt (1991) must have been pressing at the time, they now seem to have been abandoned. Secondly, it's important to establish a clear and consistent terminology. For example, ecology, dialectical ecology and organizational ecology fall under the rubric of organization theory but scholars must ensure they distinguish between them. The same holds true of chaos and complexity theories. Chaotic and complex systems are different manifestations, yet scholars such as Hayles (1991) and Rushkoff (1996) use "chaotic" and "complex" interchangeably. These misconceptions not only undermine their arguments but also the interdisciplinary process. Therefore, before initiating a discussion about the mass media and media *cas* multiplicities, it might be useful to examine some of the difficulties attending previous

interdisciplinary approaches, especially those incorporating chaos and/or complexity theories, in order to avoid certain conceptual weaknesses.

Divided into three sections, this chapter will assess science's impact on late Twentieth Century media scholarship. The first section introduces many of the interdisciplinary articles published in the last thirty years, but focuses on those that adopt an ecological perspective. Although eclectic in range and scope, most of this research falls into one of two categories. The first contains articles that engage directly with the hard sciences, while the second focuses on studies originating in the social sciences, especially organization theory. Divided into three critical lines — structural formalism, dialectical ecology and organizational ecology — organization theory and complexity theory seem at first glance to share common features. However, structural formalism's emphasis on equilibrium, dialectical ecology's disregard for environmental factors and organizational ecology's insistence that natural selection and not adaptation is the fundamental force of change suggests that organization theory and complexity theory are not analogous.

Section two analyzes the more successful work of Altheide (1995) and Johnson *et al* (1998). Altheide's ecological approach emphasizes the interconnectivity of various media participants and the technology they use to communicate. Although he does not state it in such concrete terms, Altheide argues that media evolve because societies create new technology to meet their communications needs. This technology in turn transforms how we communicate with one another. Altheide's emphasis on interconnectivity signals a shift away

from political economy (see Chapter Four). Johnson *et al* (1998) also illustrates the importance of interdependence, suggesting that the Internet will spur interdependence, self-organization, and enhance our ability to solve problems. Although Johnson focuses solely on the Internet, the same argument could be made for other print, radio or television. However, while he recognizes the limitations of print, radio and television, Johnson fails to appreciate that the Internet too engenders fundamental limitations that impede self-organization and interdependence.

Finally, section three examines more recent theoretical contributions that visualize media as chaotic or complex systems. The literary critic Katherine Hayles (1991), pop culture enthusiast Douglas Rushkoff (1996) and mathematician John Paulos (1996) have applied chaos and complexity theories to journalism and mass communication problems, with disappointing results. Their theoretical stance remains problematic because they do not clearly differentiate among the terms “chaos,” “complex,” and “complexity.” Hayles and Rushkoff complicate matters further when they coin novel terms such as “chaotics” and “chaos virus” in order to strengthen the parallels they construct between scientific theories and their social science counterparts. Misconceptions, combined with novel terms founded on those misconceptions, ultimately undermine the work of Hayles and Rushkoff. Paulos fares slightly better than his humanistic counterparts, although he is by no means exempt from their tendency to equate social systems with chaotic systems rather than with complex systems.

Science and Social Science

In the last twenty years periodicals have published only about two dozen scientific articles spanning a broad range of theory and methodology. Examples of topics proposed and later abandoned include field theory and semiotics (Nadin 1986), artificial intelligence and communication (Pavitt 1991), and the biological origins of human interaction (Cappella 1991). Theme issues remain a popular forum for interdisciplinary work; a 1993 issue of the *Journal of Communication* exemplifies this tendency. Devoted to mathematics and media, the journal focuses on topics such as models (Fink 1993), cultural interaction (Armstrong and Bauman 1993), and issue prioritization (Zhu *et al* 1993). However, many of these interdisciplinary projects languish in a theoretical vacuum, since their technical language or complicated methodology seems to dissuade further research, or they contain misconceptions or inaccuracies that ultimately undermine their findings. Even theme issues are not exempt from these problems. Although thematically similar, the mathematics articles published in the *Journal of Communication* are theoretically independent and often difficult for a non-mathematician to follow, limiting their overall impact on the field. An eclectic body of literature, interdisciplinary research founded on the hard sciences challenges scholars to find a common theoretical thread when more often than not, one does not exist.

The so-called “hard sciences” may not be theoretically critical to journalism and mass communications research, but sociology in general and organization theory in particular have produced a substantive literature. Rooted in the social and administrative sciences, organization theory delves into the

structure, function and development of organizations such as media. Influenced by social pioneers like Comte, Spencer and Durkheim (Hassard 1993), theorists such as Parsons (1937 and 1951) and Donaldson (1985) favored approaches grounded in structural formalism. However, structural formalism's dominance is by no means total and there are other critical alternatives, including Marxist (Benson 1977; Aldrich and Mueller 1982), ecological (Terreberry 1968; Carroll 1988) and postmodern (Cooper and Burrell 1988; Gergen 1992) proposals. In addition to the general theoretical concerns, studies on the newspaper industry's dialectic ecology (Kaul and McKerns 1985), newspaper mortality in Argentina and Ireland (Delacroix and Carroll 1982 and 1983) and the ecological character of Chicago's foreign language press (Bekken 1997) specifically confront media from organizational perspectives.

At first glance complexity theory and three branches of organization theory — structural formalism, dialectical ecology and organizational ecology — appear to share certain salient features. For example, Hassard (1993) argues that Spencer characterizes society as “a self-regulating system [which] should be understood through the study of its constituent parts and their patterns of interdependence.”⁵³ Two of the hallmarks of complexity theory are persistent and anomalous patterns, interdependence and interconnectivity. Holland's methodology in *Emergence* (1998) is similar to that proposed by Spencer, since he breaks complex systems into their component structures or mechanisms (see

⁵³ John Hassard 1993: 13.

Chapter Seven). In addition, Spencer “draws functional analogies between the processes of organisms and societies.”⁵⁴ Hofstadter (1979) and Holland (1995) incorporate such analogies into their respective works when they compare the function of extremely complex systems such as stock markets and nations with the simpler ant colony. However, Spencer also stresses the unity or totality of social systems. He assumes a system’s behavior is the sum of the behaviors of its constituent parts, a claim that Holland (1998) clearly disputes.

Marxist organization theory, also known as dialectic ecology, synthesizes Darwin and Marx in order to create a theoretical history of mass communications that emphasizes the contradictions that result from the adaptation process.⁵⁵ Characterized by four basic principles — social construction, totality, contradiction, and praxis — dialectics is a quest for the “principles which account for the emergence and dissolution of specific social orders.”⁵⁶ Dialectical ecology’s objective is the “realization of a social situation in which people freely and collectively control the direction of change on the basis of a rational understanding of social process.”⁵⁷ There are three fundamental differences between complex and Marxist perspectives: (1) the environment; (2) adaptation; and (3) the product of adaptation. The first difference is the definition of the environment itself. Ecology and complexity theories agree that an organization’s

⁵⁴ John Hassard 1993: 13-17.

⁵⁵ Arthur Kaul and Joseph McKerns 1985: 218-219.

⁵⁶ J. Kenneth Benson 1977: 3.

⁵⁷ J. Kenneth Benson 1977: 18.

environment is open, that is, the environment “comprises all that is external to and potentially influential on a population under observation, not excluding other social systems and the interactions they incite.”⁵⁸ Marxism’s fascination with boundaries also influences its conception of organizational environments. Marx favors closed systems, which means an organization’s internal environment is much more influential than exterior concerns. Considering their different conception of environment, it should not surprise that ecology and dialectical ecology do not agree how organizations interact with their environment either. Again, ecology and complexity theories are similar because they argue that a system or organization’s environment stimulates adaptation and change. Marx, on the other hand, rejects external environmental factors as a source of change. Instead, he argues that “change is a process of internal dialectic arising out of an unexplained movement toward technological improvement and accumulation.”⁵⁹ Kaul and McKerns (1985) provide a good example of this emphasis on contradictions. The authors conceptualize the daily newspaper as a “dinosaur” beset by contradictions. Newspapers are dying, they argue, because they are too general and too slow to compete with radio, television and the Internet. Although most major newspapers now publish Internet editions, Kaul and McKerns argue that this adaptation does not resolve the contradiction that newspapers should be, in fact, made of paper.⁶⁰

⁵⁸ Amos Hawley 1984: 906.

⁵⁹ Amos Hawley 1984: 914.

⁶⁰ Arthur Kaul and Joseph McKerns 1985: 230.

Finally, dialectical ecology and complexity theory dispute the results of adaptation. Marx argues that organizations and other systems develop toward an equilibrium state, which “occurs when the forces of production are appropriate for and in harmony with the relations of production.”⁶¹ Though Marx goes on to argue that equilibrium is also unstable, beset by crises, Holland disputes this association of organizations at equilibrium.

It is essentially meaningless to talk about complex adaptive systems being in equilibrium: the system can never get there. It is always unfolding, always in transition. In fact, if the system ever does reach equilibrium, it isn't stable. It's dead.⁶²

Structural formalism, dialectical ecology and complexity theory are not complementary, but neither are organizational ecology and complexity theory, despite their common ecological premise. While Holland (1975 and 1995) concentrates on adaptation, Carroll (1988) argues that natural selection is the fundamental source of organizational change since strong inertial forces severely constrain adaptation.⁶³ Hence the emphasis in Delacroix and Carroll (1982 and 1983) on the birth and death rates of newspapers in Argentina and Ireland. However, Hawley (1988) identifies two problems encountered by organizational ecology: (1) variation is absent, since the theory assumes that organizations are “genetically” equivalent; and (2) the processes that generate novel organizations or niches are unclear. Hawley does not provide solutions to these problems,

⁶¹ Amos Hawley 1984: 908-909.

⁶² Mitchell Waldrop 1993: 147.

⁶³ Glenn Carroll 1988: 2.

except to suggest the niche creation has something to do with “niche emergence.” What is more interesting is that the problems that hamper organizational ecology are central to complexity research. For example, Holland (1995) elaborates on niche emergence (see Chapter Five), while Miller (1995) uses a genetic algorithm to produce more effective organizations from existing ones (see Chapter Seven).

Altheide — A Step Forward

Although grounded in the humanities, Altheide (1995) offers an interdisciplinary perspective that bears similarity to the work of Holland. As the title *Ecology of Communication* suggests, Altheide argues for an ecological approach to communication. Communication, media and the technology they deploy are subject to evolutionary forces and the inherent instability of their “effective environment.” Environmental instability also suggests that power and control is unstable. Altheide incorporates four primary themes in his argument: the emergence of communications technology, the effect these emergent technologies have on the communication process, the role of the media and the impact the audience has on this role, and finally, the question of power and control of media.⁶⁴ Foremost among Altheide’s achievements is his insistence that media exist in an ecosystem composed of many different agents, as in a

⁶⁴ Although it is outside the purvey of this paper, another major theme Altheide’s explores in *Ecology of Communication* is how technology affects our perception and handling of disputes, such as those in court cases.

natural ecosystem. To study this ecosystem then, the critic must consider all of its components, from the owners and their media organizations to the audiences and the various technologies all these agents invoke. Already, we can see how Altheide breaks with media theories such as political economy that isolate agents from one another.

More important, however, is Altheide's emphasis on technology.

Technology is key to Altheide's analysis because it is both a product of and catalyst for evolution and he summarizes this in two important observations: (1) new information technology like radio, television, and now the Internet are responses to perceived social and communication needs; and (2) these emergent technologies have in turn transformed society.⁶⁵ These form the one-two punch that challenges and then buries the categorizations normative theory has to assume. While critics like McQuail, Curran, and Kurtz begin their analysis with a presupposition that "the media should be X," and then elaborate on why the media is not X, followed by ideas on how governments or the media organizations themselves ensure it eventually becomes X, Altheide argues that this is an impossibility. Our communication needs have generated novel communications technologies to which the media must adapt and incorporate into the fold. Technology, however, also transforms how we communicate, displacing the old while generating unanticipated methods. Altheide uses the example of satellite

⁶⁵ David Altheide 1995: 14.

technology but there are many others. A few short years ago the majority of mail was delivered by hand and many people were restricted to telephone 'party lines'. With the advent of computer technology and global communications demands, fibre optics, e-mail, and wireless cellular phones appeared. These technologies have since revolutionized how we communicate with one other. For example, answering machines and voice mail are standard issue in offices, while larger corporations adopt these technologies to eliminate operators and to route calls instead through automated voice answering services. In this respect, Altheide's work is much closer to that of Holland: the media can never achieve X, thanks to the development and influence of novel technologies. As Altheide states, "social order is increasingly an electronically communicated and mediated order and this has tremendous consequences for social life and especially for freedom and justice."⁶⁶

Altheide, like his colleagues, attempts to define the role of the media in society. Unlike the others though, he refuses to reduce the media to a single model but instead tries to define what the media actually do. The media's role, according to Altheide, is not that of an objective transmitter, as those who favor "objectivity" would have us believe. Rather the media is a collection of "concrete action agents that come to represent or stand for the location and establishment of various kinds of meanings."⁶⁷ Altheide's ecological communication breaks with

⁶⁶ David Altheide 1995: Preface.

⁶⁷ David Altheide 1995: 60

traditional academic approaches in that it dismisses the possibility of objectivity outright. First, Altheide rejects the notion that an objective model, or “true” media exist, and he then rejects any possibility that the media themselves are capable of objectivity. Instead, Altheide insists that the media generate meanings, stake out positions, and ultimately have a voice in the generation and depiction of society. Indeed, there is no precedent or rule that explicitly states the media should be a vehicle for justice or democracy or that the media should, as Curran argues, “sustain vigilant scrutiny of government and centers of power” while providing “a source of protection and redress the weak and unorganized interests,” — though the media are capable of staking out both of these positions just as easily as they can support injustice or antidemocratic movements.⁶⁸ We do not have to look far in history to find examples of these just and unjust, democratic and antidemocratic tendencies.

In keeping with his ecological bent, Altheide reincorporates the audience into media theory previously dominated by big business. Contrary to Adorno and Horkheimer, who reduce the audience to a mass of mindless drones incapable of resisting the temptation of inherent meanings issued by the “culture industry”, Altheide’s audience actively participates in media. After all, it is the audience who “recognize formats, relate a current message to previous communication, and draw on their own biographies and effective environment to provide the context

⁶⁸ James Curran 1991b: 111.

for a message.”⁶⁹ What is even more interesting, however, is that Altheide manages to integrate audience and media without relying on a structure such as the public sphere, which as we have already seen, is a dubious concept at best since it is never truly public. The reference to a public sphere becomes unnecessary because we see that the boundaries that differentiate the public from the private begin to break down. Audiences call on their experiences from both spheres when they formulate meaning.

Another of Altheide’s important observations is about the nature of power and control in communication systems. As we have already seen, control is a function of market forces. Those who have the most capital have enough money to operate expensive media outlets. The masses then are at a disadvantage because they don’t have the capital to invest in media ventures. Altheide, however, stakes out an alternative position. Performance, or as Altheide calls it “skill,” and not capital, is the factor that determines the flow of power and control in media. Here again, Altheide’s ecological approach shadows Holland’s conclusions. Stated simply, when a novel communications technology emerges, those who perform the best with the new technology and the novel environment it generates will assume the lion’s share of power and control. This runs contrary to Adorno and Horkheimer’s assumption that market domination in itself is enough to ensure the longevity of the culture industry. Indeed, we can already see how a communications technology like the Internet transforms our perceptions of power

⁶⁹ David Altheide 1995: 62.

and control. At the moment, the Internet is a rather exclusive club with only a small percentage of the world's population on-line. It is not a cheap communications tool since it requires hardware, software, and service providers. Still, the medium itself has created alternatives to the prohibitive costs. Cyber-cafes cater to those who don't have computers, while organizations such as the World Wide Web community of GeoCities provide anyone with access to the Internet with eleven free megabytes of disk space with which they can create their own Web page, subject to certain restrictions.⁷⁰ The catch is, however, that you need an e-mail address. This is not a problem because companies like Hotmail have stepped in to provide Netizens with free e-mail accounts accessible from anywhere in the world at any time. Those who adapt to a world of HTML tags, Cgi, and JavaScript have some very powerful tools at their disposal to help them communicate, or even to restrict the communication of others, as hackers have done to the Republic of Indonesia's Web site in protesting that government's policies in East Timor.⁷¹ While the government may initially have created the Internet to communicate in the event of a nuclear holocaust, it is the ordinary citizens frowned upon by Adorno and Horkheimer who have adopted the technology as their own, made it grow, and provided much of its character. Only

⁷⁰ GeoCities does not permit pornographic Web pages and will close such sites upon discovery. It also asks customers to choose either a mandatory banner ad or pop-up window ad to appear when their page loads. These ads often refer to other GeoCities Web pages.

⁷¹ The Republic of Indonesia's Web site has been hacked on three different occasions. The hacked pages can be downloaded for viewing at www.focus-asia.com.

recently did governments and big business realize the Internet's potential; they now have to catch up with the millions of Web pages currently roaming the Net.

In Altheide's work we find the first elaboration of the media *cas* in contemporary media theory. Altheide's media is an evolving entity composed of diverse agents who demand and must adapt to novel technologies. Society, communication and technology exhibit an "interdependence," in that "a change in any portion of the process is likely to influence another portion."⁷² Technology challenges agents because it creates new niches that are then filled by even more novel technologies and agents. This is an ongoing process with no final objective or model; hence any argument that insists the media should conform to a certain model will be subverted by this ecology of communication. The co-evolution of society, media, and technology nullifies Curran's presuppositions and categorizations. Finally, the diversity of agents and the demands of novel technologies ensure that power and control in the media *cas* rest with those agents whose performance in the new environment is above average. As new technologies develop and are incorporated into the communication fold, agents must also improve their performance or risk extinction.

The World Wide Web and Self-Organization

Altheide (1995) analyzes modern society's technological demands and the consequent impact of said technologies on the communications process from a

⁷² David Altheide 1995: 11.

communications perspective. Johnson *et al* (1998) on the other hand tackles the impact of technological advances, specifically the Internet, on *cas* from a scientific perspective. Scientific interest in the media focuses on the growth and future of the World Wide Web. For example, Bollen and Heylighen (1996a and 1996b) and Heylighen and Bollen (1996) visualize the Internet as a kind of brain, in which the thousands of interconnected networks serve as the neurons. The complexity of this Web fluctuates as it adds and deletes networks, creates new pathways, and expands its signal capacity. In many respects this cybernetic model of the Internet is also a complex adaptive system, a media *cas* composed of millions of complex interconnected agents who adapt and evolve.

In keeping with this brain metaphor and model, Johnson (1998) argues that the Internet, an agent in the media *cas*, will greatly enhance the self-organization of agents in other *cas*, especially their ability to solve complicated problems.⁷³ Such strides are possible because the strengths of the Internet and human agents complement one another while minimizing their respective weaknesses. Human agents can solve problems when presented with limited heterogeneous data, but have much more difficulty when presented with a lot of homogeneous data, unlike computers, which crunch large quantities of numbers efficiently.⁷⁴ A combination of the two then, would enable both to solve difficult problems and improve performance.

⁷³ Norman Johnson *et al* 1998: 5.

⁷⁴ Norman Johnson *et al* 1998: 2.

Though Johnson emphasizes the role of the Internet in self-organization, it is not difficult to see how such a model could be extended to incorporate the other prominent technologies operating within media *cas*. Ubiquitous radio and television phone-in programs such as *Cross-country Check Up*, which actively solicit audience participation and input on a specific topic, operate along similar lines. What differentiates the Internet from radio and television, however, is its dual capacity as information storage center and mode of nearly instantaneous communication.⁷⁵ Although the Internet, and especially its current pop-culture incarnation, is still a relatively young technology when compared with radio or television,⁷⁶ Johnson is correct in suggesting that its ability to store information is unparalleled. Recent estimates put about 320 million Web pages floating around in cyber-space and this number is expected to grow at a rate of 1,000 per cent a year.⁷⁷ Businesses big and small, though slow off the mark compared to universities and your average computer geek, also recognize the Internet's potential to revolutionize business. In many ways, it already has when one considers that more than half of North America's five trillion dollar economy transpires digitally and experts believe Internet sales will top one trillion dollars very soon.⁷⁸ Radio and television cannot hope to match such overwhelming

⁷⁵ Norman Johnson *et al* 1998: 2.

⁷⁶ Once known as ARPANET, the Internet's current incarnation traces its origins back to a 1969 U.S. Department of Defense experimental project designed to insure the possibility of communication in the event of a full scale nuclear war.

⁷⁷ Anonymous 1998a: A8.

⁷⁸ Robert Colapinto 1997: 59.

figures, a drawback often evident on phone-in programs. While an Internet debate on peace in the Middle East might stumble over a section in the Oslo Accords, a couple of clicks is all it takes for the parties involved to download the document in its entirety. The best a radio or television phone-in show can hope for is a clip from an interview or perhaps footage of the latest disturbances on the West Bank, accompanied by a brief graphic outlining the Accord's major points. Access to nearly unlimited information, coupled with nearly instantaneous global communication, is a powerful component of the media *cas*.

In spite of the vast amount of information at its disposal, the Internet suffers from many of the same storage problems that plague radio and television, a fact that Johnson largely ignores in his analysis. The Internet's rapid expansion over such a brief period of time creates growing pains not easily resolved. For example, the same analysts who estimate that the Internet comprises some 320 million Web pages go on to suggest that current search engines like Yahoo and Hot Bot access only about 40 per cent of available pages.⁷⁹ This means that more than half of the Web pages housed in this vast library are inaccessible to all but the lucky few who stumble across them. Another problem is the impermanence of most Web pages. The Internet is not a permanent record and Web pages disappear all the time for different reasons. Individuals, organizations and businesses revamp their Web sites all the time, deleting some pages while adding others. The vast majority, including most major newspapers, do not maintain

⁷⁹ Anonymous 1998a: A8.

archives because of space shortages.⁸⁰ Indeed it is highly probable that many of the Internet resources quoted in this paper will move to another Web address or disappear completely within a year. Libraries and databases have a distinct advantage over the Internet in this respect. Finally, concerns over bandwidth tarnish the Internet's claim to instantaneous global communication. The transmission of every word, image, and file takes up space on existing communication lines and only the lucky few who use cable modems or access a T1 line enjoy quick downloads. This problem is getting worse since many Netizens favor image intensive layouts over the traditional text-based variety, resulting in slow downloads. Without substantial retooling or advances in technology, the reliability of the Internet as an information storage center, and, to a lesser extent its ability to transmit that information quickly will suffer. These problems aside, however, Johnson's argument not only emphasizes the importance of a media *cas* but also its connection to other agents. The Internet and to a lesser extent other technologies adopted by the media *cas*, could play a fundamental role in the organization of agents and their ability to solve complex problems. Noteworthy here is the fact that Johnson emphasizes the media *cas*' storage potential rather than the characteristics of the stored information itself. Furthermore, what agents do with this information is also left unanswered.

⁸⁰ *The Globe and Mail* archives newspapers on-line for two weeks, and then not all the stories. *The National Post* maintains an more complete on-line archive. Any story published since the newspaper started operation in October of 1998 is available.

Chaos is Complex!?

From a layman's perspective, the definitions of "complicated," "complex" and "complexity" seem rather straightforward, even synonymous. From a scientific perspective, however, they are quite different. As we have already seen, scientists consider objects like computer chips and snowflakes to be complicated but not complex because they are not spontaneous or alive. The Toronto Stock Exchange or the pods of Killer Whales migrating off the coast of British Columbia, on the other hand, are complex. In each case the systems are alive, and academics are still trying to figure out a way to predict the spontaneous behavior of stock markets and whales. The question is, however, which of these systems are the more complex and how do you prove it. Are whales more complex than the stock exchange? How about the media? Are newspapers more complex than radio? Or is television the most complex medium? Perhaps the Internet will soon displace them all. While complex systems analysis reveals why things like stock markets, whales, and the media are complex, complexity theory attempts to measure the complexity of these systems and understand how this measurement fluctuates as the systems adapt and evolve. As long as media scholarship uses such terms interchangeably it will remain ill equipped to address such questions.

Hayles (1991) represents what is perhaps the first full exploration of chaos theory and its potential application to literary theory. However, Hayles' introduction to *Chaos and Order* is problematic; it not only lumps chaos and complexity together, but her understanding of chaos theory's basic tenets is questionable. Even though Hayles acknowledges that the term "chaos" should be

treated with due circumspection (p. 2), she has already claimed on the first page of her introduction that: (1) chaos is extremely complex information; (2) chaos seeks to understand complex behavior; and (3) the science of chaos is the science or sciences of complexity.⁸¹ Prigogine and Stengers' (1985) influence here is clear, yet it merely underlines the need for rigorously defined terminology. Funes (Date unavailable) undermines Hayles' first point when he concludes that the information content of a Mandelbrot fractal is, for all intent and purposes, zero.⁸² In addition, the fundamental limitation to chaos theory is that it does not understand complex behavior since it cannot account for learning, adaptation, and evolution in *cas*. It follows then that the study of chaos, contrary to Hayles' assumptions, is neither the science of the complex nor the science of complexity. In spite of these important differences Hayles uses "chaos" and "complex system" interchangeably, thus undermining the usefulness of her argument.

Another critic who falls headlong into the chaos vs. complex vs. complexity trap is "the brilliant heir to McLuhan," Douglas Rushkoff.⁸³ While Rushkoff's theory of the media virus, and of memetics in general, is beyond the scope of this thesis, his misappropriation of chaos theory is worth noting.

⁸¹ Katharine Hayles 1991: 1.

⁸² A fractal is an object that exhibits patterns within patterns, or in other words, self-similarity across scale. These patterns do not change, unlike the persistent patterns in complex adaptive systems (see Chapter Five). Mandelbrot (1977) was one of the first to recognize and generate fractal images from non-linear equations, although there are many natural fractals, including coastlines and clouds. See James Gleick 1988: 98-103.

⁸³ He is McLuhan's heir, according to *New Perspectives Quarterly*. The quote is taken from the back cover of the 1996 edition of *Media Virus!*.

Rushkoff (1996) broaches two complementary themes: (1) the emergence of a “datasphere,” an abstract region that is “the circulatory system for today’s information, ideas, and images,”⁸⁴ and (2) media viruses infiltrate this datasphere just as their biological counterparts spread throughout a human circulatory system. Chaos theory, or chaos math as Rushkoff calls it, is classified as a “self-generated virus” or “mutation” in that it originates in the media spontaneously and elicits dramatic responses wherever it travels.⁸⁵ The primary reason Rushkoff categorizes chaos theory as a self-generated virus turns on the media cliché of the Butterfly Effect, and the powerful impact this sensitive dependence on initial condition can have on systems. In keeping with the viral theme, however, it would seem that the Butterfly Effect is also only one of the few concepts in chaos theory Rushkoff understands clearly. He splices and dices chaos theory, the complex, and complexity, to create a harmful mutant strain.

In the section entitled “Rodney The Butterfly” Rushkoff briefly summarizes the impact of chaos theory on the datasphere, and, as the title suggests, concludes that the Rodney King beating is the butterfly, which flapping its wings, produces profound social and cultural changes. Closer examination of Rushkoff’s definitions, however, reveals the corrupt mutations at work in his text. For example, Rushkoff states that the datasphere is a chaotic system of great complexity:

⁸⁴ Douglas Rushkoff 1996: 7.

⁸⁵ Douglas Rushkoff 1996: 14.

The increasingly unfathomable complexity of the datasphere looks amazingly simple once its chaotic properties are reckoned with. The bizarre new effects of media on our culture must be seen as the influence of chaos on a system that was originally designed to instill order, but got too complex to manage.⁸⁶

In this respect, Rushkoff is right and wrong. As noted earlier, the complexity of a chaotic system is quite low when compared to that of a *cas*, and so it is incorrect to argue that the datasphere is chaotic and that it exhibits an unfathomable complexity. The two terms simply cannot be reconciled. Rushkoff is correct to assume, however, that if the datasphere were indeed a chaotic system, it would be relatively simple once such properties were understood. Still, it is difficult to imagine that either Holland or Gell-Man would consider even Rushkoff's abstract datasphere as anything but a *cas*.

Rushkoff proceeds to differentiate ordered from chaotic systems, and, as before, generates a mutant chaos strain that threatens not only to infect but destroy its source:

What makes a system change from an orderly one into a chaotic one is — in simplest terms — its complexity. A small stream of water can be understood as an orderly system, and its motion can be predicted using simple equations. The ocean, on the other hand, is influenced by too many factors for its motion to be reduced to one or two neat, linear equations. Still, the motion and properties of systems as complex as the ocean (or even the datasphere) can be predicted or even harnessed once their essentially chaotic nature is accepted. Remember, chaos does not mean random; chaotic systems have an underlying order to them.⁸⁷

⁸⁶ Douglas Rushkoff 1996: 33.

⁸⁷ Douglas Rushkoff 1996: 33.

To his credit Rushkoff correctly identifies the hidden order behind chaotic systems. His claim, however, that chaos originates only in systems of great complexity, or even size, is just plain wrong. The question of complexity has been dealt with earlier but it bears repeating: in spite of their appearance, chaotic systems are not complex compared to complex adaptive systems. Responding to Rushkoff's second claim, then, scientists have found chaos in water dripping from a kitchen faucet, mountain streams, and ocean currents.⁸⁸ There is no relationship between the size of a system and the presence of chaos. Finally, while chaos theory helps us predict the motion of ocean currents and weather systems, it has yet, contrary to Rushkoff's claims, to produce a reliable system for predicting the behavior of the mass media.

Scaling, or self-similarity, is another interesting aspect of Rushkoff's mutant chaos. Many chaotic systems are scale independent, though it is hardly a universal phenomenon. Earthquakes, for example, are scale independent because a small earthquake is simply a scaled down version of a larger quake, while the structure of an animal's skeleton is by necessity scale dependent.⁸⁹ Rushkoff argues that the datasphere exhibits self-similarity "with the structure of television cable networks reflecting the structure of individual TV sets, themselves reflecting the structure of the optic networks in the people who view them."⁹⁰ The example is curious because it illustrates scale dependence far better than self-

⁸⁸ James Gleick 1988: 122.

⁸⁹ James Gleick 1988: 107.

⁹⁰ Rushkoff 1996: 38.

similarity. Rushkoff describes three very different beasts, each requiring a specialized structure to support its function. While his desire to draw tidy parallels between the producers and receivers of media images through their networks is clear, Rushkoff seems content to ignore the finer points of chaos theory that problematize, or even negate, such connections. Ultimately, Rushkoff's analysis is inadequate because he fails to grasp the fundamentals of chaos theory, much less complex adaptive systems or complexity theory. When he tries to enforce his perception of the datasphere as a chaotic system, Rushkoff spawns a deadly deviant, a chaotic virus that displaces its predecessor to the detriment of society. Consequently, his arguments are confusing and offer no substantial insight into media complexity.

Finally, while Hayles and Rushkoff apply chaos theory to literary and media studies from within the confines of the humanities, John Allen Paulos (1996) approaches the media from the opposite direction. A mathematician by training, Paulos appropriates mathematical tools, and to a lesser extent, chaos and complexity theories, to his analysis of newspapers and their coverage. In doing so, he avoids many of the pitfalls that impede Hayles and Rushkoff. Yet in many ways, Paulos' arguments follow a similar path. For example, he contends that an understanding of certain fundamental mathematical principles, such as probability theory or Gödel's incompleteness theorem, alters the audience's perception of the newspaper and its contents. When he turns to the application of chaos theory to the media, Paulos resorts to a definition of the Butterfly Effect and how sensitive dependence on initial conditions is a component in many news stories. Paulos

warns readers that most economic forecasts produced by and for the media are essentially worthless since “our standard economic statistics are notoriously imprecise and unreliable, and this imprecision and unreliability propagates.”⁹¹ There is no better example of this imprecision than the ongoing coverage of the frail Canadian dollar. Each record low sets off a new round of debate over the causes, effects and fate of the currency, while investors wager on whether the Bank of Canada will step in to stop the slide. News reports cite a plethora of reasons: first it is the Asian economic crisis, then high taxes or our debt load, followed by a strong American dollar coupled with low interest rates. And yet, mimicking Paulos’ warning about sensitive dependence, a recent editorial in the *Calgary Herald* concludes:

No one — least of all the federal government — knows precisely why the loonie has fallen from 71 cents US in March to a low of 65.15 before closing at 65.83 on Friday This does, of course, raise the question of why all those high-priced economists can’t pinpoint the problem but to be fair it is obviously imprudent to react unless one knows exactly to what one is reacting.⁹²

Although Paulos does not distinguish chaotic systems from those of the complex adaptive variety, his mathematical background not only grounds a definition of complexity but also suggests at least one application of complexity and information theory to media studies. Paulos hints at some of the issues associated with data compression (see Chapter Eight). In “Special Investigator Says Full Story Not Told,” Paulos introduces an informal “complexity horizon.”

⁹¹ John Allen Paulos 1996: 25.

⁹² Anonymous 1998b: A14.

The presence of a complexity horizon, “beyond which social laws, events, and regularities are so complex as to be unfathomable,” means that newspapers must produce news that is accessible to a given readership.⁹³ The ability to compress news, a trait borrowed from information theory, becomes extremely important in this respect, although this in turn generates its own ethical issues.

A chaotic system is not a complex system, nor does it exhibit substantial complexity. While they share a mutual origin in thermodynamics, chaos and complexity theory are distinct fields of inquiry in that they deal with two types of systems, one static and governed by precise laws, the other subject to adaptation and evolution. The previous interdisciplinary approaches of Hayles (1991) and Rushkoff (1996) have failed to differentiate among the chaotic, the complex, and complexity, resulting in mixed messages and confusing terminology. Paulos (1996), on the other hand, provides a more accurate starting point for the application of complex systems analysis and complexity theory to media studies. With this distinction in mind, the following two chapters, *Mass Media* and *Media Cas*, begins to examine the characteristics of the mass media and media *cas* multiplicities.

⁹³ John Allen Paulos 1996: 120

CHAPTER 4: THE ESTABLISHMENT OF MASS MEDIA

Introduction

One question dominates media studies: What is media's role, if any, in a society, democratic or otherwise? The answer brokered by many Western critics, it would seem, is that media, and more specifically the so-called "mass" media, should support and nurture the democratic process. Herman and Chomsky (1988), for example, insist the mass media are a tool of the government and other power brokers, resulting in "a systematic and highly political dichotomization in news coverage" that ultimately constricts democracy.⁹⁴ In other words, the power of the mass media is a consequence of elite power. Postman too is uncomfortable with the performance and power of mass media, specifically that of television. Television is dangerous, he argues, because it transforms edifices of high culture, such as news, debate and politics, into cheap, culturally devoid entertainment.⁹⁵ McQuail (1991) treats the mass media with less indignation when he suggests it should serve the public interest, while Curran (1991a and 1991b) takes this concept of public service one step further when he argues that the mass media should assist "the equitable negotiation or arbitration of competing interests through democratic processes."⁹⁶

⁹⁴ Edward Herman and Noam Chomsky 1988: 35.

⁹⁵ Neil Postman 1985: 159.

⁹⁶ James Curran 1991a: 30.

However, the construction of this democratically-orientated mass media engenders questionable presuppositions about how media interact with other social constructions and consequently, the origins of political power over and of media. Siebert, Peterson, and Schramm (1956) were the first to formalize the interaction and politicization of media in their construction of Authoritarian, Libertarian, Social Responsibility, and Soviet Communist models of what the press should be and do. In each model, power over and of the media is a product of the political system in which it operates and not of internal mechanics. More important, however, is the fact that these presuppositions about media originate within the framework of a larger Cartesian epistemology that presumes that everybody understands certain fundamental concepts, such as what it means to think and be. Deleuze (1994) identifies this epistemology with an image of thought, and hence, when we speak of an image of the media, or of the mass media image, we are also reflecting on an orientation in thought that prevails in modern media theory.

The overwhelming power of the mass media image is surprising considering the number of alternative analytical tools developed in the last thirty years. In the late 60s and early 70s, for example, Continental movements such as *Tel Quel* initiated an all-out assault on the literary, class, and gender truisms of the day. It dismissed literary theory's preoccupation with objective meaning as fruitless, abandoning it in favor of deconstruction and other postmodernisms. This is not to say that media critics ignored the Continental tradition entirely: some of them embrace one of postmodernism's most stalwart opponents, the

German philosopher Jürgen Habermas. It is not surprising that they would turn to Habermas, as opposed to his more playful French counterparts, since his agenda is so overtly political in nature.

The media theory's orientation in thought and the dynamic mass media image that results from it are problematic because their determinism fails to explain the media's thermodynamic properties. Media theory has a great deal of difficulty explaining why the media consistently subvert all attempts to categorize them as a monolithic democratic tool. As many of the guests on CNN's *Reliable Sources* would surely attest, it is quite easy to criticize or even outright dismiss the media when they fail the democratic process around election time or embark on a schizophrenic tangent like the Monica Lewinsky affair. Jensen (1990) argues that it is more difficult to commit a leap of faith and set aside the presuppositions we take for granted, especially the existence of the so-called mass media, in favor of a more rigorous reassessment of media and their role in society.⁹⁷

This chapter embarks on just such a leap of faith in order to posit an alternative to the mass media image, the media *cas*, and in doing so, to distinguish two multiplicities: mass media and media *cas*. On the one hand, there is the mass media image, founded on interactive and political presuppositions about media performance that are themselves oriented in a process consumed with the search

⁹⁷ Joli Jensen 1990: 15.

for objective truths. Generality and homogeneity characterize this image, since even the term itself — mass media — suggests order and the subordination of difference to uniformity. Space is key, since the mass media image inscribes the boundaries and dimensions of media performance, beyond which there is only error. A spatial multiplicity, the mass media image obscures the image of the media *cas*. A multiplicity of pure duration, the media *cas* contests the notion of a totalizing, homogenous media replete with democratic obligations. The media *cas* is heterogeneous, perhaps even schizophrenic, with its diverse agents, aggregation and non-linear flows. This is not to say that the media *cas* is not political, quite the contrary. Power within the media *cas* is neither the gift of an elite overlord nor the product of central authority; it originates in the internal interactions of the media agents themselves.

Construction of the mass media multiplicity unfolds in two sections. The first section introduces the Cartesian image of thought (Deleuze 1994) and multiplicity (Deleuze 1991; Deleuze and Guattari 1987). The section proposes that media theory, like philosophy before it, is oriented in thought, and in doing so, it too presupposes an image, in this case, the mass media image. Siebert, Peterson, and Schramm (1956) are key here because they not only acknowledge the impact of an image of thought on their theoretical methodology, but embrace it unquestioningly in the formalization of the political presuppositions central to the mass media image. In addition to its democratic orientation, the image is characterized by two other properties. First, the image embraces generality, signified in the shift from a discussion of differentiated “media” to that of

homogenous “mass media.” Secondly, scholars who invoke the image react negatively towards sources of turbulence and friction. In other words, they criticize agents that cause media to stretch the mass media image’s predefined boundaries.

With this mass media image in mind, the section then turns to the image’s theoretical development through the latter half of the Twentieth Century. The section divides the theoretical approaches into two rough groups, although it should be noted that the distinction between them is quite loose, especially when one considers that the Habermasian public sphere invoked by Curran and Dahlgren is an outgrowth of Adorno and Horkheimer’s Frankfurt School. The first group to consider is that of Adorno and Horkheimer (1973), Postman (1985), Herman and Chomsky (1988), and Kurtz (1995). The primary theme that runs throughout the work of these critics is that the mass media are not performing their democratic duties, while the mass media’s decimation of culture runs a close second. The reasons for this failure depend on the critic. For Adorno and Horkheimer (1973) the mass media is merely a tool of rampant capitalism, producing nothing but a profane culture. Postman (1985), on the other hand, argues that the combination of technology, especially television, and the mass media transforms the culturally significant topics of politics and religion, to name just two, into entertainment. Herman and Chomsky (1988) argue that the mass media are under the thumb of a wealthy elite, a propagandist for those who have the power and resources to enforce their own agenda. This restricts the average citizen’s access to information and democracy suffers from an uninformed public.

Finally, Kurtz (1995) offers the perspective of a journalist working within the mass media. While he focuses exclusively on the decline of the American newspaper from a presupposed zenith, the reasons to which he ascribes this decline are hardly original: the shift towards entertainment over substance, and the unwillingness of reporters and editors to challenge the power of the elite. More interesting, however, is that while Kurtz (1995) generally embraces the image of a responsible media, he does suggest briefly that they exercise a negative influence, in that they breed complacency. While this image supports Adorno and Horkheimer, Postman, Herman and Chomsky, and Kurtz in their indictment of the mass media, it also acts as a limitation; for when they associate the undemocratic with error, they also exclude any possibility that these negative ticks are actually an essential element of media performance.

Other academics, including McQuail (1991), Curran (1991a and 1991b), and Dahlgren (1991 and 1995), are less pessimistic, but more noteworthy for their overtly political and normative orientation. The mass media, in spite of minor glitches, still operate in the public interest and it is best for us all to foster this relationship. McQuail (1991), for example, insists the mass media serve the public interest and sets out to identify the basic, normative requirements for social communication. Curran (1991a and 1991b) and Dahlgren (1991 and 1995) opt for a slightly different approach, choosing instead to focus on the social space in which the mass media operate. They conceptualize this space as a public sphere, drawing on the work of Habermas (1991), even though Habermas restricted his critique to a specific "bourgeois public sphere." However, McQuail, Curran, and

Dahlgren's unquestioned embrace of the mass media image and their emphasis on normative theories of media performance serve only to underline the limitations of the image and its deterministic dynamism.

An Image of Thought

The fundamental problem with media theory is the way in which its practitioners assign the media *a priori* dimensions, boundaries, and orientation, which, they assume, everybody knows. These critics construct, or later buy into, the classical argument that the media should above all else support the democratic process. Consequently, they condemn the media for overstepping boundaries of which it was unaware, imply a single mass dimension when there are many, and postulate control where there is none. Deleuze (1994) identifies this unquestioned adherence with an orientation towards an image of thought: just as thought implies an orientation, so too does an image of media. The image of thought and its counterpart, the mass media image, require careful analysis before we can posit an alternative image, the media *cas*.

Deleuze (1994) identifies the Cartesian epistemological tradition with an image of thought the implicit boundaries of which all but exclude alternative models of thought, such as schizophrenia. Moreover, the Cartesian image and the schizophrenic image of thought are multiplicities of space and pure duration respectively. Deleuze argues that Descartes carefully avoids objective presuppositions, concepts such as rational or animal, in his meditations, by replacing them with subjective presuppositions, primary among them the

assumption that everybody knows what it means to think and to be.⁹⁸ While these assumptions seem innocent enough, Descartes' recourse to opinion and the form "everybody knows," creates a discourse of representation, or an orientation of thought:

As we ask, "what is it to be oriented in thought?" it appears that thought itself presupposes axes and orientations according to which it develops, that it has a geography before having a history, and that it traces dimensions before constructing systems.⁹⁹

An orientation in thought is characterized by a distribution of space at the conceptual and methodological levels. For example, when Descartes claims that everyone knows what thought is, he creates an indisputable concept with dimension, geography, and most importantly, boundaries. These boundaries excluded other possible modes of thought, such as schizophrenia. As we shall soon see, we can make the same argument for media. Furthermore, Descartes' orientation imposes geography at the methodological level, since the act of thinking itself is subject to certain restrictions:

We suppose that thought possesses good nature, and the thinker a good will (naturally to 'want' the true) . . . we designate error, nothing but error, as the enemy to be fought; and we suppose that the true concerns solutions — in other words, propositions capable of serving as answers.¹⁰⁰

The discourse of representation posits presupposed boundaries and a search for objective truth. When everybody knows what it means to think and be, methodological boundaries harbor truth to the exclusion of error, just as

⁹⁸ Gilles Deleuze 1994: 129.

⁹⁹ Gilles Deleuze 1990: 127.

¹⁰⁰ Gilles Deleuze 1994: XVI.

conceptual boundaries effectively isolate the concept they enclose from doubt. The discourse constructs an indisputable concept of thought, or in our case, the media like a bar of gold — first it distributes the space in the form of a mold and only then pours the contents.

Deleuze proposes an alternative image, that of schizophrenia, to illustrate the weaknesses of the traditional image of thought. However, Deleuze argues that discarding the repressive Cartesian image of thought in favor of a different, though equally repressive image founded in schizophrenia is counterproductive. To avoid this difficulty, Deleuze turns to the idea of multiplicities as developed by Bergson, among others. Bergson's impact on Deleuze (1991 and 1994) and Deleuze's later collaborative efforts with Félix Guattari (1983 and 1987) is, by their own admission, profound:

Bergson completely alters the scope of the comparison [between the macrocosm and the microcosm] by opening up both ends . . . to the extent that the whole, of the world as of the living being, is always in the process of becoming, developing, coming into being or advancing, and inscribing itself with a temporal dimension that is irreducible and nonclosed.¹⁰¹

Multiplicities are central to Bergson's thought. Indeed, all of his multiplicities derive from his interest in the relationship between space and duration:

¹⁰¹ Gilles Deleuze and Félix Guattari 1983: 96.

It is created precisely in order to escape the abstract opposition between the multiple and the one, to escape dialectics, to succeed in conceiving the multiple in a pure state, to cease treating it as a numerical fragment of a lost Unity or Totality or as the organic element of a Unity or Totality yet to come, and instead distinguish between different types of multiplicity.¹⁰²

Bergson's two multiplicities — duration and space — run throughout Deleuze's work. For example, Deleuze (1994) differentiates between passive and active synthesis, individuation and generality. Passive synthesis is duration, a subjective time that infuses all events. It is a Bergsonian fabric, a continuity of background characterized by "the entire past at every moment but at diverse degrees and levels, of which the present is only the most contracted, the most concentrated."¹⁰³ We isolate events from this passive synthesis, activate them from the fabric, when we "restore them in an auxiliary space, a derived time in which we may reproduce them, reflect on them, or count them like so many quantifiable external-impressions."¹⁰⁴ Deleuze concludes that a positive difference and repetition, as opposed to the negative difference and repetitions encountered in Hegel and Marx is present in the stratum of the passive synthesis and not the differentiated auxiliary spaces we create.¹⁰⁵ Thought and schizophrenia follow a similar pattern. They are another in the long list of multiplicities Deleuze constructs to reflect his interest in space and duration. In this aspect, thought is a spatial multiplicity and schizophrenia is a multiplicity of

¹⁰² Gilles Deleuze and Félix Guattari 1987: 32.

¹⁰³ Gilles Deleuze 1994: 286.

¹⁰⁴ Gilles Deleuze 1994: 72.

¹⁰⁵ Gilles Deleuze 1994: 287.

pure duration distributed in “a space which is unlimited, or at least without precise limits,” — or in other words, a nomadic distribution.¹⁰⁶ To summarize briefly: the Cartesian image of thought distributes space, constructs boundaries, and establishes a geography from the outset, while schizophrenia exhibits limitless space where boundaries, dimension and geography are in constant flux.

In their collaborations, Deleuze and Guattari (1983/1987) again appropriate the Bergsonian multiplicity to construct *stratum*, a thousand plateaus through which existence traverses non-linearly. Deleuze and Guattari define a “plateau” as “any multiplicity connected to other multiplicities by superficial underground stems in such a way as to form or extend a rhizome.”¹⁰⁷

On the one hand, multiplicities that are extensive, divisible, and molar; unifiable, totalizable, organizable; conscious or preconscious — and on the other hand, libidinal, unconscious, molecular, intensive multiplicities composed of particles that do not divide without changing in nature, and distances that do not vary without entering another multiplicity and that constantly construct and dismantle themselves in the course of their communications, as they cross over into each other at, beyond, or before a certain threshold.¹⁰⁸

The number of multiplicities Deleuze and Guattari create can be overwhelming. A brief list would include the likes of the rigid and supple, striated and smooth, chess and Go, molar and molecular, and the arborescent and rhizomatic. Deleuze and Guattari consider the dualistic nature of the multiplicities they create and abandon as a necessary evil. For instance, they

¹⁰⁶ Gilles Deleuze 1994: 36.

¹⁰⁷ Gilles Deleuze and Félix Guattari 1987: 22.

¹⁰⁸ Gilles Deleuze and Félix Guattari 1987: 33.

“invoke one dualism only in order to challenge another,” and “employ and dualism of models only in order to arrive at a process that challenges all models.”¹⁰⁹

There is no question, however, of establishing a dualist opposition between the two types of multiplicities, molecular machines and molar machines; that would be no better than the dualism between the One and the multiple.¹¹⁰

Once the subjective “*Everybody knows, no one can deny,*” is firmly entrenched, it is difficult to question that which cannot be questioned.¹¹¹

Unfortunately, media theory is not exempt from the claim “everybody knows.”

Indeed, Siebert, Peterson, and Schramm (1956) signal the decisive turn to this image of thought, and consequently, the formalization of the mass media image:

To see the social systems in their true relationship to the press, one has to look at certain basic beliefs and assumptions which the society holds: the nature of man, the nature of society and the state, the relation of man to the state, and the nature of knowledge and truth.¹¹²

Siebert, Peterson, and Schramm (1956) offer this methodological advice in their introduction to *Four Theories of the Press*, and the media still suffer from its influence on a generation of critics. The fundamental problem with Siebert, Peterson, and Schramm’s methodology is that it accepts philosophical assumptions or objective truths about society, knowledge and thought without question, extending them as necessary to incorporate the press. The author’s

¹⁰⁹ Gilles Deleuze and Félix Guattari 1987: 20.

¹¹⁰ Gilles Deleuze and Félix Guattari 1987: 34.

¹¹¹ Gilles Deleuze 1994: 130.

¹¹² Fred Siebert *et al* 1956: 2.

epistemological assumptions result in four images — Authoritarian, Libertarian, Social Responsibility, and Soviet Communist — that express the “true” relationship between a political system and its press. These images, especially the image of a socially responsible or democratic media, have in turn served as a template for a whole generation of critics. Everybody, or at least every media critic, knows the media should be socially responsible; and this orientation has constricted media theory since its inception.

This image of the media as “a partner in the search for truth” is characterized by a stark negativity.¹¹³ If this is the true role of the media, as Siebert, Peterson, and Schramm would have us believe, then somewhere along the way, as the media evolved from the initial forays into print journalism and the penny press into our modern fixtures of daily newspapers, public and private broadcasting stations, and the looming shadow of the Internet, society lost control. The media became a mass media, that powerful, overbearing, faceless Leviathan that churns out page after page of nonsensical newsprint, hours of incoherent broadcasting, and millions of useless Web pages. It is a threat to our cultural values, prohibits ordinary citizens from communicating effectively or from receiving information, and is a major stumbling block to the democratic process. Even media critics must wince when they are forced to adopt traditional terminology, such as the ubiquitous “mass media,” “mass culture,” and the

¹¹³ Fred Siebert *et al* 1956: 3.

faceless “masses.” These terms have been used and abused so often it is hard to imagine their meanings being anything other than pejorative and meaningless.

When media theorists Siebert, Peterson, and Schramm (1956) argue that “everybody knows . . . the media assumes the political dimensions of the society in which it operates,” or “everybody knows . . . the media is socially responsible, and as such, supports the democratic process,” they create limits to not only what the media can and cannot do but also to the character of the debate. Dissenting voices are effectively isolated and this, perhaps more than anything, explains the unnecessary distinction between classical and radical media theory.

The Legacy of The Culture Industry

Though they were not the first to engage the media, few critics have had such an enduring effect on our perceptions of the media as Adorno and Horkheimer. The forcefulness of their thought and their theory of the “culture industry” originates in their analysis of the relationship between late capitalism, media and culture. Adorno and Horkheimer’s attacks are not directed against the media so much as the effects of late capitalism on twentieth century cultural constructs. Marxist ideology is fundamental to their thought, as is a form of dialectical materialism. Here is a brief summary of their thought.

The focus of Adorno and Horkheimer’s critique is late capitalism, which transforms everything, from labor to information, into a homogenized product of one kind or another, and appropriates the mass media as a delivery system for its goods. Negt (1980) summarizes this mass media as an entity that creates “the

appearance of universality, completeness, immediacy of information,” while it is actually “reducing everyday communication to something subjective and random, inconsequential and reserved for leisure time.”¹¹⁴ The mass media Negt describes is both product and pawn of the corporate world. On the one hand it is a vehicle for merchandise and amusement, on the other, it feigns interest in the public sphere in order to subjugate the masses.

Culture cannot escape the capitalist machine and soon it too is fabricated, portioned, and shipped to the masses through the capitalist organ of the media, hence the term “culture industry.” And as with any industry of mass production, cars, tanks, the military machine, uniformity is prized; production is standardized to include only those cultural elements that fit a predetermined, authoritarian mold, for somebody must decide what culture is legitimate and which is not. In this manner, Adorno and Horkheimer argue that the culture industry issues “authoritative pronouncements,” transforming itself into an “irrefutable prophet of the prevailing order.”¹¹⁵ The capitalist act of commodification strips culture of its significance and hence where “works of art are ascetic and unashamed,” the culture industry produces art that is “pornographic and prudish.”¹¹⁶ More problematic, however, this pornographic and prudish art is advertised as a form of

¹¹⁴ Oskar Negt 1980: 75.

¹¹⁵ Theodor Adorno and Max Horkheimer 1973: 369.

¹¹⁶ Theodor Adorno and Max Horkheimer 1973: 363.

amusement, when capitalism, they suggest, has already quietly transformed amusement into another category of work.¹¹⁷

Subjugated by the culture industry, the masses are mindless automotons who wander to the factory and home again, their only respite yet more work dressed as amusement. Helpless before the culture industry they are satiated with pre-packaged meaning, incapable or unwilling to generate any of their own, and content to acknowledge that the homogenous society is the perfect society. Such a theory is untenable, especially in light of the “reader response” theories of Wolfgang Iser and Stanley Fish, or deconstruction’s fascination with play. The reader clearly plays a role in the construction and distribution of meaning, as seen in Altheide (1995).

An interesting aspect of Adorno and Horkheimer’s approach to mass media is their dialectical materialism, the position that “enlightenment reaches human beings not by appealing to ideals and theories, but by referring to immediate interests and needs.”¹¹⁸ It seems relevant to take a moment to explore this notion in the light of a scientific approach to the media. Science has always been interested in trying to find the underlying “truths” of existence in the material world, as opposed to an idealist or even theistic position, and Holland’s theory of complex adaptive systems is no different. However, as I have attempted to show in the previous chapter, the primary difference between a chaotic system

¹¹⁷ Theodor Adorno and Max Horkheimer 1973: 361.

¹¹⁸ Oskar Negt 1980: 67.

and a complex adaptive system is cognition at some level. Leaves do not think as we understand “thought,” but on the cellular level there is some cognition at work that ensures adaptation. Moreover, this adaptation does not proceed towards a predefined goal, unlike scientific discovery. In this respect, the division between materialistic and idealistic interpretations of existence breaks down. The ability to adapt consciously to an environment differentiates us from rocks; thus consciousness would seem to play an important role. And yet I can’t come to that conclusion without the help of science and a study of the material world.

Postman (1985) follows in the tradition of Adorno and Horkheimer (1973) but also MacDonald (1944 and 1962) in his analysis of the mass media’s damning effect on culture. Postman singles out television as the emergent technological villain of the late Twentieth Century, a subtle deviant that strips high cultural artifacts of their noble sensibilities and substitutes amusement in the place of serious cultural discourse. This is not to say, however, that all television is bad:

Television . . . serves us most usefully when presenting junk entertainment; it serves us most ill when it co-opts serious modes of discourse – news, politics, science, education, commerce, religion – and turns them into entertainment packages. We would all be better off if television got worse, not better. “The A-Team” and “Cheers” are no threat to our public health. “60 Minutes,” “Eye-Witness News” and “Sesame Street” are.¹¹⁹

Postman’s analysis of television’s role is problematic because his argument rest on two familiar presuppositions: (1) the construction of a mass media, in which television devalues culture, and by extension, the democratic

¹¹⁹ Neil Postman 1985: 159.

process; and (2) the potential audience of *Amusing Ourselves to Death* understands the distinction between “serious” high culture and a merely “amusing” low culture. In this respect, Postman’s conception of the mass media is closer to that of McQuail or Curran rather than that of Adorno and Horkheimer. The mass media he constructs is not a wholly negative entity; rather it is one aspect, that of television, which threatens to undermine the democratic system. In order to argue effectively against television, however, Postman must identify it with error and truth with a glorified “pretelegraphic Eden.”¹²⁰ Postman’s “Eden” is the American Age of Exposition, heralded with the arrival of the Mayflower at Plymouth Rock and culminating years later in the lengthy Douglas-Lincoln debates. In short:

Exposition is a mode of thought, a method of learning, and a means of expression. Almost all the characteristics we associate with mature discourse were amplified by typography, which has the strongest possible bias towards exposition: a sophisticated ability to think conceptually, deductively and sequentially; a high valuation of reason and order; an abhorrence of contradiction; a large capacity for detachment and objectivity; and a tolerance for delayed response.¹²¹

Postman claims that the period espoused complex rhetorical resources and captivated audiences, yet Jensen (1990) is right to question whether such a bastion of rational discourse even existed. Still, if we suspend disbelief for a moment and accept Postman’s claim at face value, it follows that his identification of truth and error, print and television, emphasizes the categorical generality of the mediums,

¹²⁰ Joli Jensen 1990: 48.

¹²¹ Neil Postman 985: 63.

their homogeneity rather than the heterogeneous levels at work among and within themselves. In this light, the outright disregard for television's potential benefits to rational discourse that Postman exhibits in his conclusion is not surprising since he cannot acknowledge television's contributions to his serious discourse without further compromising the status of print. Postman's mass media confines television to the bedrooms of the elderly, the infirm, and to motel patrons, a source of simple comfort rather than a technology capable of serious rational discourse.¹²²

Itself a presupposition, Postman's mass media construct incorporates two other problematic presuppositions: the distinction between "serious" culture and "amusing" culture, and the claim that television's content relates to its form.¹²³ The first is a question with which critics have struggled, or dodged outright, because it seems that such a distinction should be possible, that a boundary between the serious and amusing can be drawn and cultural artifacts easily distributed on either side, and yet such cultural distinctions are obviously subjective and open to reinterpretation. Turning to television for a moment, we could classify CBC's nightly newscast *The National* as high culture. Perhaps Canadians might even extend high culture status to programs like *This Hour Has 22 Minutes* or *The Royal Canadian Air Farce*, considering our talent for social commentary and satire. However, such distinctions do not explain why some of

¹²² Neil Postman 1985: 28.

¹²³ Joli Jensen 1990: 50.

the highest rated cable television programs in Canada and the United States right now are those produced by the Stamford, Connecticut-based World Wrestling Federation or its rival, Ted Turner's World Championship Wrestling. Assuming Postman's perspective for a moment, he would probably consider professional wrestling a harmless diversion that caters to the lowest social classes and blacklist *The National* as a trivial, even dangerous, counterpart to *The Globe and Mail* or anything produced by the Southam chain. How television transforms *The National* into trivial entertainment is another question; one that Jensen (1990) argues Postman does not adequately answer:

Postman concentrates on content rather than form. Yet his early arguments are based on the televisual experience, the how of television, rather than on the content or meaning, the what of television. He implies that the "how" determines the "what," but does not explain how this happens — what is it about the visual/aural televisual process that promotes irrationality and amusement; what is it about the print/visual experience that makes it rational and serious?¹²⁴

The presupposition Jensen describes is in keeping with the tendency towards generality and homogeneity identified with Postman's mass media. However, rather than terms like truth and error we could adopt Bergson's duration and space, or even Deleuze's more elaborate passive and active synthesis. Television's content, the "what," represents space and consequently falls easily within the boundaries Postman constructs for himself and his mass media. The "how," on the other hand, the methods by which television transforms the serious into the amusing is duration, an elusive condition of experience omitted because

¹²⁴ Joli Jensen 1990: 49.

Postman concentrates his theoretical construction on the spatial plane. Postman suggests a mass media oriented in space instead of duration, a theoretical approach dominated by presupposition and auxiliary spaces rather than by a consideration of the conditions of said spaces.

Herman and Chomsky (1988) construct a pessimistic, dynamic theory of the mass media. The source of their pessimism is the “obvious” correlation between the mass media’s perceived role and the maintenance of a democratic society.¹²⁵ In this case, power over and control of the mass media rest in the hands of a wealthy and influential elite, who not only have the financial clout to advertise, or perhaps even purchase the mass media outlets for themselves, but also the power to control the content. Under this “propaganda model,” Herman and Chomsky characterize the mass media as a defender of “the economic, social, and political agenda of privileged groups that dominate the domestic society and the state.”¹²⁶ However, Herman and Chomsky’s philosophical approach also binds their hands, for it is when they invoke the mass media image, with all its generality, in place of difference and its abhorrence of the aberrant, that their theoretical bent excludes the very differences they find so appealing.

Herman and Chomsky’s image of the mass media is noteworthy for its characterization of the audience. In keeping with the overwhelming power of capitalism, Herman and Chomsky argue the mass media and its advertisers are

¹²⁵ Edward Herman and Noam Chomsky 1988: Preface xi.

¹²⁶ Edward Herman and Noam Chomsky 1988: 298.

interested only in affluent audiences who can afford their products, in other words, consumers. The transformation of the audience into a consumer accomplishes two related objectives: (1) the audience, restricted by the elite to mere consumption, is exempt from blame for mass media performance; and consequently (2) any influence it might have had on the mass media is mitigated, insuring a stronger connection between mass media and the elite. In this respect, the audience is a messy segment, another friction replete with contradictions and counter-movements that would complicate the relationship between the elite and mass media. By transforming them into hapless consumers, Herman and Chomsky exempt them from the discussion and preserve the sanctity of their circle. The audience cannot be anything but a consumer because the relationship between the elite and the mass media insures that audiences aren't receiving the information they require to participate in a democracy.

Another interesting aspect of *Manufacturing Consent* is their brief analysis of adaptation in the mass media. Though it barely warrants half a page in their conclusion, Herman and Chomsky argue that there is a consistent pressure in the mass media to conform, or in other words, to adapt to the tenets of the propaganda model:

Given the imperatives of corporate organization and the workings of various filters, conformity to the needs and interests of privileged sectors is essential to success. In the media, as in other major institutions, those who do not display the requisite values and perspectives will be regarded as "irresponsible," "ideological," or otherwise aberrant, and will tend to fall by the wayside.¹²⁷

¹²⁷ Edward Herman and Noam Chomsky 1988: 304.

The pressure can be subtle, like the editorial decision that kills a story, or more forceful, as in Guatemala where piles of corpses serve as the catalyst for sober second thought. The problem with such an argument, however, originates in generalization, and is twofold. First, Herman and Chomsky generalize when they casually compare cases in the United States and Guatemala, emphasizing the differences in degree at the expense of differences in kind. A more recent example can be drawn from coverage of the Canadian tainted blood scandal. Bangladesh and at least a half-dozen other countries around the world are fighting to contain blood tainted with HIV and Hepatitis C, and yet it would be foolhardy to suggest that, beyond the superficial similarities, the scandals are the same. A reporter need only consider the role of blood in each society to generate substantial differences. Secondly, the authors' biological turn is interesting, not so much for what it tells us about adaptation, but because it illustrates how far Herman and Chomsky are willing to go in order to preserve the concept of the mass media in spite of the damning evidence against such a concept. On the one hand they describe an inverse adaptation — an evolution from the differentiated to the same. Only after this initial adaptation towards the monolithic origin can they hope to differentiate, and then, only so far as they don't cross the boundary. Those who are unwilling to pursue that path are unfit. This concept runs contrary to that of Holland, and certainly to that of Deleuze.

The adaptation Herman and Chomsky describe is curious because it neglects potential catalysts for agent adaptation. We need simply consider the

interaction of reporters and the reader to discount their claim. For example, it is entirely conceivable that reporters adapt and consequently evolve based on information they collect about their readers, rather than on the overwhelming influence of the corporate elite. If this is the case then many of the problems Herman and Chomsky identify with reporters are simply a reflection of a larger social phenomenon.

In this light *Manufacturing Consent* is a book of contradictions: for each reporter the authors identify as catering to the major institutions, there is another who rejects this yoke. Each time the mass media cover an event extensively, such as the atrocities committed by the Khmer Rouge, there is a counter movement, in this case, the mass media's ignorance of similar atrocities in East Timor. In each case Herman and Chomsky highlight actions and events that substantiate the existence of a homogeneous mass media while downplaying the messy segments, the turbulence that subverts their theoretical framework at every turn. Herman and Chomsky must ignore or minimize the nuances and secondary effects, since such frictions threaten to disturb their monolithic mass media construct on which the totality of their argument rests. It is ironic that Herman and Chomsky clearly favor the disruptions and destabilization produced by the various aberrant and schizophrenic segments that crop up in the mass media, and yet the authors' image of the media excludes aberration from assuming any position except that of error within their theoretical framework.

People who work in the media, as opposed to those sitting on the sidelines pronouncing judgement upon it, have also bought into the mass media image.

Howard Kurtz is perhaps the most visible media critic in America. Press critic for *The Washington Post* and a regular on CNN's *Reliable Sources*, Kurtz (1994), like many others before him, embraces political economic models of the press. Indeed, Kurtz openly acknowledges that "newspapers are a mass medium" written for and read by the masses.¹²⁸ Unlike Postman and Chomsky, however, who are concerned with the capitalist media influence over the audience, Kurtz analyzes the debilitating effects of capitalism on newspaper business in three stages: (1) on reporters like himself; (2) the organization of the medium; and (3) the relationships in which it engages.

Kurtz's first argument characterizes the reporter of the 1990s as a faceless drone who has sold his soul to the "almighty dollar." The good old days are gone, Kurtz laments, because there just aren't enough of the old blue-collar "stiffs" around any more, the ones who worked long hours, drank hard liquor, manned the front lines at the Democratic Convention in Chicago, or filed copy from Cambodia during the Vietnam War:

Today's scribe is a well-tailored, well-educated, health conscious baby boomer who travels with a cellular phone and Toshiba laptop and speaks the language of political image-makers. The new zeitgeist is one of cool detachment, of moving with the media mob from one mega-event to the next, scribbling down the details CNN might miss.¹²⁹

More comfortably in a café than in the Killing Fields, the well-educated but professionally inept reporter pursues the truths embodied by the mass media

¹²⁸ Howard Kurtz 1994: 382.

¹²⁹ Howard Kurtz 1994: 5.

image with passionless resolve. Sucked in by “the vast entertainment culture that seeks to amuse and titillate and shies away from the risks of old-style muckraking,” today’s journalists are a shadow of their former selves.¹³⁰

The second problem Kurtz identifies is that reporters in thrall to capitalism produce boring newspapers that disenchant the reader. Kurtz argues reporters produce tepid copy because they are afraid of offending people in positions of power who might provide a “leg up” the corporate ladder, while their editors worry about political correctness and offending the general public. Another problem is the media’s flirtation with tabloid sensibilities and its fascination with star power, as displayed during the O.J. Simpson trial. All these factors add up to a “cancer eating away at the newspaper business — the cancer of boredom, superficiality and irrelevance.”¹³¹ The problem with such an argument is that like the other political economists before him, Kurtz differentiates between high culture and low culture. Politics and debate occupy the high ground while O.J. Simpson and Lorena Bobbit dwell in the cellar. Thus the danger for newspapers that cross the imperceptible line between the cultural poles is that they threaten to undermine their credibility and respect in the eyes of the public.

Kurtz offers some suggestions to fix the problem. For starters, the reporter of the future needs commitment and “fire.” Kurtz argues sports reporters are models in this respect since they “are so much more opinionated, hailing the

¹³⁰ Howard Kurtz 1994: 5.

¹³¹ Howard Kurtz 1994: 13.

heroes and kicking the goats with reckless abandon.”¹³² The “fire” of a sports reporter is just the first of eleven recommendations listed in the final chapter. Unfortunately, Kurtz doesn’t reveal how newspapers and other media outlets are going to achieve these lofty goals and consequently, his familiar arguments against media don’t break any new ground.

The Public Sphere and Model Media

The media’s role in society remains a contentious issue. While certain political economists regard media with suspicion or outright disdain, others are trying to reposition them as positive forces for democratic change. Driving such efforts is a hypothesis that a “proper” medium is vital to the modern democratic process. While there are many critical lines on this issue, Habermas (1989) and his concept of “the public sphere” is perhaps the most influential. He may have coined the term but it is media theorists who have struggled to understand its implications of the public sphere for the operation of the media within a democratic framework. Curran (1991a and 1991b), and Dahlgren’s (1991/1995) appraisal and adoption of the idea of the public sphere, and McQuail’s (1987/1991) normative quest for a measure of media performance, have been instrumental in outlining the terms of the media debate. With this in mind, I want to take a moment to analyze Curran and Dahlgren’s contributions to the media debate in preparation for the following chapter. As we shall see, the shift towards

¹³² Howard Kurtz 1994: 385.

normative theory, which is just one response to what Curran and Gurevitch describe as a growing interest in “the relationship of media organizations to the structure of power in society,” is just another incarnation of the mass media image.¹³³ Though they claim to promote the study of media in a larger social environment, i.e., media’s relations with government, business, and the masses, Curran and Dahlgren’s arguments suggest that in the end there is only one medium that “should represent or function as X.” The fact that the same academics criticize the media because not conforming or functioning as X suggests there are serious flaws with this dynamic approach. In the end, the dynamics of normative theory only isolate the media further because it strips them of their most important characteristics, the ability to adapt and evolve.

At its heart normative media theory is interested in how the media should operate if we want to achieve a certain state exemplified by a certain set of values.¹³⁴ Naturally, this state conforms to some utopian vision and its values are likewise considered to be noble and pure. Rather than focus on the public sphere’s influence on political theory I will restrict my analysis to the media’s role. Dahlgren defines the public sphere as:

that realm of social life where the exchange of information and views on questions of common concern can take place so that public opinion can be formed . . . when citizens, exercising the rights of assembly and association, gather as public bodies to discuss issues of the day, specifically those of political concern.¹³⁵

¹³³ James Curran and Michael Gurevitch 1991: 10.

¹³⁴ Dennis McQuail 1987: 4.

¹³⁵ Peter Dahlgren 1995: 7-8.

Dahlgren's definition highlights the political and more specifically, the democratic component of the public sphere. Media play a fundamental role because they have the power to transcend distance, attract, and inform disparate populations or groups. In general the structure of McQuail, Curran, and Dahlgren's arguments for the public sphere follow a similar path. First, the critics argue that the concept of the public sphere, as envisioned by Habermas, is flawed but can be salvaged and re-deployed. Following the salvage operation, the critics proceed to describe the modern conceptualization of the public sphere and its relationship to the media. Curran (1991b), for example, addresses the first problem succinctly when he questions how "[Habermas'] model — supposedly realized by a restricted class in the early Nineteenth Century — be universalized during the era of mass politics in a highly differentiated, organized capitalist society?"¹³⁶ The answer, he suggests, is that media critics can't just enlarge the public sphere to include those masses that Habermas originally excluded in his analysis of bourgeois society, but rather "the public sphere and the role of the media in relation to it has to be re-conceptualized and reincarnated in a new form."¹³⁷ Dahlgren too takes Habermas to task. According to Dahlgren, the bourgeois public sphere not only excludes other "oppositional" or "plebian" public spheres but also it never achieves the level of sophisticated discourse Habermas claims.¹³⁸ In spite of these problems Dahlgren maintains that the

¹³⁶ James Curran 1991b: 83.

¹³⁷ James Curran 1991b: 83.

¹³⁸ Peter Dahlgren 1991: 5-7.

concept of the public sphere is still useful because it “should be understood as an analytic category, a conceptual device which, while pointing to a specific social phenomenon can also aid us in analyzing and researching the phenomenon,” as Habermas originally intended.¹³⁹

After confronting the problems with the Habermasian public sphere, Curran and Dahlgren proceed to define the modern, mass mediated public sphere. Curran constructs perhaps the most elaborate public sphere:

a core surrounded by satellite networks and organized groupings . . . where all interests interact with one another in seeking to establish agreement or compromise about the direction of society. Feeding this core are a number of umbilical cords that connect it to the life force of civil society — different interpretive communities with a shared normative conception of society.¹⁴⁰

Curran’s model is problematic for three reasons: it hints at the tension between “democratic” and “normative” societies, it excludes those who don’t share the normative conception of society from participating in the public sphere, and this dynamic model is incapable of evolution. Firstly, the concept of a “normative society” is extremely subjective. We need look no further than the ongoing legal battles over homosexual rights to see how many people in Alberta dispute the Supreme Court of Canada’s “normative conception of society.” The United States has similar movements, most notably the recent campaigns by Republicans who argue that homosexuality is a curable disease rather than a lifestyle ordained in the womb. Here, we see the tension between the

¹³⁹ Peter Dahlgren 1991: 2.

¹⁴⁰ Curran 1991b: 103.

“democratic” and “normative” ideal first hand. The heterosexual vs. homosexual conflict suggests that the public sphere falls into the same trap of the Habermasian sphere in that it too excludes those who don’t share the normative conception of society. In a sense, Curran argues “good” opinions are acceptable and “bad” opinions are to be ignored. Finally, and in spite of his interesting adoption of biological metaphors of the “core”, or womb, and the “umbilical cords” which connect to this central womb, Curran’s public sphere is a construct and nothing more. The public sphere is an inorganic static model unfettered by thermodynamic forces, unlike a complex adaptive systems that is the product of thousands of years of adaptation and evolution. Curran’s public sphere is a Newtonian sphere or planetoid that orbits endlessly unable to break free of its pattern. Once Curran institutes his core and umbilical cords, the model is universal and static. It transcends time because we could leave, to return in one or fifty years, to find the exact same public sphere in perfect working order. From Holland’s perspective, however, the fitness of such a model, the chance that it survives, is quite low since it can’t adapt to environmental challenges or the needs of its evolving interpretive communities. Curran’s womb is an artificial machine incapable of generating life.

Finally, Curran positions media within this spherical framework.

According to Curran, the media:

should empower people by enabling them to explore where their interest lies; it should foster sectional solidarities and assist the functioning of organizations necessary for the effective representation of collective interests; it should sustain vigilant scrutiny of government and centers of power; it should provide a source of protection and redress the weak and unorganized interests; and it should create the conditions for real societal agreement or compromise, based on an open working through of differences rather than a contrived consensus based on domination.¹⁴¹

Curran's media model is more positive than Adorno and Horkheimer's but it ultimately raises more questions than it answers. For example, the model encourages the "insistent and ancient belief" that truth "is not earned, but inspired, revealed, supplied gratis," by media each day.¹⁴² Rather than liberating truth from historical or cultural constraints and forcing novel perspectives to emerge *à la* Deleuze and Guattari, Curran's model reinforces those bonds. This flight towards the predictable haven of universal truth is problematic considering Curran expects media to promote agreement and compromise, something that usually occurs after the agents in question willfully abandon presuppositions and representations. In addition to reiterating the dominance of universal truths, Curran implies that media can pursue many of the goals he lists simultaneously when the situation is more complicated and consequently, unpredictable. While sustaining vigilant scrutiny of government and protecting the weak might be construed as complementary goals, creating social consensus even in the best of

¹⁴¹ James Curran 1991b: 111.

¹⁴² Walter Lippmann 1965: 203.

situations often occurs at the expense of one group or another, usually the weak or the minority voice. The ongoing current crisis in Kosovo is a chilling example of such a conflict between the call for minority rights and demands for a social consensus. Finally, Curran's model raises the possibility that democracy is an emergent media behavior when he argues that media are responsible for the emergence of democratic social systems that curtail economic and cultural injustice. While media *cas* might produce emergent democratic behavior (see Chapter Five), Curran's model in general and the mass media image in particular actively discourage novel behavior democratic or otherwise that could upset the long-term stability and consequently the predictability of the system in question. Indeed, Curran's positive model is no more successful at charting a course for media than the negative models produced by Adorno and Horkheimer, Postman, or Herman and Chomsky.

Characterized by universal truths, presuppositions and representations political economy and the mass media multiplicity it enshrines strip media of their differences, transforming them into homogenous systems "incapable of doing interesting, novel, or useful."¹⁴³ Therefore, Deleuze is correct when he states that such an image dreams "less of acting than of foreseeing, and of allowing free rein to action which goes from the unpredictable to the predictable (from the production of differences to their reduction)."¹⁴⁴ In order to ensure the

¹⁴³ Jeremy Campbell 1982: 32-33.

¹⁴⁴ Gilles Deleuze 1994: 225.

propagation of familiar patterns, the mass media multiplicity distributes space, imposes boundaries and establishes limitations on media, restricting the formation of nomadic patterns that might destabilize the system. Moreover, it distinguishes among aesthetic media behaviors, such as supporting the democratic process or addressing the concerns of the weak and underprivileged and the unaesthetic evils of capitalism. In the end, the mass media multiplicity and the theory it informs are incapable of conceiving of a heterogeneous complex system, much less analyzing its structures, behavior, or function. However, there is an alternative image — media as complex adaptive systems — that avoids many of the problems associated with the mass media image.

CHAPTER 5: THE EMERGENCE OF MEDIA CAS

Introduction

In the previous chapter this thesis explored how political economists such as Adorno and Horkheimer imagine the media, reducing it to a homogenous and predictable representation — mass media — that has become the central premise of most “popular” journalism and mass communications scholarship. This mass media image and the theories founded upon it are problematic since they are unable to account for the media’s heterogeneity and unpredictability. One alternative image, media as complex adaptive systems, or media *cas*, follows a different path. Composed of heterogeneous structures capable of adaptation and change, *cas* are more than just the sum of their parts. Complex adaptive systems such as media exhibit emergence — the generation of complex large-scale patterns from relatively simple components (Holland 1998). Although emergence is the hallmark of all complex adaptive systems, it is neither easy to recognize or explain.¹⁴⁵ The goal of complex systems analysis then is to differentiate recurring patterns from those that are merely irregular or random and in doing so, discover the universal rules that govern the function of complex systems and lead to the formation of emergent phenomena. This objective is clearly at odds with the postmodernist project; and yet Holland’s work on emergence in general and agents and niches in particular bears a striking resemblance to Deleuze and

¹⁴⁵ John Holland 1998: 4.

Guattari's (1987) thoughts on social segmentation, the characteristics of space and the tension between being and becoming.

Divided into three sections, this chapter will introduce the basic structural components and properties of complex adaptive systems, examine how these properties create the conditions suitable for emergence, and propose that sensationalism and objectivity, but not democracy, are emergent media patterns. In addition to these goals, the chapter illuminates some of the parallels between emergence (Holland 1995; 1998) and being and becoming (Deleuze and Guattari 1987) in order to construct a mass media multiplicity characterized by molar segments and striated spaces, and a media *cas* multiplicity that emphasize molecular agents and smooth niches. Section one introduces agents, the building blocks of complex adaptive systems, and niches, which facilitate the development of complex interactions. Agents at one level serve as the building blocks for those at a higher level, an awkward existence that resembles both being and becoming. Hence agents seem to fluctuate between fine and coarse grains or perhaps better, molar and molecular states. Niches are also subject to destabilizing effects, in this case from the territorialization and deterritorialization of space. Therefore it is useful to determine whether a particular niche is orientated in striated or smooth space.

While *cas* have common components, they also share certain salient properties, such as non-linearity, aggregation, diversity and flow. Section two introduces each of these properties and examines their contribution to the emergence of unpredictable patterns. With the conditions identified, the section

turns to the question of emergence proper, especially as it pertains to the complex media systems. The section identifies two emergent media patterns, sensationalism and objectivity, and proposes a third, democracy. However, this designation is problematic, considering Lippmann (1965) fervently denies such a contention and Schudson (1995) assumes the opposite point of view. Moreover, it is unclear whether the framework Holland constructs supports such an argument.

Finally, having identified the basic components of complex adaptive systems, section three reconsiders the mass media and media *cas* multiplicities. Characterized by molar figures and striated lines, the mass media is saturated by presuppositions that inhibit transformations. As a result, the best it can do is homogenize difference further, securing a predictable equilibrium. Media *cas*, on the other hand, encourage the destabilizing routines of molecular agents distributed in smooth spaces. Heterogeneous nomads, media *cas* wander through the shifting patterns between the poles of linearity and nonlinearity in search of liberating geometry.

Agents and Niches

Complex adaptive systems in general and media *cas* in particular are composed of agents “diverse in both form and capability.”¹⁴⁶ Agents form the

¹⁴⁶ John Holland 1995: 6-7. Holland borrows the term “agents” from economics because “it is descriptive but avoids preconceptions.”

“skeleton” of media *cas* and come in all shapes and sizes, including the thousands of reporters, publishers, newspapers, radio outlets, television stations and audience members that interact daily. However, this “skeleton” is always under construction, since media *cas* not only replace all their agents regularly, a process similar to cell replacement in the human body or staff turn over at a newspaper, but they also generate novel agents. In the event that an agent disappears entirely or the environment shifts, the complex adaptive systems respond with a “cascade of adaptations” that “fill the hole,” insuring the system continues to operate at peak performance.¹⁴⁷ The Internet is a good example of this process. During the Cold War the threat of nuclear conflict forced the United States military to devise novel agents and novel communications technology, one of which would eventually become the Internet. Available for over forty years, the Internet’s recent emergence as a “popular” communications medium and a potential market has generated many novel agents, including Internet service providers (ISPs), on-line communities like GeoCities and Tripod, Web page designers, hackers and security experts. Deleuze and Guattari (1983) recognize a similar process in social machines that generate and regenerate order by feeding “on the contradictions they give rise to, on the crises they provoke, on the anxieties they engender, and on the infernal operations they regenerate.”¹⁴⁸

¹⁴⁷ Holland 1995: 27.

¹⁴⁸ Gilles Deleuze and Félix Guattari 1983: 151.

There are two additional aspects of agents generation that bear mention. First, *cas* do not normally generate these novel agents from “scratch.” Basic agents such as reporters serve as the building blocks for more complex agents such as newspapers, radio stations and television studios. This phenomenon is fundamental to the development of complex systems. Consider, for example, a “newsroom” agent composed of ten distinct “reporting” agents. If there are ten “reporting” agents for each slot in the “newsroom” then those one hundred building blocks can construct over 10^{10} (ten billion) distinct “newsrooms.”¹⁴⁹ Although the scope of this example is limited, it clearly illustrates how combinations of simple agents can produce more complex structures.

Secondly, the generation process creates a tension between the various levels. When an agent serves as a building block it is in a sense both “being” an agent and “becoming” an agent, a state similar to that represented by molar and molecular multiplicities (Deleuze and Guattari 1987). Segmentarity, Deleuze and Guattari argue, permeates society. Segmentation is inherent in our cellular structure but also appears in the “segmentation” of church and state. Molar segments represent the “coarse” agents such as states, churches or even media, while molecular segments represent the fine segments such as revolutionary groups, cults and reporters. It is important to emphasize here that the molar and molecular, coarse and fine grains, are permeable since agents are always in

¹⁴⁹ John Holland 1995: 35. Holland uses a similar example, breaking the human face into ten components (eyes, ears, etc.) with ten values (blue, brown, large, or droopy etc.).

transition between these two states. A newspaper agent is molar and molecular since it destabilizes the molar media *cas* of which it is a part, and at the same time, it is subject to the destabilizing influence of its own molecular components that threaten to transform themselves into novel molar alternatives. The events surrounding *The Regina Leader-Post* are an example of such a transition from molecular to molar agents, fine to coarse grain. When Southam News dismissed the *Post*'s reporters, the reporters formed their own weekly newspaper devoted exclusively to local issues. Southam's molecular agents transformed themselves into a competitive molar agent.

Deleuze and Guattari also use chess and Go to illustrate the difference between the molar and molecular. Chess is a game of the state extrinsically, because it's a game emperors played, and intrinsically, since the pieces mimic state agents and their actions in conflict:

Chess pieces are coded; they have an internal nature and intrinsic properties from which their movements, situations, and confrontations derive . . . Each is like a subject of the statement endowed with a relative power, and these relative powers combine in a subject of enunciation, that is, the chess player or the game's form of interiority.¹⁵⁰

Molar agents, like chess pieces, incorporate distinct patterns that not only distinguish them from other molar segments but also determine their relative power in the system. Go reflects an entirely different approach. Go pellets have "no intrinsic properties" in and of themselves. They do not have an intractable

¹⁵⁰ Gilles Deleuze and Félix Guattari 1987: 352.

identity like bishop, knight, editor or reporter; their identity is more a composite of their position in space.

While molar and molecular agents account for the “vertical” organization of complex adaptive systems, niches describe the “horizontal” interaction of agents. An ecological term, scholars such as Dimmick and Rothenbuhler (1984) often represent a niche as a space preoccupied with boundaries. Newspapers, for instance, control distinct territories that they must defend from rivals if they want to take advantage of the resources. In Holland (1995), niches are more flexible. Indeed, it is difficult to draw parallels between Dimmick and Rothenbuhler (1984) and Holland (1995) since they approach niches from two very different perspectives, one as the bounded territory and the other as a fluid network.. Formally, Dimmick and Rothenbuhler (1984) define a niche as “the function or role” of a “form or population” that is subject to the availability of resources. Holland (1995) defines an agent’s niche in terms of the “interactions” centered on that agent. The definitions sound somewhat similar; but there is a substantial difference between a form’s universal purpose and understanding how forms interconnect and communicate with others in a complex system. This definitive difference affects how Dimmick and Rothenbuhler and Holland describe a niche’s geometry. Dimmick and Rothenbuhler visualize a niche as a spatial quantity delineated by lines and boundaries. Their recourse to terms like “niche breadth” and “niche overlap” emphasizes the boundaries of forms, the institutionalization of purpose and the competition for scarce resources. While Holland also acknowledges this spatial element when he compares the “small” niche of the

Viceroy butterfly with the “large” niche of the Monarch, he does so at the expense of the “interaction” he hints at earlier. Holland’s work emphasizes interactions that transcend space over those rooted in space. If the boundaries that normally restrict agent interaction are flexible or absent, as is the case with the Internet, then agents can create, destroy, or simply abandon one niche in favor of another. Niches are “being” space and “becoming” space and in this sense, we can appropriate Deleuze and Guattari (1987) to differentiate among striated and smooth niches.

Deleuze and Guattari also use chess and Go to construct striated and smooth space, respectively.¹⁵¹ Chess is the embodiment of striation. Each chess piece has a distinct function characterized by the type of space or perhaps better, the niche it controls. Bishops control the diagonal niches, while rooks patrol the ranks and files. Concept such as “niche breadth” and “niche overlap” are vital in chess, since games pivot on a player’s ability to arrange “a closed space for oneself, thus of going from one point to another, of occupying the maximum number of squares with the minimum number of pieces.”¹⁵² Go, on the other hand, is characterized by a nebulous smooth space subject to territorialization and deterritorialization. In Go, “it is a question of arraying oneself in an open space, of holding space, of maintaining the possibility of springing up at any point: the movement is not from one point to another, but becomes perpetual, without aim

¹⁵¹ Gilles Deleuze and Félix Guattari 1987: 353.

¹⁵² Gilles Deleuze and Félix Guattari 1987: 353.

or destination.”¹⁵³ Hence, pellets interact in decentred networks rather than along predefined diagonals, ranks, or files. A Go pellet’s niche is less spatial than temporal, since its function is always dependent on its context. However, it is important to emphasize that Deleuze insists that chess and Go are complementary and the two kinds of spaces they represent, the striated and smooth, and are in constant flux because “smooth space is constantly being translated, traversed into striated space; striated space is constantly being reversed, returned to a smooth space.”¹⁵⁴ The same phenomenon applies to niches.

Emergence and Media

Emergence is the characteristic that ultimately distinguishes complex media systems from the leaves fluttering in the wind, but it is also one of the most difficult to grasp. He devotes an entire book to the question but in the end, even Holland (1998) concedes that emergence is an elusive quality and he refuses to explicitly define it. In addition to his definitive reluctance, Holland restricts his analysis of emergence to systems where the basic rules are well understood, as is the case with checkers and chess. Needless to say, Holland avoids characterizing emergence in media *cas* and other complex systems that don’t seem to have any rules whatsoever or at least, rules that are easy to define. Nevertheless, Holland’s emerging methodology does raise a number of interesting albeit difficult questions about the emergence of patterns in media *cas*. What is the definition of

¹⁵³ Gilles Deleuze and Félix Guattari 1987: 353.

¹⁵⁴ Gilles Deleuze and Félix Guattari 1987: 474.

an emergent media pattern? Do recurring media patterns share certain common characteristics that distinguish them from irregular patterns? Does a media *cas* have to achieve a certain level of complexity before patterns such as sensationalism or objectivity emerge and if so, what is this level?

Before tackling these questions it is important to identify the properties that create the conditions for emergence as well as the salient characteristics of emergent patterns. Holland (1995) concludes there are four such properties — nonlinearity, aggregation, diversity, and flows. The first property, nonlinearity, distinguishes deterministic function from complex functions. In linear equations the whole is always equal to the sum of its parts. Two plus two always equals four, just as figures quoted in public opinion polls and election results add up to one hundred percent. However, complex adaptive systems are more than the sum of their parts. Nonlinearity is one reason why methodologies that emphasize simple cause and effect relationships encounter so many difficulties when they try to summarize a complex system.

The second property, aggregation, implies two distinct movements. First, it helps human beings simplify complex systems, classifying agents by the patterns they share rather than the irregularities that set them apart. It is much easier to discuss “reporters” and “newspapers” in general than Christiane, Wolf, *The Globe and Mail*, or *The National Post* in particular. Secondly, the interaction of publishing, editorial and advertising aggregates is a primary source of emergent

patterns.¹⁵⁵ An ordinary reporter, like an ordinary ant, has a fairly limited repertoire of skills. Reporters gather resources and produce a message or messages based on those resources. However, a reporter's behavior doesn't account for the complex behavior exhibited by the profession in general. The same could be said of a reader. A reader who is offended by a Web page devoted to bestiality (Nevyn Date unavailable) can lodge a complaint with his Internet service provider but chances are good that he will be ignored or mollified. This behavior is relatively simple compared to the complex patterns that emerge when aggregates of upset readers interact, prompting governments to pass laws that make Internet service providers legally responsible for sexually explicit material that passes over its phone lines.¹⁵⁶

The third property *cas* share is diversity. Diversity results from progressive adaptations that create new opportunities for agents to interact and generate new niches.¹⁵⁷ The more interactions the greater the opportunity for emergent patterns to develop. Finally, the fourth property, flows, deals with agent interconnectivity. In order to visualize the concept of flows, Holland (1995) creates simple models composed of nodes, connectors and resources. In this case a node is equivalent to an agent, and so it is relatively easy to model a media *cas* using just three nodes: source, newspaper and reader. As their names suggest,

¹⁵⁵ John Holland 1995: 11.

¹⁵⁶ In July of 1997 the German Bundestag passed a law that would hold ISPs responsible for content created by others "if the ISP is aware of such content, has the technical means of preventing its use, and can be reasonably be expected to prevent such use." See Frithjof Maennel and Beth Noveck 1997: 3.

connectors illustrate the connections among nodes, while resources represent the information that nodes exchange. In addition, multiplier and recycling effects alter the flow of resources through complex adaptive systems, enhancing the system's complexity. For example, the soil in tropical rainforests is quite poor due to heavy rainfall; yet the forest recycles nutrients so effectively that a single tree can harbor over 10,000 insect species.¹⁵⁸ Recycling plays a pivotal role in media *cas*. Indeed, it is difficult to imagine how media would operate otherwise. If a "story" is equivalent to media's "nutrients" then it seems an event such as the Monica Lewinsky scandal, considered by many to be a waste of time and energy, can sustain a few hundred reporters almost indefinitely.

Formally then, emergence appears in nonlinear systems in which "the behavior of the whole is much more complex than the behavior of the parts."¹⁵⁹ It is a product of the "coupled, context-dependent interactions" of aggregates, and often takes the form of persistent patterns that change over time.¹⁶⁰ As complex patterns emerge from aggregate interactions they too interact, increasing the diversity of the system exponentially. While these patterns can be used to measure the complexity of media *cas* (see Chapter Eight), Holland warns scholars that they must be vigilant if they want to distinguish regular patterns from the irregular, since pattern recognition remains a theoretical and perceptual

¹⁵⁷ John Holland 1995: 29.

¹⁵⁸ John Holland 1995: 27.

¹⁵⁹ John Holland 1998: 122.

¹⁶⁰ John Holland 1998: 2.

weakness.¹⁶¹ Holland (1998) introduces certain criteria that simplify the identification of emergent phenomenon, five of which are critical here. First, emergence occurs in complex systems. Secondly, the complexity of emergent phenomenon is greater than the sum of its parts. Third, phenomena that emerge from complex systems are usually persistent patterns characterized by changing components. Fourth, the function of these persistent patterns is context dependent. And finally, as the number of persistent patterns increases the “competency” likewise increases.¹⁶²

Holland’s model of emergence is useful, since it can help scholars identify emergent media phenomena and answer some of the question raised earlier in this section. What is an emergent media pattern? News stories fit Holland’s criteria. News emerges from the interaction of media agents, but its character is difficult to explain by referring to the actions of singular media agents or the grammar used to construct it. News persists even though the components responsible for its existence are always changing. Furthermore, the function of news is context-dependent. For example, Schudson (1978) argues that news in the early Nineteenth Century catered to political and commercial elites. Although the pattern persisted, the function of news changed in the late Nineteenth Century as the penny press abandoned the government and political parties, instead “enlisting

¹⁶¹ John Holland 1998: 214-215. “Our ignorance of the mechanisms that pick out salient features in visual pattern recognition leaves us with little to go on when it comes to the more subtle problem of detecting patterns in generated combinations.”

¹⁶² John Holland 1998: 225-226.

the commercially profitable support of a large body of readers.”¹⁶³ News can be transformed into a tool to pursue commercial, political, sensational, objective and democratic ends. In each case its function changes depending on the context and yet the pattern, news, persists. Finally, the interaction of news patterns improves the competence, the overall performance, of the pattern. During the crisis in Kosovo Yugoslavia expelled CNN and other Western media outlets, eliminating the redundant news patterns that correct local errors in the duplication process.¹⁶⁴ This also explain in part why reporters spend so much time reading the work of other reporters. News still emerged from the war zone but its credibility suffered in the absence of other error-correcting patterns.

Emergent patterns that can be quantified, such as news, are relatively easy to understand using Holland’s five criteria, but what about more elusive concepts such as sensationalism or objectivity? They certainly “feel” like complex large-scale behaviors that emerge from the interaction of less complex media agents. Take away the television cameras, embattled guests and the studio audience, and Jerry Springer is a fairly typical media agent. Moreover, observing his behavior in isolation doesn’t provide any real insight into the emergence of sensationalism or why sensationalism persists. The same is true of objectivity, since the actions of a solitary reporter cannot account for the emphasis journalism schools or newsrooms place on an issue that continues to inspire heated debated (see Chapter Six).

¹⁶³ Michael Schudson 1978: 40.

Journalism and mass communications scholarship supports the hypothesis that sensationalism and objectivity are emergent media patterns. For example, Schudson (1978) emphasizes how sensationalism and objectivity transformed the American press as it evolved through four stages. During the first stage, which lasted up until the 1830s, commercial interests and political parties controlled most of the newspapers. The second stage begins with the publication of the first penny papers. Colourful and cheap, the penny press heralds the advent of sensationalism. Disillusionment following World War One lead to the third stage, which is characterized by sober objectivity. Finally, the fourth stage reassesses the impact of objectivity on the news, discarding it in favor of the "adversary culture" of the 1960s. According to Schudson then, objectivity emerged as a persistent pattern in journalism during the 1930s, only to disintegrate as journalists realized that overcoming subjectivity was impossible.¹⁶⁵

Holland's five criteria also seem to confirm sensationalism and objectivity's status as emergent phenomena. First, both result from generated complexity, since it is difficult if not impossible to understand either pattern by referring to the skills and behavior of basic media agents. Furthermore, sensationalism and objectivity are persistent patterns despite agent turnover in media *cas*. If these patterns were irregular then they would be expected to disappear with the agents that created them; and yet they are still with us after all

¹⁶⁴ John Holland 1998: 226.

¹⁶⁵ Michael Schudson 1978: 157.

these years. Finally, the function of sensationalism and objectivity is context dependent.

While sensationalism and objectivity are examples of emergent media patterns, democratic ideals are not. The relationship between media and democracy remains a contentious issues that polarizes scholars in three distinct camps. In the first camp, political economists such as McQuail (1995) argue that media could and should play a fundamental role in the democratic process but cannot due to the effect of rampant capitalism and the “widespread rise of ‘tabloid television,’ infotainment and old fashion sensationalism.”¹⁶⁶ Bogart (1995) essentially argues the same point, concluding that “representative democracy is inconceivable without forms of mass communication,” but that these forms are currently vulnerable to the machinations of “political authorities motivated by ideological zeal or crude self-interest,” and “economic forces that limit their resources, their variety and their integrity.”¹⁶⁷ The emergence of the Internet as a viable communications medium has prompted scholars, such as Hacker (1996) and Friedland (1996) to form a second camp that heralds the arrival of electronic democracy, “a radically new form of democratic process modified by new information technologies.”¹⁶⁸ Grossman (1995) also acknowledges this

¹⁶⁶ Denis McQuail 1995: 11.

¹⁶⁷ Leo Bogart 1995: 2.

¹⁶⁸ Lewis Friedland 1996: 185.

“emerging electronic republic” that is “vastly increasing the people’s day-to-day influence on decisions of the state.”¹⁶⁹

Despite claims that the Internet will “improve democracy and create a system of political communication that engages all sectors,”¹⁷⁰ scholars in the third camp steadfastly reject both the accusations blaming media for the state of America’s democratic system as well as the projects that hold up media as the potential saviors of that system. At the turn of the century, Lippmann (1965) argued that media are “too frail to carry the whole burden of popular sovereignty, to supply spontaneously the truth which democrats hoped was inborn.”¹⁷¹ Schudson (1978; 1995) and Sigelman (1992) also voice their disapproval. Although he repeatedly refers to “the emergence of objectivity” in his work, Schudson (1978) denies that democracy is such a phenomenon. In fact Schudson argues that it is modern journalism that traces its origins back to “the emergence of a democratic market society” in the mid-Nineteenth Century, not the other way around.¹⁷² Later, Schudson (1995) restates his emphatic objection to those attempts to establish a connection between media performance and the emergence of democracy.

¹⁶⁹ Lawrence Grossman 1995: 163-164.

¹⁷⁰ Sara Ivry 1995: 169.

¹⁷¹ Walter Lippmann 1965: 228.

¹⁷² Michael Schudson 1978: 57.

Well-reported news, free from censorship, does not a democracy make. Full and accurate reporting of a candidates' records and policy positions, even if we had that, would not a well-prepared voter create.¹⁷³

Democracy is not an emergent media phenomenon, despite the protestations of those who feel it should be or those who claim it would be in a perfectly balanced world. Nerone (1987) argues media in general and news in particular are not democratic since they don't necessarily promote popular interests, protect rights, or enable citizens to participate more actively in the governing process.¹⁷⁴ Gordon (1995) and Ivry (1995) suggest the Internet will transform the participation process but their arguments underestimate the role of "reason" in the process. For example, Gordon's claim that the Internet and its thousands of chat rooms will foster reasonably novel political discourse is difficult to justify, considering how abbreviations such as lol (laugh out loud) and emoticons like :-) and ;) or : p have replaced grammar and the written word.¹⁷⁵

The methodologies scholars propose to rectify the situation are equally problematic. For example, McQuail (1991) and Curran (1991a; 1991b) claim that addressing the perceived imbalances in content, access and control of media will usher in novel democratic patterns; yet their methodology is irreconcilable with the concept of emergence. As Holland reminds us time and time again, homogenous systems are completely incapable of generating anything novel, much less complex large-scale emergent phenomena. Indeed, it is ironic that the

¹⁷³ Michael Schudson 1995: 169.

¹⁷⁴ John Nerone 1987: 392.

very methodologies constructed to promote the emergence of democratic phenomena undermine their own goals in their striving towards balance and homogeneity.

Multiplicities Revisited

The mass media are composed of immutable molar agents operating in striated space. Mogul kings, publishing queens and knight reporters prowl predictable lines, attack and defend space and subjugate their hapless audience of pawns. Unable to become anything more than they already are, these media pieces have little to do but engage in stylized battles. They issue forth from behind white picket fences and particle board desks to attack and defend the status quo. *Media cas*, on the other hand, are composed of molecular agents that assemble and disassemble themselves, connect and disconnect themselves, in unpredictable patterns. Molecular reporters become molecular readers who in turn threaten to become molecular publishers via the Internet. The agents transcend striated space to create complex networks in which the relative strength or weakness of a niche is defined by connection rather than boundaries.

Mass is a label, a weight, a presupposition. It is a pejorative term that demarcates the faceless hordes. And yet they are more like the faceless pawns arrayed before the king than like Go pieces. Mass implies a universal, a

¹⁷⁵ Andrew Gordon 1995: 173. For a list of other emoticons see Ernst Muller Date unavailable: 1-4.

deterministic entity that exists outside of time, beyond duration. Unaffected by friction, masses are easy to quantify, measure, then leave and measure again later with perfect precision. Newspaper reports on masses always contain the same number of people. Masses are static. They react, move and revolt as one. In this sense, even the socialist equivalent suggests weakness since solidarity implies an environmental reaction that projects a singularity of motion. Complex adaptive systems on the other hand, adapt and evolve. They never “be.” They transform themselves in an unending series of variations with no destination. Complex adaptive systems are diverse, novel. They add new agents as the environment changes and transforms. Complex adaptive systems are nomads, the rhizome to the arboreal masses, rooted and routed, attacked and defended. McQuail’s definition of mass suggests it is an “aggregate in which individuality is lost.”¹⁷⁶ Yet it is also an aggregate in which adaptability is lost. Even Holland’s ants are better off than the “mass audience” bandied about by media critics and sociologists.

And so where does this leave the concept of “mass communication”? Here, it represents a deductive form of communication, an enforcement of ideals upon the mass. It visualizes a media and then imposes that communications format upon the masses. It presupposes the meaning of the message before it is sent. Metaphors become irrelevant in mass communication because they are already predetermined and defined. The messages have a Newtonian component,

¹⁷⁶ Denis McQuail 1987: 29.

a clockwork compatibility that insists on universal truths. The masses don't even need to digest the messages. This is opposed to *cas* communication, which is founded on metaphor and play. The power of metaphors give the *cas* a communications flexibility and diversity. Messages are created and flow through the system, generating new messages and meaning wherever they touch down. *Cas* communication does not presuppose the meaning of the message before it is even sent. Such is the difference between mass and *cas* communication.

CHAPTER 6: STRATEGY, POWER AND CONTROL

Introduction

Games are a fundamental aspect of the human experience. Children develop important social skills as well as establish their status among peers through games. It's a safe bet that our fascination with games doesn't end in childhood, a factor that thousands of lotteries, sports franchises, and weekly poker games depend on. In the 1940s, von Neumann and Morgenstern (1944) finally developed a mathematical theory of games to make sense of so much play. However, with the exception of a few studies that critique the reporter-source relationship (Murphy 1987 and 1989; Charron 1989; Russell 1994), media scholars have largely ignored the implication for this game theory on journalism and mass communication scholarship. The apparent reluctance to engage in a productive discourse with game theory is unfortunate, since the origins of media power and control are still not well understood, in spite of what the political economists would lead us to believe. Neither I might add, is the strict determinism normally associated with game theoretic principles. While many scholars still use "classical" game theory to model modern economics problems, a growing number of scientists are demanding a theory that can account for more complex interactions such as "coevolution in nonconservative, nonequilibrium

systems.”¹⁷⁷ Although they are unable to break away completely from the traditional mold, studies focusing on the emergence of strategic patterns from relatively simple agents (Axelrod 1984; Epstein 1995; Lindgren 1995; Miller *et al* 1998) are a step in this direction and can be used to model the interaction of media agents.

Divided into four sections, this chapter introduces basic game theoretic concepts, analyzes the establishment of power and control in the mass media and media *cas*, and illustrates how models based on the Prisoner’s Dilemma might be used to critique the emergence of strategic media patterns. Although game theory is important, it should be stated that this chapter emphasizes conversational techniques over equations and axioms. Section one defines zero-sum and cooperative game branches as well as key terms like strategy and payoff. In addition to the theoretical introduction, this section will assess game theory’s impact on the study of complex adaptive systems (Holland 1995) and reporter-source relationships (Murphy 1989; Charron 1989; and Russell 1994). Although Shubik (1997b) claims media generate misconception about game theory, his conclusions are not supported by the literature.

With game theory’s general principles identified and defined, the second section focuses specifically on games based on the Prisoner’s Dilemma. It introduces the one-shot and iterated Prisoner’s Dilemma, some basic strategies, such as ALLD (All Defection) and ALLC (All Cooperation), and elements such

¹⁷⁷ Martin Shubik 1997c: 19.

as memory, tags and communication that can affect the environment and consequently, the evolution of cooperative and competitive strategy. Section three analyzes the strategic implications of the APEC Conference in general and CBC reporter Terry Milewski's coverage of the scandal in particular. APEC marks a pivotal stage in Canadian journalism, since Donolo's (1998) complaints not only challenge the definition and limits of cooperative strategies but they also signal a strategic shift in the Liberal government's approach to the CBC. Although models based on the Prisoner's Dilemma are useful for exploring the emergence of strategy in the reporter-source relationship, they do not explain other motivations that drive media agents. For example, little is understood about the inter-agent competition for the trappings of status like plum editorial posts at respected newspapers or the weekly column. Therefore, section four briefly considers the emergence of media status, drawing on Quint and Shubik's (1997 and 1998) analysis of games of status and wealth. Of interest here is not so much the game theory Quint and Shubik adopt, but the questions they raise about the emergence of status in media *cas*.

Game Theory — An Introduction

Games come in all shapes and sizes, from classics such as chess, poker, and rock-paper-scissors, to more abstract permutations that scholars create to model specific situations. Despite substantial structural differences, game theory divides all games into two general classes: zero-sum games and cooperative games. Zero-sum games are ones "in which the interests of the players are

diametrically opposed,” because “what one player wins, the other loses”¹⁷⁸

Cooperative games, on the other hand, encourage agents to interact because they cannot guarantee themselves a payoff of more than zero if they act independently.¹⁷⁹ Although some scholars have modeled media problems as zero-sum games (Zhu 1992), such games are not particularly relevant to this thesis since the interests of reporters and their sources are rarely diametrically opposed. Both have a stake in the game — the reporter wants a story and the source wants publicity — and so it is to their mutual benefit to cooperate. Even if a dispute arises and the agents assume a more aggressive or outright adversarial stance, the potential complexity of the resulting payoff makes it difficult to identify definitively not only who won or lost, but also what was won or lost.

Strategy and payoff are two other important components of game theory. A strategy is “an all encompassing plan which contains instructions concerning what a player should do under all contingencies.”¹⁸⁰ In a one-shot Prisoner’s Dilemma there are four strategies, while there are approximately $10^{1,000}$ strategies in a chess game limited to forty moves and many more in a complete game.¹⁸¹ With so many possibilities to choose from, selecting an appropriate strategy seems like a daunting task, especially if the agent has to test the possibilities one at a time, praying that it hits on an effective strategy. However, agents do not

¹⁷⁸ Martin Shubik 1997a: 7.

¹⁷⁹ Martin Shubik 1991a: 9.

¹⁸⁰ Martin Shubik 1997a: 6.

¹⁸¹ Martin Shubik 1997b: 3.

create or search through a complete set of strategies since this takes time, especially in a complex game like chess.¹⁸² Agents instead use rhetorical tools like metaphors and analogy to draw connections between strategies, separating the effective from the ineffective. An accomplished chess player, for example, can draw parallels between the French Defense (e5), an effective response to King's pawn openings (e4), and the Slav Defense (d5), a traditional response to Queen's Pawn opening (d4), in order to transfer smoothly from one to the other. Later, agents can use these effective strategies as building blocks to construct novel approaches to serve as surprise weapons in the players' strategic arsenal. This process is similar to that adopted by the adaptive plan (Holland 1978) (see Chapter Seven).

Payoff is defined as "the worth of the outcome of the game."¹⁸³ In zero-sum games such as chess or poker the payoff function is well-defined, since the winning player gets the point or the pot of chips, while the loser receives nothing. This simple payoff structure is not always the case, especially in complicated multi-agent cooperative games where the pot can be split in any number of ways depending on the game's outcome. Moreover, the value of what is won or lost is not always clear. An agent participating in an iterated Prisoner's Dilemma might get away with the occasional defection and rack up an impressive short term profit, but only at the expense of potential long-term profitability.

¹⁸² Martin Shubik 1997b: 3.

¹⁸³ Martin Shubik 1997b: 2.

Game theory's basic components — zero-sum and cooperative games, strategy and payoff — are versatile and can be used to model many different situations. However, this versatility comes at a price. Although it is more than fifty years old, game theory remains a normative theory. For example, game theoreticians assume that agents engaged in a zero-sum game share common knowledge about the game environment and act rationally, meaning they always select the optimal strategy that maximizes their payoff and minimizes that of their opponent¹⁸⁴ In short, game theory defines the rules for games such as tic-tac-toe and chess as well as determines all the ways to play these games, but it does not “provide us with a prescription as to how the game should be played, nor with the evidence as to how the game is actually played.”¹⁸⁵ However, scholars such as Shubik (1997c) recognize this problem and are developing models that account for selective environmental knowledge, a fundamental component of complex adaptive systems.

Disciplines ranging from economics and complexity theory to journalism and mass communications have appropriated game theory, despite its normative origins, in order to untangle the complicated web that is human interaction. In Waldrop (1993), Holland argues that agents in complex adaptive systems engage in cooperative and competitive games, making a distinct break from methodologies that consider power and control predetermined and immutable.

¹⁸⁴ This is von Neumann's minimax theory of two-player, zero-sum games. See Manfred Eigen and Ruthild Winkler 1993: 14.

¹⁸⁵ Martin Shubik 1997a: 14.

This observation makes sense, considering that agents in the pursuit of food, wealth or power, usually achieve their goals only with the help, or at the expense of other agents. Power of and control over agents in *cas* is a product of these cohesive agent-to-agents interactions, but they tend to remain highly dispersed in even the most complex systems since they are always subject to the destabilizing forces of the agents themselves.¹⁸⁶ This conception of power and control in *cas* closely resembles the postmodern image forwarded by Deleuze and Guattari (1987). Centralized power is an illusion, Deleuze and Guattari argue, since it is constantly subjected to the destabilizing influence of molecular agents who “actively participate in the exploitation of the Third World, the arming of the dictatorships, and the pollution of the atmosphere.”¹⁸⁷ Power then, “is not where all the other points melt together, but instead acts as a point of resonance on the horizon, behind all the other points.”¹⁸⁸

Journalism and mass communications scholars and media commonly use game theory, although Shubik (1997b) considers its application to media to be a contentious issue. He argues that the “popular press” misuses game theory’s terminology, creating misconceptions that circulate to all levels of society. In addition to terminological discrepancies, Shubik argues that media reduce game theory to a “calculus of deterrence” or to a doctrine advocating “first strike and brinkmanship,” even though von Neumann and Morgenstern (1944) clearly favor

¹⁸⁶ Mitchell Waldrop 1993: 145.

¹⁸⁷ Gilles Deleuze and Félix Guattari 1987: 225.

¹⁸⁸ Gilles Deleuze and Félix Guattari 1987: 224.

cooperative models of social interaction.¹⁸⁹ This apparent shift towards noncooperative game theory is problematic, Shubik argues, because media model critical and complex social problems, such as the prospect of nuclear war, as simple 2 x 2 games, despite the astronomical number of strategically different 2 x 2 and 3 x 3 noncooperative and cooperative games at their disposal.¹⁹⁰

Shubik's criticism of media is weakened by his failure to provide any concrete examples. Indeed, a review of journalism and mass communications literature suggests, at least from an academic perspective, that his conclusions are unfounded. For example, Murphy (1989) advises reporters and sources alike to avoid conceptualizing public relations crises as zero-sum games since an opportunity often exists to resolve the conflicts cooperatively. Charron (1989) also emphasizes the interdependence of reporters and public relations officers, although his work does not explicitly refer to game theory. While scheduling news conferences on Friday afternoons, steering reporters towards "bonus" information and encouraging competition between rival news organizations can secure an edge, Charron argues that these competitive strategies are useless unless both sides are prepared to participate in the "complex" negotiations that establish the rules governing the exchange of information.¹⁹¹ Russell (1994) draws similar conclusions, although his analysis focuses more heavily on media-government

¹⁸⁹ Martin Shubik 1997b: 16.

¹⁹⁰ Martin Shubik 1997b: 16.

¹⁹¹ Jean Charron 1989: 52.

relations and the impact of strategic legislation on the rules of the game. In short, these works do not support Shubik's claims.

The Prisoner's Dilemma

Cooperative games provide a relevant setting to investigate the strategies Canadian media agents deploy; and one cooperative game, the Prisoner's Dilemma (PD), has attracted the attention of complexity scholars more than any other. The Prisoner's Dilemma is a cooperative game used to model the evolution of cooperative and competitive strategies in complex organizations. Examined extensively by Rapoport and Chammah (1965), PD emerged in popular discourse in the 1980s with the publication of *The Evolution of Cooperation* (Axelrod 1984). Since then, the Prisoner's Dilemma has been used to chart the evolution of stable strategies (Axelrod 1987; Boyd and Lorberbaum 1987), test the fitness of the Tit-for-tat strategy (Nowak and Sigmund 1992 and 1993), and assess the impact of communication, noise, misunderstanding, and mistakes on strategy selection (Wu and Axelrod 1995; Nowak, Sigmund, and El-Sedy 1995; Lindgren 1996; Miller, Butts and Rode 1998). The scholarship is considerable, and yet the underlying premise of the Prisoner's Dilemma is quite simple. Two agents must decide to cooperate or defect, but neither knows the other's decision beforehand. Mutual cooperation guarantees that both benefit, while mutual defection guarantees neither benefit. However, if one agent cooperates and the other defects, the defector benefits at the other's expense. Table 1 summarizes the payoffs.

Table 1 — The Prisoner's Dilemma

	Cooperate	Defect
Cooperate	+, +	-, +
Defect	+, -	0, 0

The solution to the Prisoner's Dilemma is somewhat surprising because there is really only one choice — defection. Defection ensures the best payoff because, “it is better to defect if you think the other player will cooperate, and it is better to defect if you think the other player will defect.”¹⁹²

A model based on a one-shot Prisoner's Dilemma illustrates the strategic value of defection but it does not describe events in the real world. Reporters and sources usually develop long-term relationships that emphasize cooperation over defection. Consequently, most scholars interested in the evolution of strategy focus on models based on an iterated Prisoner's Dilemma, although there are notable exceptions (Epstein 1997; Miller *et al* 1998). In an iterated Prisoner's Dilemma, agents play repeatedly, allowing scholars to analyze the strategies that evolve when players remember the actions of other agents and make predictions. Iterated Prisoner's Dilemma often incorporate functions such as memory (Axelrod 1984), identification tags (Holland 1995), or communication tokens (Miller *et al* 1998), in order to create more complex models.

¹⁹² Robert Axelrod 1984: 9.

Tournaments conducted by Axelrod (1984) concluded that an effective strategy in an iterated Prisoner's Dilemma *with memory* is Tit-for-tat (TFT). Agents employing Tit-for-tat cooperate with all other players until one opponent defects, at which point it defects in the next game as a punishment, before returning to cooperation. In the iterated PD tournaments, cooperative strategies like TFT scored consistently higher than defection strategies, leading Axelrod (1984) to postulate that successful strategies have four properties. These are: (1) the avoidance of unnecessary conflict by cooperating as long as the other player does; (2) provocability in the face of an uncalled-for defection by the other; (3) forgiveness after responding to a provocation; and (4) clarity of behavior so that the other player can adapt to your pattern of action.¹⁹³ However, scholars have not ruled out the creation of successful defection strategies. In successive tournaments, scholars submitted defection strategies that tried to take advantage of TFT's penchant for cooperation. The tournament results suggest that with each iteration of the Prisoner's Dilemma defection strategies that take advantage of suckers face extinction because cooperative strategies evolve and won't be so easily conned. "Not being nice may look promising at first," Axelrod argues, "but in the long run it can destroy the very environment it needs for its own success."¹⁹⁴ In this sense, Tit-for-tat is a robust strategy because it performs well in different environments and can "resist the intrusion of whole clusters of mutant

¹⁹³ Robert Axelrod 1984: 20.

¹⁹⁴ Robert Axelrod 1984: 52.

strategies.”¹⁹⁵ However, Lindgren (1996) concludes that another strategy, FAIR, (FA) is more robust than Tit-for-tat, since it can maintain cooperation in the presence of mistakes and misunderstanding generated by noise.¹⁹⁶

Tags are also an important tool complex environments and have been used in Prisoner Dilemma models (Holland 1993 and 1995; Riolo 1996). Holland defines tags as a “pervasive mechanism for aggregation and boundary formation in *cas*.”¹⁹⁷ What this means is that there are certain visual cues or features that distinguish reporters from sources and *vice versa*. Tags also “facilitate selective interaction,” since “they allow agents to select among agents or objects that would otherwise be indistinguishable.”¹⁹⁸ This environmental information in turn helps agents select an effective strategy to employ. For example, sources of information, such as public relations practitioners, exhibit certain tags that distinguish them from the uninformed or recalcitrant. Reporters who recognize these tags should be able to select an effective strategies and consequently, produce a better story than a competitor who doesn’t recognize these signals and interviews irrelevant sources.

A vital component of cooperation and competition in the real world, communication’s effects on the evolution of strategy in one-shot or iterated models based on the Prisoner’s Dilemma are not as well understood as those of

¹⁹⁵ Robert Axelrod 1984: 100.

¹⁹⁶ Kristian Lindgren 1996: 18. The discovery of a robust strategy like FAIR does not imply that agents will find it (see Chapter Seven).

¹⁹⁷ John Holland 1995: 13.

¹⁹⁸ John Holland 1995: 14.

memory and tags. This is unfortunate, considering that agents can use communication to justify previous defections or mask the tags that could give away its strategy. However, a one-shot model has been developed in which participants send and receive communication, via the exchange of “meaningless” communication tokens, before they decide whether to cooperate or defect (Miller *et al* 1998).¹⁹⁹ Miller’s model is interesting because it hypothesizes that “no systematic tendency toward cooperation should be observed in the system,” i.e., agents should defect regardless of the presence of communication.²⁰⁰ After all, communication as defined by the model is still “cheap talk” that contains no enforceable commitments.²⁰¹ Reporters and sources can make as many “promises” to each other as they like about what is “on” or “off” the record or what a story will or will not cover, but more often than not there are no mechanisms available to enforce commitments. Despite the strong tendency towards defection, aperiodic yet systematic cooperation emerges. More important, however, is the fact that the emergence of cooperation is marked by a dramatic increase in the duration and complexity of the communication.²⁰² Although it’s unclear whether this correlation appears in iterated models, the observation is nevertheless an important step towards a methodology that could

¹⁹⁹ Miller *et al* 1998: 2. In Miller’s model agents have access to a standard set of identifiable symbols which they use to communicate. However, the meaning of these symbols is left up to the individual agent, rather than specified in advance.

²⁰⁰ John Miller *et al* 1998: 6.

²⁰¹ John Miller *et al* 1998: 2.

²⁰² John Miller *et al* 1998: 8-10.

use the duration and complexity of inter-agent communication to predict the emergence of media patterns such as sensationalism and objectivity (see Chapter Five).

Milewski's Dilemma

Models based on the Prisoner's Dilemma help scholars visualize the evolution of media strategy, since reporters, public relations officers and government officials tend to develop lasting cooperative relationships that emphasize give-and-take. This is not to say that these relationships are always beneficial. While it is important that public relations officers and government officials maintain a good working relationship with media and *vice versa*, competition veiled by cooperation is, more often than not, the rule rather than the exception. Problems arise when cooperation breaks down and agents resort to adversarial tactics. A good example of this kind of struggle is the growing tension between Canadian media in general and the CBC in particular, and the Prime Minister's Office. The Liberal government needs the parliamentary press gallery to cooperate with its agenda, trumpet its good works, and laud its wise policy decisions. Yet there is a growing sense in Canadian media that the Chrétien government and the PMO have not reciprocated this cooperation. The *Toronto Star* denounces the Chrétien government's "culture of secrecy" because it won't discuss the ethics standards it sets for its ministers or strengthen the Access

to Information Act.²⁰³ Other members of the press have complained they don't have enough access to the Prime Minister when parliament is in session or when he is on a visit overseas.

However, these disagreements are relatively minor when compared to the very public battle over the definition and limits of cooperative strategy that ensued following the Asia Pacific Economic Cooperation Conference (APEC). Jean Chrétien's director of communications, Peter Donolo, accused CBC reporter Terry Milewski of bias, claiming that he "secretly conspired with a complainant on legal strategies," when he advised the students and their lawyers to "dredge up a few security experts" in a private e-mail message.²⁰⁴ Donolo also claimed that Milewski "sought to portray the government . . . as "the Forces of Darkness," referring to a quote from Milewski's private e-mail.²⁰⁵ Milewski responded to Donolo's criticism in a scathing letter that appeared in *The Globe and Mail*, charging that the government's attack against him and his strategy, if successful, would "tie the hands of many other reporters," resulting in self-censorship akin to "Eric Honecker's East Germany."²⁰⁶ Following Donolo's complaint, the CBC pulled Milewski off the APEC story for "perceived bias" and suspended him, presumably for his public response to Donolo's accusations, although CBC executives refused to elaborate. They also appointed Radio-Canada ombudsman

²⁰³ Edison Stewart 1998: 1.

²⁰⁴ Peter Donolo 1998: 1. Also Terry Milewski 1998a: 1-2.

²⁰⁵ Peter Donolo 1998: 1.

²⁰⁶ Terry Milewski 1998b: A31.

Marcel Pépin to review the case.²⁰⁷ In his conclusion, Pépin emphatically stated that Milewski did not step over the line when he cooperated with Craig Jones and other APEC protesters:

What principle says that a reporter should refrain from giving information that belongs to him in order to obtain other information? This is an entirely new theory to me, which I cannot find any support for in the academic sources I have consulted. My own experience of 35 years in this profession has taught me that Mr. Milewski is certainly not the first journalist to suggest questions that might be asked or look for strategies that might help in finding the truth.²⁰⁸

Although Pépin dismissed Donolo's allegations, cleared Milewski of any wrongdoing, and chastised the CBC for treating "its reporter with undue harshness because the complaint had come from the federal government,"²⁰⁹ the *National Post* and the Fraser Institute attacked Milewski's strategy and his news judgement. In the days following his suspension the *National Post* published a commentary that concluded, "the problem isn't that Milewski spoke (or e-mailed) out of turn, but that he may have profoundly misread a story."²¹⁰ An editorial the following day continued the attack, arguing that Milewski symbolized a larger problem at the CBC, where "a bias in favor of the left and against certain kinds of authority . . . is spread through the corporation like raisins in a rich fruitcake."²¹¹

While the *National Post* challenged Milewski's journalistic credibility, it

²⁰⁷ Anne Marie Owens 1998: 1-2. The CBC appointed Pépin after Milewski refused to cooperate with ombudsman David Bazay. Milewski accused Bazay of bias after he ruled against him on a previous complaint.

²⁰⁸ Marcel Pépin 1999: 21.

²⁰⁹ Doug Saunders 1999: 2.

²¹⁰ George Jonas 1998: 3.

²¹¹ Philip Mathias 1998: 1.

sympathized with Peter Donolo, portraying him as a mild mannered victim. Bryden (1998) characterizes the Prime Minister's communications director as "boyish," "refreshing," and a "bit of a scamp." Donolo not only disarms reporters with "humour, wit and pithy one-liners" but also "can count on the fingers of one hand the number of times he's complained to a reporter's superior."²¹² Finally, a month before Pépin's ruling Lydia Miljan, director of the Fraser Institute's National Media Archive, concluded in her report that "it didn't seem . . . that he [Milewski] wanted to be fair to the government," because he focused "on the protesters' complaints . . . leaked information that implicated the PMO . . . and information that showed the RCMP were not interested in the security of the APEC leaders."²¹³

Although APEC and the infamous pepper spray incident occurred almost two years ago, the fallout still has a considerable impact on media and government interaction. For example, recent announcements by the Liberal government suggest a shift towards an adversarial stance, especially with regards to the CBC. Bill C-44, for one, would allow the Prime Minister's Office to fire any future CBC president, raising concerns that the government could turn the public broadcaster into a "mouthpiece for the state."²¹⁴ In another move to clamp down on the CBC the government has demanded that "all Canadian government institutions . . . apply the Canada word mark prominently," a move CBC

²¹² Joan Bryden 1998: 1-2.

²¹³ Elena Cherney 1999a: 2-3.

²¹⁴ Chris Cobb 1998: 1.

representatives perceive as a threat to their “journalistic independence.”²¹⁵

Although the CBC denies them, there are also rumors circulating that the CBC’s board of directors, at the behest of the government, is planning to appoint a director to oversee news and current affairs programming.²¹⁶

Although difficult to categorize, the Liberal government’s strategy is not optimal. Relatively simple strategies such as ALLC or ALLD do not account for the government’s behavior towards media. Optimal strategies such as Tit-for-tat or FAIR are not adequate either since neither incorporates a mechanism in their basic framework to stimulate unprovoked defections, an important tactic in the government’s public relations arsenal. Only time will tell whether the government will implement any or all of the above measures, but still the Liberal’s aggressive approach to media relations seems to suggest a strategic shift from cooperation to defection.

While the government can cooperate or defect freely, the mass media images impose limits on reporters in general and Milewski in particular, putting them at a disadvantage. For example, Donolo’s criticisms suggest reporters are free to pursue an effective cooperative strategy with one source but not another. Miljan makes a similar point. If cooperation implies objectivity, as she suggests, then reporters have but one strategy — ALLC. Assuming the government pursues strategies that advocate the occasional defection then reporters will

²¹⁵ Chris Cobb 1999b: A3.

²¹⁶ Chris Cobb 1999a: 1-2.

always receive a lower payoff. In addition to strategic limitation, Donolo (1998) imposes limits on the kind of “communications tokens” reporting agents and their sources can exchange. While Pépin (1999) clearly disputes this point, Donolo’s complaint raises interesting questions about how the duration and complexity of reporter-source communication affect the emergence of news.

The Emergence of Status

So far I have restricted my analysis of media *cas* and games to the Prisoner’s Dilemma. The Prisoner’s Dilemma explains in part how cooperation evolves, and is a useful tool for exploring the competitive and cooperative relationship between media agents such as reporters, sources, and public relations practitioners. However, Axelrod (1984) identifies three restrictions on the theoretical feasibility of such models. First, most models describe the one-on-one interaction of agents rather than the participation multiple agents. Secondly, the models currently provide no method for agents to make enforceable threats or commitments to secure cooperation in the face of defection. Finally, agents can’t change the payoff they receive for cooperation or defection.

A fourth limitation of Prisoner’s Dilemma models is that they are unable to account for patterns other than cooperation and competition. For example, scientific and media scholars alike have largely ignored the emergence of status in complex adaptive systems. Quint and Shubik’s (1997a; 1997b) work on games of status and wealth could serve as a starting point, although their axiomatic methodology is beyond the scope of this thesis. Classically orientated, Quint and

Shubik also assume that all agents rank social positions in the same way and that the top position is the most desirable, presuppositions that don't lend themselves well to the study of media *cas*. However, Quint and Shubik also recognize these assumptions and the limitations they imply. Perhaps Quint and Shubik's most important contribution to the debate, is the emphasis they place on status as a subjective value, ill-defined though often conceived as "the best . . . in the world."²¹⁷

Status is an ill-defined emergent media pattern. In the United States, analysts confer status on *The Washington Post* and *The New York Times* while Canadians look to *The Globe and Mail* or *The Toronto Star* as bastions of journalistic integrity. Reporters jockey for status in the industry, whether their goal is a plum editorial position or a weekly column. Some media agents argue that foreign correspondents have more status than the lowly general news reporter since there are so few of them. Others lament the downfall of the once mighty labor beat. At one level, the respective status of reporters and editors is clear; yet at another, the comparative status of sports reporters and foreign correspondents are more problematic. Undoubtedly many would rank national politics and foreign beats more highly than city pages or sports; and yet there are sports personalities, such as Don Cherry on *Coaches Corner*, whose status far outweighs that of any Canadian foreign correspondent and most American correspondents as well, with the possible exception of Christiane Amanpour of CNN.

²¹⁷ T. Quint and Martin Shubik 1997a: 1.

In addition to being a subjective value, media status is characterized by loose hierarchization, unlike the more regimented status conferred by the army.²¹⁸ A newspaper employs interns, freelancers, general reporters who do a little bit of everything, beat reporters who specialize in one area, columnists and editors, to name just a few. How an agent progresses through these positions, if at all, is unclear. The transition from a reporting position to an editorial position seems like a natural progression, but it's a step many writers refuse to make, despite the potential increase in status. Other agents view a newspaper beat as a gold mine, or just a necessary evil that must be endured before they make the jump to the flexibility of freelancing.

The relationship between wealth and the emergence of status in media *cas* is another interesting problem. In systems where wealth can be converted into status, the relationship is quite clear. After all, "history is replete with stories of rich men buying themselves knighthoods."²¹⁹ Campaign contributions might purchase a seat in the Canadian Senate, but wealth is largely irrelevant to complex systems like newspapers or reporters. Conrad Black uses his wealth to create

²¹⁸ The U.S. Armed Forces, for example, consists of four armed forces (the Army, Navy, Air Force, and Marines) and different grades. The Army, for example, differentiates among recruits, private, private first class, corporal, sergeant, staff sergeant, sergeant first class, master sergeant, sergeant major, two levels of warrant officer, and five grades of Second Lieutenant, First Lieutenant, captain, major, Lieutenant colonel, colonel, and general. See T. Quint and Martin Shubik 1997a: 6.

²¹⁹ T. Quint and Martin Shubik 1997a: 1.

status but, generally speaking, media agents cannot buy editorial posts, weekly columns, or titles such as “the *Globe and Mail*’s correspondent in Rwanda.” The status of most agents emerges at an undetermined threshold following interactions with other media agents. However, media also convey status on agents such as Miss Canada, Juliana Thiessen, columnist for the *Calgary Herald*, former Reform Party organizer Ezra Levant, columnist for *The National Post*, or General Lewis MacKenzie, Kosovo columnist for the Southam chain. An explanation for this phenomenon could include the notion of “competency” (Holland 1998), explored in Chapter Five. If there is a set of basic rules that governs the emergence of status beauty pageants, politics, the military and media, then the patterns produced in these systems would be similar. The interaction of these patterns should then improve the competency, or persistence, of an agent’s status in media *cas*.

Games theory is a tool that explores the origins of power and control and the evolution strategy. It may also provide insight into the emergence of status. Unfortunately, there is relatively little research on this point, much of it rooted in classical game theory with its presumption that rational agents always pursue “the best” position. The metaphorical value of zero-sum games like chess and Go is high, but they are not particularly useful as models since the interaction of reporters and sources rarely results in winners and losers. Models based on the Prisoner’s Dilemma are more useful in this respect, since they focus on how the interaction of media agents such as reporters and sources, results in cooperation and competition.

CHAPTER 7: MODELS AND METAPHORS

Introduction

A well-conceived model will exhibit the complexity, and emergent phenomena, of the system being modeled, but with much of the detail sheared away To understand emergence, we must understand the way in which models in science and elsewhere allow us to transcend the knowledge that went into their construction.²²⁰

In the last two chapters, this thesis considered the structural and interactive features that distinguish media *cas* from mass media. I also constructed some informal models of media *cas* in order to analyze the implications of properties such as agents, niches, emergence and games on media theory. Indeed, models are a fundamental preoccupation of complex adaptive systems in general and complexity researchers in particular. This double movement raises two important questions. First, how do *cas* (1) construct models of their environment; (2) learn from their mistakes; and consequently (3) modify their models and other structures, such as agents, improving their overall performance? Secondly, are models of modeling — the adaptive plan (Holland 1975) and constrained generating procedures (*cgps*) (Holland 1998) — also applicable to the study of media *cas*?

Divided into three sections, this chapter analyzes how media and other complex adaptive systems use induction to construct and modify “internal models” (Holland 1995) as they adapt and evolve in the face of uncertainty. It also proposes that the current scientific models are applicable to the study of

²²⁰ John Holland 1998: 12.

media *cas*, although the complexity of the transition function is a fundamental limitation. Section one will argue that *cas* use induction to build internal models (Holland 1995) of their environment. Internal models help *cas* select an effective course of action when they encounter unfamiliar situations and environments. However, adaptation in the face of uncertainty can take a long time, especially when there are many potential solutions; and so Holland suggests *cas* use metaphor and other rhetorical devices to speed up the process. In addition to describing the adaptation process, the section introduces some key components of internal models, including condition-action rules, q-morphism, parallelism, and default hierarchies. These features are important, since they reappear in Holland's models.

Having defined induction and the basic features of internal models, section two analyzes two techniques — the adaptive plan (Holland 1975) and constrained generating procedures, or *cgp* (Holland 1998) — used to construct models of the adaptation process in general and complex systems in particular. The adaptive plan, as its name suggests, constructs a formal framework for the study of adaptation. Constrained generating procedures (*cgp*), on the other hand, illustrate how simple mechanisms interconnect to produce emergent phenomena. Unfortunately, the application of these models to the study of media *cas* are problematic, since they emphasize simple rule-based systems, when the rules governing media *cas* remain ill-defined. Finally, the value of metaphors is worth a mention. The relationship between metaphor and adaptation is an important

one, and the parallels with postmodern concepts of “becoming” (Deleuze and Guattari 1987) are hard to ignore.

Induction

Induction is defined as the modification of knowledge through its use (Holland *et al* 1986). Agents use induction to create fluctuating internal models of their environment. In this respect it is a constructive process, “a problem-directed activity, executed in response to specific system objectives such as seeking plausible explanations for an unexpected outcome.”²²¹ The hallmark of induction is the formation of condition-action rules. Construction of these rules is such a common cognitive process that we hardly notice when we create or employ them. For example, after a bad experience with a German Shepherd in a park, a child might decide the best way to avoid being bitten is to avoid all dogs, or perhaps just that particular park after dark. A businessman might take the high road to work everyday because he knows the seaside freeway is always congested. The general form of these rules is IF . . . THEN Condition-action rules can be extremely general: IF a dog approaches THEN run away, or specific, IF walking through Central Park AND a German Shepherd approaches THEN run way. A collection of general and specific condition-action rules form what is known as a q-morphism. The structure within the q-morphism is hierarchical. These hierarchies are an important innovation, since they help (1)

²²¹ John Holland et al 1986: 68.

agents make predictions when knowledge about the environment is incomplete, and (2) robust rules, those that perform well in many different environments, are retained as defaults.²²²

Another element of an internal model is parallelism. When an agent receives information from its environment, all the rules in the internal model check to see whether the signal fulfills the condition portion of the rule. If the condition is fulfilled then the rule is activated. However, one signal could activate many rules at once. This is not a problem, according to Holland, because rules then have to compete. Successful rules become stronger, and have a better chance at becoming defaults, while weak rules disappear, making way for new, as yet untested, rules. One way to model this rules competition is through a bucket brigade algorithm (Holland *et al* 1986). Under this algorithm, each rule activated by an environmental signal bids for the right of activation. If the bid is successful and the agent selects the rule for activation, the rule loses strength equal to its bid. While it might lose strength in the short term, the rule could gain strength when other rules activated by its signal pass their strength on to it. Successful rules gain strength and have a much greater chance of being selected as defaults.

Internal models contain condition-action rules organized into default hierarchies exhibiting parallelism. The model can also incorporate an algorithm that reinforces the strength of robust rules while eliminating the ineffectual and maladaptive. The final component of internal models is the ability to create and

²²² John Holland et al. 1986: 36.

test novel rules. Internal models use abduction, environmental inputs, existing rules coupled with a genetic algorithm, as building blocks in this process, although Holland clearly prefers the latter.²²³ The idea behind the genetic algorithm is quite simple. The model selects two strong condition-action rules and then exchanges the conditions or actions, creating offspring that replace the weakest rules in the model. These adaptations coupled with the refinement of existing rules helps agents in complex adaptive system counter environmental uncertainty and variability.

The Adaptive Plan

Induction describes how agents in complex adaptive systems construct and organize internal models of their environment. Internal models can also incorporate algorithms that change the models depending on their performance. The adaptive plan (Holland 1975) formalizes this process. The adaptive plan's task is "to produce structures which perform "well" (are fit) in the environment confronting it," since any given structure performs differently when employed in various environments.²²⁴ Signified by the symbol τ , the adaptive plan contains six formal elements: structures, operators, environment, signals, and pay-off. These are signified in turn by the sets $A \in \alpha$, $\omega \in \Omega$, $E \in \varepsilon$, $I(t) \in I$, and $\mu \in U$

²²³ John Holland *et al* 1986: 83 and 89.

²²⁴ John Holland 1975: 4.

respectively, and a distinct element is simply one of a hundred or perhaps even a thousand possibilities. Table 7.1 summarizes these sets:

Table 7.1 — A Summary of the elements in an adaptive plan

Adaptive plans	$T \in \tau$
Structures	$A \in \alpha$
Environments	$E \in \varepsilon$
Environmental signals	$I(t) \in I$
Operators	$\omega \in \Omega$
Payoff	$\mu \in U$

The most interesting elements are structures and environments. A symbolizes a distinct structure from a set of possible structures α , and could represent anything from chromosomes to game strategies or behavior patterns.²²⁵ The adaptive plan tests $A(t)$, the state of the structure at a distinct time t , and then invokes operators ω to produce a structure $A(t + 1)$, the state of the structure at the next distinct time sequence.²²⁶ Hence, a given structure $A(t)$ is actually two parts:

²²⁵ John Holland 1975: 4. Holland provides a table of disciplines with their respective structures and operators. For the purposes of this section a structure is a "reporting strategy." The operators are the "rules of thumb" reporter uses to determine the appropriate strategy in keeping with the game-theoretic approach in the previous chapter.

²²⁶ John Holland 1975: 23-24. As we shall see shortly, the adaptive plan selects a random structure based on a probability distribution over the set of possible structures.

$A_1(t)$, which is the structure being tested, and $\mathcal{H}(t)$, the history of environmental signals retained by the structure thus far.²²⁷ One structural problem Holland identifies, however, is that an adaptive plan must sift through $A \in \alpha$, which could be quite large, in order to find robust structures. This search could take a lot of time, especially if the plan considered $\alpha = \{A_1, A_2, A_3, A_4, \dots, A_N\}$ sequentially. To avoid this problem, the adaptive plan must use the history $\mathcal{H}(t)$ to increase the number of effective structures it produces over time.²²⁸

E is a distinct environment of the system where the structures are tested to determine if they are efficient. Similar to A , a distinct environment represents just one of many possible environments in a set the system may encounter, and is thus designated $E \in \varepsilon$. Environmental diversity creates a major problem for the adaptive plan because information about a given environment E at time t , signified by $I(t)$, is often unavailable, incomplete, or available yet undetectable by $\alpha(t)$. This creates a fundamental uncertainty in the adaptive plan because it can never say for sure what environment it is facing.²²⁹ Indeed the pay-off $\mu_E(\alpha(t))$ might be above average in E_1 , average in E_2 , or even far below average when tested in E_3 resulting in the death or destruction of the agent. To counter this information deficit, the adaptive plan must generate robust structures that perform above average in as many environments in the set ε as possible.²³⁰ It is

²²⁷ John Holland 1975: 23.

²²⁸ John Holland 1975: 17 -18.

²²⁹ John Holland 1975: 4 and 22.

²³⁰ John Holland 1994: 314 and John Holland 1975: 17.

understandable why Holland emphasizes generalization and the necessity of adaptive histories and memory $\mathcal{H}(t)$, for without them, the adaptive plan would need to start a new search through $\alpha = \{A_1, A_2, A_3, \dots A_N\}$ each time it encountered an unknown situation in $\epsilon = \{E_1, E_2, E_3, \dots E_N\}$, a daunting and lengthy task that may not produce a good structure in time.²³¹

The adaptive plan is a useful tool since it can be used to model how a reporter or other media *cas* adapt to novel environments. For example, if a hypothetical reporter, Christiane, is sent by her newspaper to report on the Crisis in Kosovo then it is possible to define the elements for the adaptive plan T_1 from the set $\tau = \{T_1 \text{ (Christiane)}, T_2 \text{ (Wolf)}, T_3 \text{ (Donaldson)}, \dots T_N\}$.²³² $E \in \epsilon$ is a set of potential war zones Christiane might encounter during her career, where $\epsilon = \{E_1 \text{ (Kosovo)}, E_2, E_3, \dots E_N\}$, and $I(t)$ represents the information about Kosovo Christiane receives at time t .²³³ $A \in \alpha$ is the set of strategies Christiane can employ to get the story, where $\alpha = \{A_1 \text{ (interview Serbs)}, A_2 \text{ (interview Kosovars)}, A_3 \text{ (interview Yugoslav officials)}, A_4 \text{ (interview KLA officials)}, A_5 \text{ (interview NATO officials)}, \dots A_N\}$. Finally, in order to simplify the model, this

²³¹ John Holland 1994: 314.

²³² Although the model's objective is a comparison of several adaptive plans, this examples examines only the formal components of Christiane's plan. See John Holland 1975: 25.

²³³ If we wanted to be more specific we could define $E \in \epsilon$ as a set of environments within Kosovo itself, where $\epsilon = \{E_1 \text{ (Kosovo-Macedonian border)}, E_2 \text{ (Belgrade)}, E_3 \text{ (Pristina)}, \dots E_N\}$, or place limits on the information signals Christiane is capable of receiving. However, this example assumes that a precise environment is unnecessary, and Christiane keeps her eyes and ears open.

example assumes that operators ω in the set $\Omega = \{\omega_1, \omega_2, \omega_3, \dots, \omega_N\}$, are responsible for structural adaptation, but their nature remains undefined.

Again, the adaptive plan's goal is to find effective structures that perform well in an environment identified with Kosovo. Although Holland does not do so, this search can be divided into (1) information; (2) selection; and (3) resolution stages. In the first stage, the structure being tested ($A(t)$) receives information from its environment $I(t)$. While this example assumes Christiane can detect all of the signals emitted by her environment, this need not always be the case. After all, limited information about the environment is often a stronger stimulus for adaptation than universal knowledge. Once received, the adaptive plan uses that information to select $A(t+1)$, the structure that will be tested during the next time step. Holland defines this transition from $A(t)$ to $A(t+1)$ with the function $\tau: I(t) \times A(t) \rightarrow A(t+1)$.²³⁴ Although it could select a unique structure such as A_2 (interview Kosovars) to test at $t+1$, Holland argues that the adaptive plan is more flexible if selection is conceived as a stochastic (random) process that assigns a distribution of probabilities $\mathcal{P}$ to a range of structures in $\alpha = \{A_1, A_2, A_3, \dots, A_N\}$.²³⁵ For example, Christiane is pursuing strategy A_1 ($A(t)$) when she hears that the Kosovo Liberation Army (KLA) is mounting a new offensive ($I_1(t)$), the Serbian government has declared a cease fire ($I_2(t)$), and a United States F-117 Stealth fighter has been shot down ($I_3(t)$). For the sake of simplicity, assume

²³⁴ John Holland 1975: 23. The transition function for constrained generating procedures is the same (see below).

²³⁵ John Holland 1975: 24.

Christiane may tackle only one of the three events and may invoke only one strategy. During the selection stage then, Christiane's adaptive plan assigns a distribution of probabilities $\mathcal{P}$ to the structures in α depending on the value of $(I_N(t))$ she decides to follow. Table three summarizes each distribution.

Table 7.2 — Probability and the selection of $A(t+1)$

	KLA Offensive	Serb Cease fire	F-117
A_1 – Serbs	.10	.05	.30
A_2 – Kosovars	.15	.10	.05
A_3 – Yugoslavia	.30	.20	.25
A_4 – KLA	.35	.20	.05
A_5 – NATO	.05	.30	.30
A_N – Other	.05	.05	.05

If Christiane pursues the news of the KLA offensive then the strategy selected by the operators is subject to a certain probability $\mathcal{P}$. The strength of the probability is subject to payoff, meaning it could increase or decrease depending upon the results of the interviews. Although the probabilities clearly favor certain strategies over others, the advantage of this stochastic process is that every now and then Christiane's adaptive plan will test a strategy A_N . While the payoff from such a test may be poor, the plan may also discover a strategy more effective than the others. The stochastic process clearly favors certain "strong" rules that

perform well in the environment, but it never discounts the possibility of finding better ones.

Finally, during the resolution stage the transition function resolves, selecting a random structure from the set for $A(t+1)$, and the adaptive plan receives a payoff $\mu_E(A(t))$ for the structure $(A(t))$. Holland distinguishes plans that receive only payoff information from those that receive direct indication of the performance of the structure via $I(t)$ signals, but only the latter is important here. In a general sense, a strategy's payoff $\mu_E(A(t))$ could represent something concrete like a good story, or a more ambiguous value, such as her status at the newspaper, among colleagues, or her popularity with the audience. If Christiane's adaptive plan selected a relatively novel strategy A_{10} (reporting from the roof of a hotel in Belgrade) when she should have been pursuing A_2 (interview Kosovars), then the payoff $\mu_E(A_{10}(t))$ would be relatively low, i.e., a call from her editor.

The adaptive plan is a complicated but rewarding methodology that can be used to study the adaptation of structures in media *cas*. Although the Christiane example is fairly basic, it hints that a comparison of more elaborate adaptive plans, accounting for such elements as memory, a genetic algorithm, and a payoff that effects the distribution of probabilities, would provide a means to determine which plans, given the same environmental constraints, would produce effective structures first. However, scholars must work out certain problems with this model, including the definition of strategy, the sheer number of strategies in the set α , and how operators select a strategy when $I(t)$. Another problem is the

elusive nature of the operators that produce the transition function. While defined as Christiane's "rules of thumb" in the example, operators are not well-defined. A rigorous analysis of journalistic practice during an event such as the crisis in Kosovo may answers some of these questions, providing a basic framework scholars can use to construct, test and compare the search for effective media strategies.

Constrained Generating Procedures (CGPs)

[Constrained generating procedures] are dynamic, hence procedures; the mechanisms that underpin the model generate the dynamic behavior; and the allowed interactions between the mechanism constrain the possibilities, in a way the rules of a game constrain the possible board configurations.²³⁶

An adaptive plan models the quest for effective structures fairly well, but it is largely unable to assemble structures into coherent complex systems. Constrained generating procedures, or *cgps* (Holland 1998), on the other hand, describe the organization of complex adaptive systems in general and the emergence of pattern. A step above the adaptive plan with which they have certain features in common, such as the transition function (see below), constrained generating procedures are based on the Greek contention that all machines are composed of simple components such as lever and pulleys. In keeping with this theoretical shift, Holland replaces structures and operators with a set of primitive mechanisms, environmental signals with input-output values,

²³⁶ John Holland 1998: 126.

and redefines $A(t)$ as the mechanisms state S at time t . However, media *cas* present *cgps*, like their adaptive plan counterparts, with a daunting challenge. Constrained generating procedures are useful when the systems in question are composed of a few simple mechanism governed by clearly defined transition functions, or rules.²³⁷ This is not the case in media *cas*, since the rules that govern a media agent's transformation from one state to the next remain unclear.

Constrained generating procedures are composed of mechanisms, states and inputs. The structural component, mechanisms, respond "to actions (or information), processing that input to produce resultant actions (or information) as output."²³⁸ In this sense, mechanisms resemble the condition-rules discussed earlier. If a mechanism receives information that satisfies its condition then it processes that information and produces an action. Symbolized by f , the definition of any mechanism in the set $F = \{f_1, f_2, f_3, f_4, \dots, f_m\}$ is quite arbitrary. For example, Holland constructs a checkerboard from one mechanism replicated thirty-two times, once for each square of play on the board. Holland can do this because each square is governed by the same set of rules. The same cannot be said of media *cas*. Although we could model *The National Post* or another newspaper by identifying each staff member as a distinct mechanism, the sheer number of mechanisms required would become unwieldy. One solution is to use just three mechanism, $F = \{f_1 \text{ (reporter)}, f_2 \text{ (editor)}, f_3 \text{ (management)}\}$. A more

²³⁷ Indeed, Holland (1998) uses just one mechanism in most of the models he constructs.

²³⁸ John Holland 1998: 126.

specific model can be constructed using eleven mechanisms, $F = \{f_1 \text{ (general news reporter)}, f_2 \text{ (business reporter)}, f_3 \text{ (sports reporter)}, f_4 \text{ (entertainment reporter)}, f_5 \text{ (news editor)}, f_6 \text{ (business editor)}, f_7 \text{ (sports editor)}, f_8 \text{ (entertainment editor)}, f_9 \text{ (assignment editor)}, f_{10} \text{ (editor-in-chief)}, f_{11} \text{ (publisher)}\}$. Clearly, aggregation is key, and the complexity of the model is subject only to the level of detail we want to capture.

The second element common to constrained generating procedures are the states $S = \{s_1, s_2, s_3, \dots, s_m\}$ of a mechanism. In his checker example, Holland defines five states for a primitive checker square — empty, black piece, black king, red piece or a red king. Identifying the state of a square on a chess or checker board is relatively straightforward, but defining the states of a newspaper's mechanisms is a more difficult process. What are the states of a business reporter, an arts editor or a publisher like Conrad Black? The question is not an easy one but there are a number of options. For example, we could define three states for all reporting mechanism, $S = \{s_1 \text{ (nothing)}, s_2 \text{ (researching)}, s_3 \text{ (writing)}\}$, three states for editors, $S = \{s_1 \text{ (nothing)}, s_2 \text{ (editing)}, s_3 \text{ (managerial duties)}, s_4 \text{ (consulting with reporters)}\}$, and so on for each mechanism. If the model has a specific goal, to study the emergence of sensationalism, objectivity, cooperation, or competition, for instance, the set might include $S = \{s_1 \text{ (objective)}, s_2 \text{ (sensational)}, s_3 \text{ (cooperative)}, s_4 \text{ (competitive)}\}$. In short, there is really no limit to the amount of detail a given set can contain, a reason computers play such an important role in complexity theory.

Finally, Holland assigns input and output values to each mechanism.

These values are fundamental since they encourage mechanisms to establish links, producing simple constrained generating procedures that serve in turn as the building blocks for higher level *cgps*. For example, when reporters and editors become interconnected they form a “section” *cgp*. These “section” *cgps* also create links and eventually, a newsroom *cgp* emerges. Formally, each mechanism can have an infinite number of inputs, and each input can have an infinite number of values.²³⁹ The product of the inputs produces a new state. For example, consider f_1 , a mechanism with two inputs $I = \{I_1, I_2\}$, where each input has three values $I_1 = \{a, b, c\}$ and $I_2 = \{x, y, z\}$. This means that there are nine combinations that can produce a new state S . The values of these two inputs influence the state via the transition function $f_1: (I_1 \times I_2) \times S \rightarrow S$ where f_1 is the mechanism in question, i.e., a space on the checker board, I represents the inputs and S is the mechanism’s current state. This transition function is the same as that for the adaptive plan.

The transition function is the most difficult aspect of the modeling process. Holland uses games, physical phenomena and cellular automata as examples because the rules that govern their transformation are clear in comparison to those regulating media *cas*. The question then is, what are the rules of media? What are the rules governing reporting? How do you model such

²³⁹ Holland 1998: 144. One special case are “free inputs” that are not connected to another *cgp*. In his checker game example, Holland defines the input from the players, i.e. their choice of move, as a free input.

rules within the *cgp* framework? While this thesis provides no concrete answers, it is clear that research should focus on the most basic of media agents, reporters. There are many basic “rules of thumb” that operate at this level that could conceivably serve as models for more elaborate rules. For example, journalism schools often teach their students that they should use at least two sources to increase the validity, or to use Holland’s terminology, the competency of the story (see Chapter Five). Modeled as a transition function for a sports reporting agent, the rule might be “IF an input I_N is received from sports mechanism f_S THEN enter state s_Q , querying source mechanisms f_S, f_1, f_2 and f_3 .” Although it is a fairly specialized rule, this function captures the basic transition of a reporter from information receiver to sender. News values such as prominence, proximity, impact and currency, might also serve as rules of thumb that help reporting agents differentiate among relevant and irrelevant inputs. Constructing simple constrained generating procedures from reporting and source mechanisms and using those *cgps* as the building blocks for more complex systems is a viable methodology, but only when we understand more about their transition functions, and the basic rules of thumb that govern media *cas*.

Metaphors — From Evolution to Becoming

Few modern scholars would question the arts’ fascination with metaphor. Once perceived as a devious means to subvert truth, today’s authors and critics

embrace such figures to generate emergent theories and meaning.²⁴⁰ The impact of metaphor is equally powerful on scientific discourse. Holland *et al* (1986) emphasizes how *cas* use metaphors and analogy to construct better internal models of their environment. More recently, Holland devoted an entire chapter in *Emergence* to the subject of metaphors, modeling and innovation. Indeed, this very thesis invokes metaphor to draw parallels between Holland's thought and Deleuze and Guattari. In short metaphors and other rhetorical figures illuminate science from a postmodern perspective and postmodernism from a scientific standpoint. Considering their importance, not only to this thesis, but also to adaptation and model construction, a closer look at metaphors and their impact on science and postmodernism is worthwhile.

Formally, Lakoff and Johnson (1980) define metaphor as a way to conceive of one thing in terms of another, while metonymy allows one thing to stand in for another.²⁴¹ Moreover, metaphors are grounded in spatial conceptualization, such as UP-DOWN, FRONT-BACK, NEAR-FAR, etc.

It is these that are relevant to our continual everyday bodily functioning, and this gives them priority over other possible structuring of space — for us. In other words, the structure of our spatial concepts emerges from our constant spatial experience, that is, our interaction with the physical environment.²⁴²

²⁴⁰ According to Locke “. . . all the Art of Rhetorick, besides Order and Cleanness; all the artificial and figurative application of Words Eloquence hath invented, are nothing else but to insinuate wrong *Ideas*, move the Passions, and thereby mislead Judgement; and so indeed are perfect cheat.” See John Locke 1975: 508.

²⁴¹ George Lakoff and Mark Johnson 1980: 36.

²⁴² George Lakoff and Mark Johnson 1980: 56.

Furthermore, Lakoff and Johnson argue that metaphors are organized into a hierarchy, just like the rules in Holland's q-morphisms. Metaphors like ACTIVE IS UP and PASSIVE IS DOWN serve as useful generalizations but beneath them are more sub-categories that serve as rules for more specific situations. Metaphors like ACTIVE IS UP and PASSIVE IS DOWN are by no means universal or intractable. For example, in Japanese culture passive behavior is upheld while aggressiveness is considered inappropriate. A Western businessman unaccustomed to PASSIVE IS UP and ACTIVE IS DOWN, and unwilling or unable to adapt to the situation, will be frustrated, while his Japanese associate might be shocked by his rude behavior. Metaphors, like internal models, must adapt to new environments.

Metaphors, like adaptation, are not random or arbitrary but goal directed. An adaptive plan that tests random structures isn't likely to find an effective one any quicker than if it tests the structures one at a time. The same holds true for metaphors. Interesting then is the common criticism directed at postmodernism in general and deconstruction in particular that they generate endless strings of metaphors that defer meaning and interpretation.²⁴³ Postmodernists don't generate metaphors randomly anymore than agents test random structures; rather they search for effective metaphors that perform well in a rapidly changing philosophical environment. Deleuze and Guattari (1987) use terms like molar, striated, arboreal and evolution, and Derrida (1976) invokes "trace, difference,

²⁴³ Christopher Norris 1991: 126-127.

reserve, supplement, dissemination, hymen, greffe, pharmakon, parergon,” but each is a goal orientated adaptation that is displaced when it is no longer suitable, i.e. performs well, in the philosophical environment with which they engage.²⁴⁴

Lyotard (1988) also supports this orientation towards performance as a means of escape from the traditional image of thought:

In the context of the mercantilization of knowledge, more often than not this question is equivalent to: “Is it efficient?” Having competence in a performance-oriented skill does indeed seem saleable . . . What no longer makes the grade is competence as defined by other criteria true/false, just/unjust, etc., and, of course, low performativity in general.²⁴⁵

While the scientific concept of “effectiveness” or “performance” crops up in postmodernism, Holland (1998) employs terms that resemble postmodern tropes. Perpetual novelty and adaptation, for instance, describe the continuous changes that occur in complex adaptive systems. Holland’s choice of language is quite interesting given the context of the current discussion, because “novelty” and “adaptation” have at least two meanings. Novelty implies a “new thing,” a “creation,” or “innovation,” and this is certainly in keeping with Holland’s interest in the emergence of new agents, structures, niches, and rules. However, novelty also suggests the pejorative “novelty toy,” “gimmick,” or “fad.” Moreover, terms such as gimmick and fad suggest disguise, deviousness, or something that is not wholly original. In this light, the emergence of complex persistent patterns is not so much an act of originality as it is an effective gimmick

²⁴⁴ Gayatri Spivak 1976: lxx.

²⁴⁵ Jean-François Lyotard 1988: 51.

or fad to be displaced in favor of another. In addition to novelty, the term adaptation can be used in a scientific sense, the transformation of a structure from one state to another, or in a literary sense, such as a book adaptation. In both connotations, the term adaptation suggests that the resulting structure is not wholly original. In this sense, perpetual novelty and adaptation have more in common with the postmodern tropes of parody, simulacra, pastiche and allegory than with originality.

Finally, while metaphors aid adaptation, they undermine traditional images of evolution. Indeed, the evolution of complex adaptive systems Holland describes in his models bears a striking resemblance to the smooth, rhizomatic becoming proposed by Deleuze and Guattari (1987). Although they abhor the sciences' quest for universal truths, Deleuze and Guattari (1987) do not oppose Darwin (1950) or evolution *per se*. On the contrary, Deleuze and Guattari applaud Darwin for his contributions to the "thought of individual difference" and a science of multiplicities that substitutes "populations for types" and "rates or differential relations for degrees."²⁴⁶ They do, however, reconceptualize the image of evolution as a striated, arborescent multiplicity that describes the world "in terms of production (from A to x)," rather than "in terms of relationships (between A and B)."²⁴⁷ In addition, Deleuze and Guattari point out the inherent limitations of deterministic evolutionary schemas that produce "gatherers — hunters — animal breeders — farmer — industrialists," or "local groups —

²⁴⁶ Gilles Deleuze 1994: 248 and Gilles Deleuze and Félix Guattari 1987: 48.

villages and small towns — cities — States.”²⁴⁸ In effect, evolution becomes a multiplicity reserved for the mass media and other “human sciences” that invoke materialist, evolutionary, or dialectical schemas.²⁴⁹

The alternative image of evolution — becoming — is a smooth, rhizomatic multiplicity that is “has no beginning or end; it is always in the middle, between things, interbeing, intermezzo.”²⁵⁰ Becoming represents the evolutionary schema Holland describes. It is adaptation, a transition, and the perpetual leap from one novel structure to the next in a matrix of nearly infinite possibilities. Adaptation is the pause between the signal and mechanism, condition and action, and the input and the output. It is a metaphor that expresses the relationship between agents, structures, classifiers and mechanisms. Adaptation is a metaphor, a movement, a becoming and “a conjunction that carries enough force to shake and uproot the verb ‘to be.’”²⁵¹

²⁴⁷ Gilles Deleuze and Félix Guattari 1987: 234.

²⁴⁸ Gilles Deleuze and Félix Guattari 1987: 430. Mongolia is a good example of a break with evolutionary determinism. Following the fall of the communist state, many people abandoned the cities in favor of a nomadic lifestyle.

²⁴⁹ Gilles Deleuze and Félix Guattari 1987: 431.

²⁵⁰ Gilles Deleuze and Félix Guattari 1987: 25.

²⁵¹ Gilles Deleuze and Félix Guattari 1987: 25.

CHAPTER 8: COMPLEXITY

Introduction

Newspaper stories average 400 words, radio sound bytes are measured in seconds and television crews have about a minute and twenty seconds to package complex events. Space and time are at a premium in today's news media and so academics and the general public naturally assume that long magazine articles and television documentaries (1) have a higher information content (Shannon 1949) than newspaper briefs or sound bytes; and (2) provide a better accounting of an event's complexity. While Baudrillard (1980) and Nevitt (1982) at least criticize the implications of information theory on journalism and mass communications, whether media provide a reliable measurement of a system's complexity remains a theoretical mystery. This lack of a formal approach to complexity measures is somewhat surprising, considering media's fondness for the term. Although Paulos (1995) protests that media reduce complex systems like the North Atlantic Treaty Organization (NATO) and the Federal Republic of Yugoslavia to simple linear equations, political pundits continue to assemble on the nightly news to discuss "complex" peace negotiations or economic forecasts, while advertisers pitch fruit dehydrators, complicated exercise equipment, and painless hair removal systems that claim to make our "complex" lives easier. Complex adaptive systems are the heart of news coverage; and yet their complexity remains an elusive quantity.

Divided into three sections, this chapter will argue that the schema reporters and other media agents construct are an unreliable measure of a complex

adaptive system's statistical complexity; rather they are a measure of the agent's ignorance.²⁵² Section one examines complexity's relation to the equally subjective concepts of entropy and information (Shannon 1949). Conceived as a method to measure the information content of messages while correcting errors produced by entropic forces, information theory establishes the poles of pure information and pure entropy. However, complexity is neither too orderly nor too disorderly, inhabiting the space between poles.

Having contextualized complexity, section two differentiates deterministic from statistical complexity, and analyzes effective complexity, one of two statistical measures proposed by Gell-Mann (1994a). Effective complexity is a measurement of a complex adaptive system's regular patterns, an idea complementary to Holland's (1998) work on emergence. However, Gell-Mann echoes Holland's warning that these regular patterns are not always easy to identify, leading to an effective complexity measurement of the observer's ignorance rather than the system's emergent patterns. The section also considers what is perhaps the only published article on complexity and media: Hendrickson (1989) investigates how media affect the complexity of an individual's perspective of international relations. Her work is all the more interesting for its striking resemblance to that of Gell-Mann.

²⁵² John Holland uses "internal model" and Murray Gell-Mann uses "schema" to define the same concept. For the sake of simplicity, this chapter uses schema, since Hendrickson (1989) also employs that term.

Finally, the chapter concludes with the question of whether a media agent's schema is a measure of complexity or ignorance. The section also proposes that schema are in fact a measure of ignorance for two reasons. First, most media agents build poor models of their environment when they reduce complex systems to linear systems. Secondly, a long datastream helps agents distinguish patterns from irregularities, but in the fast-paced world of modern media agents often don't have the time to wait for the regularities to emerge. This impatience prompts agents to emphasize a complex adaptive system's irregularities rather than the regular patterns that serve as building blocks for later innovations.

Entropy, Information and Complexity

Despite science's interest in the subject and media's "popularization" of the term, the measurement of complexity remains ill-defined. Funes (Date unavailable) argues that this confusion arises because complexity is often used as a precise term and then appears as a vague idea, a lament shared by Gell-Mann (1994a).²⁵³ Complexity is a subjective value that lingers between the poles of information and entropy and consequently traces its origins back to the foundation of information theory (Shannon 1949). Briefly, Shannon (1949) designed

²⁵³ Pablo Funes Date unavailable: 1. Gell-Mann's lament refers to times when he lectures on complex adaptive systems or complexity, without mentioning chaos, and is then thanked by members of the audience for giving an interesting lecture on chaos. See Murray Gell-Mann 1994a: 27.

information theory (1) to analyze and correct for the errors that arise when messages are transmitted through a medium such as copper wire; and (2) to measure the information content of messages. On the first point, information theory attempts to counteract the effects of entropy, that is, the tendency of a system to degrade over time, on messages. Entropy smoothes out the information in messages, making them more disorderly until it reaches a maximum value, at which point the message resembles television static more than a television program.

Formally, information theory analyzes the information content of messages rather than their meanings. Scholars visualize a message m as just one alternative from a set of messages $M = \{m_1, m_2, m_3, \dots m_n\}$. The information content of a message in the set is dependent on the number of messages in the set, and this value in turn reflects the relative certainty or uncertainty of the receiver. For example, if set M_1 contains only one message m_1 the information content of m_1 will be low since the receiver already knows which message the source will broadcast. Chances are he has received the messages before and already knows the information it contains. The more we know about the message the source sends, the less uncertainty, the less the entropy, and the less the information received.²⁵⁴ However, if set M_1 contains over a million messages then the information content of a message in the set will be relatively high since the receiver's uncertainty is also high.

²⁵⁴ J. R. Pierce 1961: 23.

In this respect, entropy and information are measurements of disorder and order, uncertainty and certainty, respectively. They are subjective values, since “the idea of order is inextricably linked to the mind’s awareness,” and objective values, since systems with a maximum entropy are “incapable of doing anything interesting, novel, or useful.”²⁵⁵ Complexity is also a subjective measurement of order that rests somewhere between the poles of information and entropy. It is neither too entropic, for a system ceases to be complex at maximum entropy, nor too orderly, since the absolute certainty of pure structure is a bane. This makes sense, Gell-Mann (1994a) argues, since perfectly ordered and disordered systems are two sides of the same simplistic coin.²⁵⁶ Funes (Date unavailable) also defines complexity as a subjective measure:

If the observer is satisfied with a simple model with sufficient accuracy, there is no complexity involved. Complexity will have to be defined now as being not just an intrinsic characteristic of the physical world but a relationship between a system and an interested observer.²⁵⁷

Effective Complexity

The measurement of complexity is invariably a subjective process and this explains in part the explosion of complexity measurements. For example, Funes (Date unavailable) identifies at least five different techniques, including Kolmogorov complexity, crude complexity, Ziv-Lempel Coding, Logical Depth, and Total Information. Although there are many different complexity measures,

²⁵⁵ Jeremy Campbell 1982: 32-33.

²⁵⁶ Murray Gell-Mann 1994a: 30-31.

²⁵⁷ Pablo Funes Date unavailable: 1.

scholars distinguish between (1) deterministic complexity measures, such as Kolmogorov complexity; and (2) statistical measures, such as effective complexity. Their difference lies in the approach to the measurement. While deterministic measures attempt to account for every last bit of information — random or otherwise, statistical measures focus on a system's regularities "beyond pure randomness."²⁵⁸ This thesis analyzes the applicability of one such statistical measure, effective complexity (Gell-Mann 1994a), to media studies.

Gell-Mann defines the effective complexity of a complex adaptive system "as the length of a concise description of the entity's regularities identified in the schema," of a complex adaptive system that is observing the system and constructing a schema.²⁵⁹ Moreover, Gell-Mann argues that effective complexity measures depend on the availability of a sufficiently long datastream describing the system in question. In short, the more environmental signals available to the agent, the better the chance of "discriminating among models, where each model corresponds to a particular class of regularities."²⁶⁰ Reporters already understand this concept intuitively. The more sources available and the more information they collect about an event, the greater the chance they have to distinguish the important facts from the dross. A reporter with only one source or limited access

²⁵⁸ David Feldman and Peter Crutchfield 1997: 1.

²⁵⁹ Murray Gell-Mann 1994a: 56.

²⁶⁰ Murray Gell-Mann 1994a: 57.

to the scene, however, may not understand the story since the datastream is too short or there are significant gaps.

Gell-Mann's definition is complementary to Holland's (1998) work on emergence. Persistent patterns or behavior that appears to be "more than the sum of the parts" usually signals the presence of complex emergent phenomena (see Chapter Five). Hence a measure that focuses on identifying these regular patterns should be an effective method of measuring the system's complexity. Moreover, Gell-Mann, like Holland (1975), emphasizes the important role that environmental information $I(t)$ plays in the modeling process. However, Gell-Mann warns that the validity of such a measure is questionable since it tacitly assumes that, given a sufficiently long datastream, the observing agent can distinguish regular patterns from the irregular patterns:

The usefulness of the concept of effective complexity, especially when it is not internal, depends on whether the observing complex adaptive system does a good job of identifying and compressing regularities and discarding what is incidental. If not, the effective complexity of the observed system has more to do with the particular observer's short comings than the properties of the system observed.²⁶¹

To summarize, Gell-Mann's definition of effective complexity emphasizes that the measurement is (1) subjective; (2) dependent on the length of the datastream available to observing agent; and (3) assumes that the agent observing the *cas* can distinguish regular patterns from incidental or randomness from that datastream.

²⁶¹ Murray Gell-Mann 1994a: 56.

Although Gell-Mann (1994a) formally defines effective complexity, Hendrickson (1989) is the first and perhaps the only scholar who has attempted to apply complexity measures to media. Hendrickson (1989) quantifies the complexity of an individual's international relations perspective and attempts to determine whether there is a correlation between this value and the consumption of newspaper or television news. Methodologically Hendrickson adopts schema theory, an approach similar to that of Gell-Mann (1994a) except for minor terminological differences. Hendrickson identifies six elements — culture, science and technology, politics, economics, covert activity and military — an individual can incorporate into its international relations schema. While Gell-Mann would refer to them as “regularities,” the elements Hendrickson identifies are emergent phenomena that transcend the behavior of their components, *à la* Holland (1998). Furthermore, Hendrickson defines the complexity of an individual's international perspective as a sum of the elements the schema incorporates, which is similar to the statistical “length of a concise description of the entity's regularities,” espoused by Gell-Mann.²⁶² Methodologically, Hendrickson, Holland and Gell-Mann approach the question of complexity measures from similar perspectives, and though she doesn't use the term herself, Hendrickson is measuring the effective complexity of an individual's international relations perspectives.

²⁶² Murray Gell-Mann 1994a: 56.

Hendrickson's methodology is sound and her conclusions, though somewhat problematic, are worth mention. Briefly, she concludes that individuals who rely on newspapers for international affairs coverage "may be living in a different and more complex world," than someone who relies exclusively on television.²⁶³ The reason for this complexity differential, Hendrickson surmises, is that the permanence and flexibility of newspapers means they are better equipped to deal with complex issues. In other words, newspapers produce a more complex world since their duration of communication is longer and they recognize complex patterns more often than television. We have encountered this conclusion before in Miller *et al* (1998). Rephrased, the emergence of a complex international affairs perspective in an agent is subject to the duration of communication and the complexity of the "communication tokens" agents receive. While these factors may have a profound impact on the emergence of complex perspectives, Hendrickson ignores other explanations, such as the difference between visual pattern recognition and detecting patterns in generated combinations.²⁶⁴ In this sense, a comparison of the complexity of newspaper and television transmissions is awkward, since they rely on different modes of pattern recognition, neither of which are well understood. In spite of these considerations, Hendrickson's research supports a shift towards a complex methodology.

²⁶³ Laura Hendrickson 1989: 880.

²⁶⁴ John Holland 1998: 215.

The Emergence of Ignorance

If we accept the contention that we live in an “information society” overflowing with signals (Baudrillard 1980), media agents should not have a problem finding a sufficiently long datastream that describes the system they are observing. The question is then, why does the complexity of media coverage seem so low? Two reasons stand out: (1) poor modeling skills; (2) time constraints.

Media agents produce thousands of news stories daily, presumably based on the schema they construct. It's a safe bet media agents construct schema since they use models to predict the actions of complex adaptive systems. Kurtz provides an excellent example of this in his analysis of the Washington media's coverage of President Clinton's search for a Supreme Court nominee. In their reports the journalists assign probabilities like “a leading contender,” “the clear frontrunner,” or “the odds-on favorite” to the potential candidates.²⁶⁵ These phrases signal the production of a subjective schema of the government *cas* that is then used to make predictions based on the regularities observed in President Clinton's behavior. The fact that President Clinton did not select the candidate the newspapers predicted could mean (1) that the datastream describing the political environment in Washington was insufficient, forcing media agents to make blind predictions about their environment, or (2) there is a problem with the model itself. On the first point, a few disparate environmental signals emitted by

²⁶⁵ Howard Kurtz 1994: 4.

a mole can hardly do justice to the complex political wrangling that goes on behind the scenes in Washington. If limited information is responsible for the low payoff, but the model itself is relatively sound, then the model can become more effective with some fine tuning. However, there is also the possibility that there is a flaw in the agent's schema of the government *cas*. This problem raises serious questions, not only about the effectiveness of the model but also the agent's ability to recognize regular patterns. While a low payoff measure might motivate an agent to re-evaluate the effectiveness of its entire model, the fact that the agent builds lousy models in the first place only compounds the problem. Indeed, there is a tendency in media to use metaphor and other rhetorical figures to avoid complexity altogether. For example, the Yugoslav press compares Bill Clinton to Adolph Hitler, while the American press cites sources that view the bombing of Yugoslavia and Vietnam as analogous. Although these comparisons are colourful and can invoke powerful emotional responses on both sides, the models are extremely misleading. In the end, the reporter's schema of a complex adaptive system measures the emergence of ignorance rather than complexity.

Another important factor is time. Modern telecommunications equipment makes it possible to transmit news instantaneously, while the Internet increases the amount of information available to reporters and the general public. Finding a sufficiently long datastream under these conditions shouldn't be difficult. Unfortunately, deadline pressure or the desire to "break" a story means that the datastream is artificially shortened

In keeping with Kurtz's analysis, consider two reporters, CNN's Wolf Blitzer and an unidentified rookie, sent by their respective news organizations to cover Washington politics. The effective complexity of Washington politics is subject to Blitzer and the rookie's access to the datastream and their ability to recognize regular patterns, a fundamental component of model building.

Assuming Blitzer and the rookie have access to roughly the same datastream $I(t)$ s via news conferences, interviews, Senate debates and the like, it seems likely Blitzer's coverage would provide a better indication of Washington's effective complexity than do the rookie's reports. Blitzer has followed politics for years and is a favored and much-used conduit. He would differentiate regularities from incidentals more readily than the rookie. In the rookie's case, the effective complexity of the Washington politics would have more to do with his shortcomings. Here we see how effective complexity can also measure the ignorance of an observer *cas*.

In general terms, the chance that the media *cas* is a reliable guide to the complexity of other complex adaptive systems appears to decrease for inexperienced reporters or generalists who work without an area of expertise. The reasons for inaccurate complexity measures are many. For instance, an observer of a complex adaptive system may simply fail to recognize much less adapt to changes in the observed complex adaptive system. In this case, the observer would find that its *q*-morphisms failed much more often, or that its predictions were wildly inaccurate. A reporter who encountered these problems would surely have to adapt to the new environment or lose his or her job. As complex adaptive systems

evolve they generate new agents and niches. However, this process raises an interesting scenario. While the system is becoming more complex, the datastream in these environments may be more restricted than before and leave the reporter with less material and information with which to work. These kinds of events happen all the time in politics, especially after an election when the government ministries shuffle bureaucrats, or in the United States when the President-elect hires his executive staff. Reporters who have cultivated informative relationships in one department will have to find new sources to supply the same information.

The schema of media agents, and the news coverage based on them, measure the emergence of ignorance. Reporters who work on a steady beat and who have access to a wide range of source material should recognize regularities in the observed *cas*, whether in politics, gardening, or professional wrestling. However, as Kurtz' analysis of the coverage of Bill Clinton reveals, even astute political reporters are prone to failure from time to time, in which case an effective complexity measurement may not in fact measure the complexity of a complex adaptive system but rather the ignorance of the journalist.

CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

Complex adaptive systems analysis and complexity theory are viable and vibrant methodologies that liberate media from images that proclaim “the whole is the sum of the parts.” Media become complex adaptive systems composed of agents that engage in cooperative and competitive games and build internal models of their environment in order to improve their performance. Media *cas* exhibit emergence, generating complex persistent patterns from relatively simple components that change over time. In this sense, complex adaptive systems cannot be chaotic, contrary to the claims of Hayles (1991) and Rushkoff (1996). Although it eventually hopes to discover the simple rules that produce complex behavior, complexity theory is also a postmodern science (Lyotard 1988) that recognizes the power of unpredictability over a system. Holland’s thoughts on agents, games and adaptation bear a striking resemblance to work by Deleuze and Guattari on the segmentation of society into molar and molecular states, the coding of space into the striated and smooth territory, and the nomadic shift from evolution to becoming. The persistent emergence of structure, metaphor and meaning ensures media *cas* will destabilize the molar mass media.

But political economy is determined. In order to glorify the mass media image as a universal concept unimpeded by the error of uncertainty, it banishes complexity and emergence to the fringes of rigorous striation, branding them as an elaborate capitalist trick. But after almost fifty years of research, the best political economy and other normative media theory can offer is a search for

democracy around an equilibrium point known as the public sphere, unaware that the democratic phenomenon they desire resides in the turbulence, inequality and noise they left behind.

Patterns have emerged from this thesis. Concepts such as agents, building blocks, environmental signals, molar and molecular segments, striated and smooth spaces, chess and Go, and evolution and adaptation appear, then disappear to resurface later in a different context, transcending the boundaries established by chapters to frame them. An interdisciplinary concern, this emergent behavior is the most important characteristic of media *cas*, the property that sets them apart from deterministic models and chaotic systems. This thesis examined a number of emergent media phenomenon, including news production, sensationalism, objectivity, cooperation, competition and status, but not democracy or democratic ideals. Holland's five criteria provide a framework for the identification of emergent patterns, an activity that is not as easy as it seems from practical and theoretical perspectives. Still there are questions, always questions. What are emergent media behaviors? Do emergent media behavior share similar characteristics? At what level of complexity do persistent patterns emerge? On this last point, Miller *et al* (1998) contends that longer and more complex communication patterns signal the emergence of cooperation in a one-shot Prisoner's Dilemma game played with communications tokens. Although it is unknown whether this finding holds in iterated games, Miller's work on the complexity of communication suggests one approach to the question of emergence threshold and media *cas*.

Metaphors and models are other persistent patterns of the methodology. The adaptive plan and constrained generating procedures provide scholars with tools they can use to create model media and to observe how the selection of effective strategies or the emergence of complex persistent phenomena occurs. Indeed, they illustrate why media *cas* must use metaphors and other tropes to leap and zigzag through nearly infinite sets of potential structures; to do otherwise is suicide. Although the transition functions that govern media mechanisms are extremely complex and remain ill-defined, investigations focusing on basic rules of thumb such as “a story should have at least two sources,” or new values, such as proximity, currency and the bizarre, may provide clues that enable scholars to produce emergent media behavior on a computer screen. The ability to generate media models and then observe how those models adapt and evolve over thousands of iterations cannot be overstated, since a carefully constructed model could conceivably provide more data about media performance and patterns than can researchers who spend time in the newspapers themselves.

Finally, there is the measurement of complexity itself. A subjective value, complexity wanders between the poles of pure structure and entropy, public spheres and pure information societies. Effective complexity is a measurement of a system’s emergent patterns, and potentially, could measure the complexity of news coverage. However, media agents build poor models of the *cas* they observe and consequently their schema is a measure of their ignorance rather than complexity. Despite these initial problems, however, Hendrickson (1989)

suggests that correlations between complex perspective and media coverage are worth further investigation.

As an alternative to the mass media image, complexity theory is not a panacea. It gives rise to its own theoretical concerns that prove daunting even for scientists. In addition to problems such as the transition function or the complexity threshold, Holland (1998) contends that human beings recognize visual patterns and patterns in generated combinations differently. Persistent emergent phenomena are difficult to recognize at the best of times, but Holland's warning suggests that newspaper patterns and television patterns are also different. Scholars interested in how media agents, such as reporters, readers or viewers, recognize patterns must distinguish between print and visual mediums. Moreover, there are mathematical and computational barriers that hinder the study of emergent phenomena.

A relatively "young" science, complexity theory is a demanding, but ultimately rewarding interdisciplinary approach that challenges traditional media images and the scholars who employ them to become more than the sum of their parts.

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