CINEMA, COMPUTERS, AND WAR

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Abstract of Dissertation Presented to the Graduate School
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This project suggests an experimental method for media scholars in the age of digital communication. Starting from grammatology, the study of changes in culture that accompanied the emergence of literacy, this project suggests that new communication technologies coincide with shifts in culture. It explores the new ways of thinking, new methods for action, and new perspectives of the world embodied in electric (or, to use Gregory Ulmer's neologism, *electrate*) ways of thinking. The move away from literacy's linear, “rational” thinking ranks among the most important of these shifts; if print enabled “rational” thinking and hermeneutics, then electrate technologies embody an entirely different way of thinking. At the same time, just as speech continued after print, so we can expect electracy to retain writing. Thus, the experiments conducted here should be seen as supplements to literate hermeneutics.

This project invents its method using three key technological bodies of the twentieth century: cinema, computers, and war. The historical relationships among these

technologies make them essential to electracy. Supposing that new technologies and new media allow us to think in new ways, each chapter explores a technology associated with electrate culture: modularity, cybernetics, artificial intelligence, cryptography, and parallel distributed processing. The chapters proceed to *use* technology to find new, non-hermeneutic methods for research in film studies. For example, chapter 4, "The Frame Problem," compares artificial intelligence research with research in the humanities. It suggests that recent advances in the field of artificial life, which study emergent behavior, provide a set of rules for scholars to write about film in a different way. The last chapter of the project combines the experimental aspects of the previous chapters with a more linear argument. It suggests that parallel distributed processing provides a model for pedagogy and research, applicable to both classroom and scholarly work.

Cinema, Computers, and War explores the relationship between criticism, technology, and modern digital culture. It uses these technologies to invent new methods for film scholarship—not to define film studies in the age of electracy, but to make room for it.

CHAPTER 1
FILM STUDIES IN THE AGE OF ELECTRACY

The convergence of electronic digital media brings with it substantial changes in the way people make, encounter, and consume texts. As a film scholar, such changes are of crucial importance to me; changes in the way we consume media alter what those media mean to us, and how they do so. Walter Benjamin suggested that photography changed the auras of art objects by circulating their images more widely. Marshall McLuhan expanded that idea, noting that the content of media influences us less significantly than its form—hence, "the medium is the message." More recently, Paul Willemen has observed that the emergence of digital photography brings all indices into question. These scholars address media in terms of its form and its role in culture. This project engages with cinema in a similar way.

At the same time, this dissertation also thinks about media technology within the larger scope of the history of media and writing. That frame, called grammatology, suggests that changes in cinema reflect broad changes in media culture as a whole. As such, *Cinema, Computers, and War* explores film studies in light of the emerging digital age, asking how scholars can integrate the lessons of the digital in thinking about cinema.

A Crossroads in Film Studies

One might describe the ongoing debate between Robert Ray and David Bordwell as a duel. They argue over the future of film studies itself—an important issue in this era of shrinking budgets, immense specialization, and public doubt about humanities schol-

arship. Though Ray and Bordwell argue for different solutions to the crisis facing film studies, they agree that the problem lies with hermeneutics.

In *Making Meaning: Inference and Rhetoric in the Interpretation of Cinema*, David Bordwell conducts a thorough analysis of cinematic criticism. He argues that most film critics do not pursue truth, but write "readings" of films that fit with outside theories. Interpretation became the primary cinema studies practice because,

> Once the single film became the unit of study, interpretation became the most convenient activity. . . . Like New Criticism, academic film criticism has proven easily assimilable to the university's demand for teachable techniques, professional specialization, and rapid publication output.(22)

In other words, criticism adopted interpretation because interpretation fits best the demands of the educational institution. Bordwell also argues against interpretation because it is too easy. He charges that academia's desire for "teachable techniques" has led to a simplified set of rules for conducting research. "The routines or procedures in question consist mostly of heuristics, rules of thumb that have proven useful in meeting the interpretive institution's demands for novelty and plausibility"(138). These rule sets make interpretation too easy to do.

Making Meaning claims that because interpretation is a rhetoric, it is not real knowledge. The conclusion suggests a "historical poetics" that concentrates on film history, primary documents, and answerable questions. Bordwell writes,

> Even the official classics . . . have not on the whole been considered from the standpoint of a historical poetics. Such tasks as these, and a hundred more, require us to forge fresh theories, to ask precise questions, to examine a wide range of films from various traditions, and to supplement study of "the text" with examination of a wide range of documents. (274)

Bordwell's "historical poetics" demand a return to the shelves of the archive, an approach that asks only factual questions. This return to history pretends to have an unclouded un-

derstanding of Truth and Knowledge; it approaches the world with an Enlightenment scholar's certainty and a scientist's method.

Making Meaning joins a decades-old reconsideration of interpretation. In "Against Interpretation," Susan Sontag argues that interpretive criticism focuses too much on content, expressing a latent dissatisfaction with art. Her solution calls for a critical practice centered more closely on *form*; "the function of criticism should be to show *how it is what it is*, even *that it is what it is*, rather than to show *what it means*"(14). Roland Barthes, instead of turning to form, explores to the aesthetic-critical mode. He brings texts and critics into conversation, disrupting lines of demarcation between them. Bordwell's work reacts to post-structuralist projects like Barthes'; Bordwell re-asserts the place of objectivity and the control it brings.

Robert Ray places Bordwell within the larger context of institutional struggles over Knowledge and Truth. Ray asserts that Bordwell's use of conservative rhetoric "lowers the stakes" of knowledge and defines who may ask what. Ray explains, "I am gambling that *CHC* [*Classic Hollywood Cinema*] is precisely not an atypical work, but rather one that represents prevalent assumptions about knowledge and its dissemination" (*How* 37). Because *CHC* describes knowledge as singular and verifiable, it forecloses other avenues of research in favor of a scientific empiricism.

Ray's book, *The Avant-Garde Finds Andy Hardy* shares a starting point with *Making Meaning*. Like Bordwell, Ray starts from a problem in film studies:

> . . . [T]here is now an increasingly widespread sense that after over twenty years of exhilarating work, film studies has stagnated. The discipline whose beginnings coincided with the flowing of structuralist, semiotic, ideological, psychoanalytic, and feminist theory has evolved into another professional specialty. . ., with all the routinized procedures of any academic field. . . . Cinema journals and conferences brim over with papers rounding up the usual suspects for hermeneutical

> interrogation. . . .[T]hat procedure may be useful for beginning students, but surely it should not be the model for advanced scholarly work. Why not? Simply because we know in advance where such analyses will lead, and thus even the most skilled of such efforts will achieve very little "information," if we define "information" (as cybernetics does) as a function of unpredictability. . . . (5-6)

In essence, film studies has become routinized and stagnant; worse, it has become predictable. While Bordwell finds a solution in a return to the empirical at this point, Ray posits something different. He turns to method, suggesting that films scholars should learn to work differently, to ask different questions that supplement traditional methods.

Ray begins experimenting with criticism's forms, which, he reminds us, have worked entirely in the rhetoric of "scientific realism." He asks "What if we still want the hermeneutic effect but feel we have exhausted hermeneutics as a tool?"(9) Rather than follow Bordwell's suggestion that we return to the old way of constructing knowledge, Ray strikes out in a new direction, looking for forms of scholarship that will provide us with new, unpredictable research.

In *How a Film Theory Got Lost*, Ray explores several alternative approaches to film studies. "Snapshots: The Beginnings of Photography," consists of short sections that work as images, and a concluding section that intertwines them; "Tracking" is a film essay written as recorded music. Ray also uses the detective story as a model for scholarship in "The Mystery of Edward Hopper" and "The Riddle of Elvis-the-Actor." The pieces in *The Avant-Garde Finds Andy Hardy* and *How a Film Theory Got Lost* embody the "Baroque" approach that yields strange—unpredictable—ideas. And, as Ray reminds us, "the very strangeness of ideas derived by unconventional means inevitably provokes classicists who recognize only certain kinds of knowledge"(34). It should hardly surprise us, then, that Bordwell did not respond kindly to *Andy Hardy*.

The problem at the core of the Ray and Bordwell debate is most striking. Both scholars voice concern about the recent stagnation of film studies. They also recognize that the mechanical application of hermeneutic scholarship has caused that stagnation. Bordwell answers that interpretive rhetoric should be abandoned for an empirical approach; Ray suggests that supplementing hermeneutics with an aesthetic approach could be an answer.

So why does hermeneutics no longer work as well as it used to? Perhaps by exploring why hermeneutics used to be the ideal model for inquiry, we can elucidate why it not longer fills that role so thoroughly.

Grammatology

> In other words, we have confused reason with literacy, and rationalism with a single technology. Thus in the electric age man seems to the conventional West to become irrational. (McLuhan 15)

Grammatology, Gregory Ulmer tells us, "is concerned with the history and theory of writing"(*Heuretics* 16). Ray describes it in this way:

> The research tradition that Derrida calls "grammatology" posits that different technologies of communication occasion different ways of thinking. An oral culture, for example, relying entirely on human memory to store and retrieve its information, develops conceptual habits that would appear strange to us, the inhabitants of a fully alphabetic society. Grammatology further suggests that human history has seen only two major revolutions in communications technology: the first involved precisely this shift from oral to alphabetic cultures; the second, the transition from alphabetic to "electronic" or "cinematic," we are living through now. (*How* 27-8)

To rephrase, grammatology teaches that shifts in human modes of communication are intimately tied to larger shifts in cultural institutions. Those shifts are reflected not only in changes in thought-patterns, but in institutions and identity-formation. Grammatological research understands by analogy; the changes human culture saw during the shift

from orality to literacy are analogous to the changes occurring right now, as we shift from literacy to the new age, what Gregory Ulmer calls *electracy* (*Internet Invention* 28).

Perhaps the need for a supplement to hermeneutics stems from the emergence of electracy. Walter Ong shows how hermeneutics has become the standard model for humanities scholars. In *Orality and Literacy*, Ong expands on McLuhan's assertions that literacy heavily influences human thought. Ong argues that oral and literate cultures have fundamentally different ways of thinking; oral cultures are often:

i. Additive rather than subordinative
ii. Aggregative rather than analytic
iii. Redundant or "copious"
iv. Conservative or traditionalist
v. Close to the human lifeworld
vi. Agonistically toned
vii. Empathetic and participatory rather than objectively distanced
viii. Homeostatic
ix. Situational rather than abstract (Ong 37-49)

This list illustrates that oral cultures think in much different ways than literate cultures do. Ong suggests that literacy allows for abstract thought, something impossible in an oral culture. He explains that "Writing separates the knower from the known and thus sets up conditions for 'objectivity', in the sense of personal disengagement or distancing"(46). "Objective distance" arrives with the visualization of words, one of the effects of print that lead to hermeneutics. "All thought, including that in primary oral cultures, is to some degree analytic: it breaks its materials into various components. But abstractly sequential, classificatory, explanatory examination of phenomena or of stated truths is impossible without writing and reading"(8). In short, abstract critical skills are a trait of literate people. The very thought processes that humanities scholars value as important research skills come part and parcel with print.

Like Ray and Bordwell, Ulmer suggests that electracy demands a different model than hermeneutics: "We have been aware for some time, after all, of the limitations of the finest institutional instantiations of logical and conceptual reasoning—of critique and hermeneutics in the human sciences, and of empiricism in the natural sciences—to the point that critique has become cynical"(19). Ulmer asserts that the reason we now grasp the "limitations of . . . hermeneutics" is that the age of communication to which hermeneutics was the best fit is changing; we're entering the age of electracy.

Electrate Method from Electrate Technology

Our entry into the age of electracy demands that we reconsider the role of hermeneutics in academia; we must supplement hermeneutics with a form of criticism more appropriate for the digital age. Grammatology tells us that human thought changed as it became accustomed to literate culture. Ong suggests that abstract reasoning was one such change. We can surmise that the shift from literate culture to electrate culture will be accompanied by an analogous shift in thinking strategies.

My method in this dissertation might be called "method from technology." It builds on the notion that the structures of new communication technologies embody the new ways of thinking they represent (or occasion). For instance, Jack Goody argues that list-making is a literate practice that embodies a mode of thought foreign to oral culture.

> The list relies on discontinuity rather than continuity; it depends on physical placement, on location; it can be read in different directions . . .; it has a clear-cut beginning and a precise end, that is, a boundary, an edge, like a piece of cloth. Most importantly it encourages the ordering of the items, by number, by initial sound, by category, etc. And the existence of boundaries, external and internal, brings greater visibility to categories, at the same time making them abstract. (*Domestication* 81)

Lists occur because people have chirographic writing, and list-making encourages categorical thinking: people can *see* the boundaries of categories as they list them, making them solid. Goody also suggests that lists and tables inextricably alter the way one thinks—because sociologists study oral cultures by making tables and lists, they skew their understanding of the way oral cultures actually think (52-73). My method extrapolates from Goody's example, growing from work by scholars who engage with new technologies as new thinking practices. These researchers give me inspiration (justification?) for my method and my pursuit of it.

One example of this sort of work is Jean-Louis Baudry's essay, "Ideological Effects of the Basic Cinematographic Apparatus." Baudry argues that the physical and psychical association between the mechanism of cinema and the viewer results in the viewer's psychological identification with the camera. He writes,

> If one considers that these two conditions are repeated during cinematographic projection—suspension of mobility and predominance of the visual function—perhaps one could suppose that this is more than simple analogy. . . . In order for [the impression of reality] to be produced, it would be necessary that the conditions of a formative scene be reproduced. (294)

In short, films reproduce the Lacanian mirror stage event; the viewer identifies with the camera and its ideology. Baudry suggests that the cinematic apparatus embodies a pattern of thought, and guides its discussion of ideology using that technology.

Another work that relates to my project is David E. James' *Allegories of Cinema.* James argues that alternative films of the 1960s attempted to construct narratives that question the dominant culture of the day. In doing so they embedded their production processes in their narratives. "The mode of production [a film] manifests speaks of the social relations that constitute it, the social relations of the cinema of which it is, or would

be, a film-vehicle. Every film is thus an allegory of cinema"(12). James uses conditions of production to explain the relationship between film and culture. This project makes a similar move, using technologies as the structuring metaphor, instead of production practice. However, I use an additional technique that James does not —while *Allegories of Cinema* uses modes of production to motivate readings, it still operates within a traditional literate context; by contrast, this project uses technology to motivate subject, reading, *and writing methods*.

Cinema, Computers, and War explores technologies not just as analogies for analysis, but as models for *form* as well. In doing so, I join the scholars exploring electrate research. One group—perhaps the first—doing such work were the Surrealists. Ray describes the Surrealist reliance on games, suggesting that "Breton meant them less as ends in themselves than as alternative scanning devices, ways to notice what had previously gone unattended" (*Avant* 50). The Surrealists played the Exquisite Corpse game or watched movies with their fingers over their eyes to disrupt the story line and foreground cinema's high indexical value. They played fragmentation against continuity. The Surrealists exploited cinema's fragmentation as a research strategy (remember that as cinema records events, it breaks such events into discrete moments). Roland Barthes used a similar strategy in "The Third Meaning," using single frames to disrupt the meaning and continuity in *Battleship Potemkin*.

More recently, scholars such as Ray and Jerome McGann have used methods drawn from technology. McGann, expanding on Daniel Albright's *Quantum Poetics*, uses a method built on the Heisenberg uncertainty principle. The notion that one cannot examine an electron without moving (thus changing) it forces us to rethink our culture's

high-school science notion of objectivity. McGann is not the first to recognize the value of the uncertainty principle to humanities scholars; his innovation is to suggest a method that embraces the real consequences of the uncertainty principle—namely, a changed text. Rather than give lip service to the idea that the reader is "in" the text, he literally re-forms the text, suggesting games that involve creative, aesthetic contributions by scholars to the texts they are studying. He makes quite a leap from reader-response criticism.

In a similar vein, some of Ray's work draws on the technological developments of media to find a method that works outside the avenues of normal hermeneutic scholarship; most striking in this regard is "Tracking." In this essay, Ray suggests that the composition style of rap musicians, who work from a multitude of records by sampling from them, resembles that of academics, who perform a similar practice from the academic and primary texts. Ray urges scholars to play on this similarity:

> Scholarship, collecting, pondering, information theory—these activities may seem heady company for rap songwriting. Benjamin, however, has taught us to detect the similarities between occupations normally regarded as unrelated, and having done so, we might begin to see in contemporary songwriting suggestions for a new writing practice. What if academics were to write essays the way Paul Simon now composes songs? (*How* 66)

Ray proceeds to write an article as though recording a music track. He assembles the fragments, his "samples," with the intent that their combination will help create something new. He uses technological innovation as both analogical *and* methodological inspiration. The technology at hand provides a method for *form.*

Grammatology suggests that technological innovations represent new ways of thinking. But do those innovations, if used merely as analogy, exceed the bounds of hermeneutic criticism? Ray, McGann, and the Surrealists show that if technological in-

novation provides a method for *form* as well as for criticism it yields unexpected results. Thus, I seek here a practice for finding new form in technological innovation.

Cinema, Computers, and War

> The history of the movie camera thus coincides with the history of automatic weapons. (Kittler 122)

> War and fear of war have always been considered the main incentives to technological extension of our bodies. . . . It is from such intensive hybrid exchange and strife of ideas and forms that the greatest social energies are released, and from which arise the greatest technologies. (McLuhan 47)

The age of electracy might trace to any number of technological innovations that quantitatively changed the mode of communication for humankind. Some scholars point to photography as the beginning of the age of electracy. Photography is chemically reproducible, mechanically recorded, and alters the ability of humankind to replicate the visual world. Similarly, the gramophone captures sound, a substance previously ephemeral and fleeting. Cinema might be the beginning of electracy, as it uses photography to capture not just "reality" but movement; after 1926 it even captures sound. Bazin suggests, in "The Myth of Total Cinema," that the "perfect" capturing of reality drives cinema. If the mimetic drive were the only defining characteristic of electracy, cinema could stand alone as the premiere electrate technology.

But what of the infinite reproducibility of electrate texts? As Walter Benjamin reminds us in "The Work of Art in the Age of Mechanical Reproduction," the cultural relationship between art and audience changes as art becomes infinitely reproducible. If *reproducibility* defines electracy, the translation of media into electronic signals becomes our primary consideration instead of the mimetic recording of reality. Indeed, the typewriter, the teletype, and then the computer become as important as the film camera (if not more so) (Kittler).

Rather than approaching this project from the perspective that a single technology defines electracy, I suggest that by considering multiple technologies by way of a constellation of scholars, I can avoid oversimplification and find a more reasoned, complex approach. The intersections among these scholars will provide a systemic understanding of electrate technologies; they create what I will call the *cinema-computers-war assemblage*. This complex of ideas will guide my exploration of the relationship among these technologies and their role in electrate culture and illuminate the technologies I will use for my method.

This discussion brings these works together by means of intellectual *fulling*. Fulling contrasts with weaving, the latter being an orderly system for making *text*, the former being the process of matting together material to make *felt*. Rather than joining threads in an orderly fashion, fulling mashes threads into disordered contact. Intellectual fulling, then, connects threads of thought by contact points rather than by overt hierarchy. Fulling these works guides me in three ways. 1. It helps select which technologies to organize my chapters around. My subject technologies cut across and impact all three fields (cinema, computers, and war). 2. As these works explain the cultural and critical role of technology, they help create the form for each piece. I draw guiding characteristics for my writing from the explorations of the technology in these works. 3. The fulling process also informs my understanding of these technologies as *subject matter*. As my overall thesis suggests that technology influences our understanding and thinking, these chapters use technologies not just as models for form, but also as subject.

Six scholars figure prominently in determining which technologies become the focus for my method. With each scholar, I focus on one work that distinctly addresses

part of the cinema-computers-war assemblage. While a few of these scholars write mostly about only two of the three parts, many refer in one degree or another to all three parts of the assemblage. The threads that run through these works make it evident that these scholars are working around a larger concept. That concept guides this project.

Kittler

Friedrich Kittler's *Gramophone, Film, Typewriter* considers the shift from one media technology (writing) to many at the beginning of the twentieth century. He argues that the creation of media technologies that recorded the world directly (as with film and sound recording) allowed for a new sense of the world; the symbolic no longer had to intervene between time and memory. He also argues that film and sound, along with the typewriter, paved the way for the translation of all media into a single signal.

Each section of Kittler's book traces the development of one of his three title technologies. These tracings ground in a historical reading of culture, an exploration of the forces leading up to the development of the technologies, and a suggestion of the influence they had on future communication technologies. For instance, in "film" Kittler shows two influences on the development of the cinematic apparatus. The depiction of movement on a screen depended on Faraday's optical "deceptions" while the camera's discrete capturing of movement developed from Colonel Gatling's crank-driven gun (122). Kittler suggests that this early connection between war and cinema continues throughout cinema's history.

Gramophone, Film, Typewriter proves relevant to this project in several ways. Kittler uses a substantial portion of his last chapter to explore how the convergence and emergence of digital signals resulted directly from technological advances made during

war(136). Kittler also explores cybernetic feedback loops, the evolution of recording media (like film and video), and weapons systems(259). The author's complex understanding of the evolution of electrate media and their involvement with culture provides many nodes of interest in the cinema-computers-war assemblage.

Virilio

In *War and Cinema*, Paul Virilio traces out a process by which "the representation of events gained sway over the presentation of facts, image was beginning to gain sway over the object"(1). He traces the return of the aesthetic register in electracy, suggesting that the connection between cinema and military technology lies in their similar need for spectacle. War technology causes both physical and psychological harm.

Virilio also suggests that technological vision has replaced direct vision by means of new military technology. He describes the use of cameras on airplanes in the First World War: no longer did generals need to stand atop hills to survey the battlefield; instead they surveyed photographs taken from the air. This process altered the way battles were waged, and the way people saw the world. By the Second World War, due to the increase in information and technology available, perception and interpretation were the keys to battle (50). Virilio shows that the shift away from "direct ocular-reality" to mediated visions of war changes the way war is conducted. No longer is the goal to be able to see the enemy, but to be able to interpret all the visual data being recorded.

> Military strategy has earlier involved the division of space . . . the twentieth century moved on to the division of time, where the surprise effect came from sudden appearance and disappearance of signs on a monitor, and where screens were designed to simulate, rather than dissimulate, a war that ever more closely resembled non-stop cinema or round-the-clock television. (72)

Virilio argues that modern warfare is only possible using media technologies to observe for us. This military reliance on surveillance technologies underscores the importance of our understanding the cinema-computers-war assemblage.

As with Kittler, Virilio develops a complex explanation of the technologies involved in the cinema-computers-war assemblage. He suggests that recent innovations in military technologies build on perceptual habits and practices developed during the co-evolution of cinema and war technology in the first half of the twentieth century. His stress on perception provides a unique angle from which to address these technologies.

Baudrillard

Jean Baudrillard examines late 20th Century electronic media's effect on the culture of late-capitalism in *Simulacra and Simulation*. He argues that the ever-increasing production of media results in a "hyperreality" that becomes impossible to distinguish from "the real." Baudrillard's thinking explores the relationship between cinema and computers and touches on their connection to military technology.

In particular, *Simulacra and Simulation* draws close to *War and Cinema* and *Film, Gramophone, Typewriter* in the essay "*Apocalypse Now*." Baudrillard suggests that Coppola's film shares a method (and madness?) with the Vietnam War, in that they were both testing grounds for technological advances. He writes, "The war became film, the film becomes war, the two are joined by their common hemorrhage into technology"(59). He concludes the essay with,

> One has understood nothing, neither about the war nor about cinema (at least the latter) if one has not grasped this lack of distinction that is no longer either an ideological or a moral one, one of good and evil, but . . . of the organic metabolism of all the technologies, of the carpet bombs in the strip of film. . . . (60)

Baudrillard notes the interconnectedness of the late Capital market, information/media technologies, and war technology. The passage above goes to the heart of *War and Cinema* too, and illuminates the sort of interconnected influences Kittler explores.

While Baudrillard touches on computer technology only obliquely, he is strongly concerned with the function of simulacra and its effects; he also explores the role of simulation in culture. Thus his work directly concerns computers, even if it mentions them only occasionally.

De Landa

Manuel de Landa, in *War in the Age of Intelligent Machines* uses a Deleuzean approach to explore the systems of military technology and their connection to cultural innovation. He theorizes that a system which creates, adopts, and spreads technology stretches "across the machinic phylum." This system operates slowly, involving an innovation in one place (such as the introduction of the rifled barrel) that slowly changes the way the military machine operates (generals were slow to exploit the dramatic improvement in accuracy the rifled barrel afforded battlefield soldiers). De Landa also suggests that the gap between the introduction of a technology and its integration into the war machine embodies a strategic space through which revolutionary or counter-dominant groups hijack that technology to use toward their own ends.

In *Gramophone, Film, Typewriter,* Kittler follows the evolution of each technology from its beginning in the late 19th century through the 1950s, when computers began to emerge. De Landa traces a similar pattern, but approaches the system in a different way. Rather than examining the technologies in terms of historical development, he considers these technologies from the perspective of a natural scientist:

> The self-organizing processes studied by the science of "order out of chaos" (or "chaos," for short) have indeed changed the way scientists view inorganic matter. While at one time only biological phenomena were considered to be relevant for a study of evolution, now inert matter has been found to be capable of generating structures that may be subjected to natural selection. It is as if we had discovered a form of "non-organic life." With this in mind, I have borrowed from the philosopher Gilles Deleuze the concept of the "machinic phylum," the term he coined to refer to the overall set of self-organizing processes in the universe. . . . Order emerges out of chaos . . . only at certain critical points in the flow of matter and energy. . . . [M]achinic history would stress the role of these thresholds . . . in the development of technology. (7)

In short, de Landa explores the development of computer and war technologies from the perspective of "machine history," looking for critical points in technological development, rather than in people or time periods. This perspective gives de Landa a unique outlook that highlights conceptual developments in technology.

De Landa offers specific analysis of the way technology integrates into the military machine, and the ways in which such technology can be coopted for oppositional purposes. He focuses primarily on the relationship between computers and war, providing significant insight into the cinema-computers-war assemblage.

Manovich

The Language of New Media is a sprawling, detailed description of new media's development. Lev Manovich sketches a broad description of how new media objects work, looking through the lens of cinema as its most obvious parent. He notes that new media objects draw guiding principles from cinematic constructs. He also asserts that in recent years, cinema has begun to reflect a change from those computer constructions.

Manovich's approach is particularly useful for this project, as he concentrates on technological innovations as framing devices for his chapters. For example, he suggests that the database might be the replacement for the narrative. Manovich argues that new

media narratives are interfaces that describe one path through a database; he also stresses that with game designers, the narrative rhetoric of cinematic codes often determine the path through the database. He also examines the use of "selection" as the primary technique of authoring.

Manovich notes that while the cinematic screen was a public event the home video screen is a military one. He shows how military simulators became less cost effective in the nineties, and were moved into home computing.

> Although it was not an exclusive factor, the end of the Cold War played an important role in the extension of the military mode of perception into general culture. . . . During the 1990s, . . .companies converted their expensive simulators into arcade games, motion rides, and other forms of location-based entertainment. . . . As military budgets continued to diminish and entertainment budgets soared, the entertainment industry and the military often came to share the same technologies and employ the same visual forms. (277)

Like de Landa, Manovich suggests that interconnections between cinematic, computer, and military technologies occur at some level because of economic concerns. This interrelation shows how developments in computer technology are significant for other arenas, and can be useful in considering the cinema-computers-war assemblage.

Deleuze and Guattari

Three sections of Deleuze and Guattari's *A Thousand Plateaus* stand out as significant for this project. In "Treatise on Nomadology," the authors explore the role of the "nomad war machine" in opposition to "the State." They explain that nomad cultures have a variety of functions formed to keep the State at bay. They contrast the elusive, non-stable power of the chieftain with the totalitarian, dominating power of the State bureaucracy. Only when the State tries to co-opt (territorialize) the nomad does the war machine make war. This description of the nomad war machine is useful for framing de

Landa's systemic approach to war technology. Rather than envisioning war technology (or the cinema-computers-war assemblage) as a single, unified body, this project keeps in mind the wide, rhizomatic approach Deleuze and Guattari describe.

The second relevant thread from Plateau 12 relates to the authors' characterization of the war machine as imbricated in a system of movement and relays. They write, "The problem of the war machine is that of relaying, even with modest means, not that of the architectonic model or the monument. An ambulant people of relayers, rather than a model society"(377). The war machine does not dwell in fixed meanings, but rather operates in movement, in transmission. The view of the war machine as always contextual and always passing meaning from one point to another fits well with the idea of critical thresholds brought forth in de Landa. This project approaches the cinema-computers-war assemblage in terms of these relays, these moments of change.

Plateau 13, "Apparatus of Capture," traces the relationship between towns, "smooth spaces" of nomad cultures, and capitalism. The authors describe how the rise of taxation centers the monetary system and gives birth to modern capitalism. As capitalism emerges, the communally-owned town gives way to the privately owned space, and the modern state uses social machines (ala Foucault) to ensure "machinic enslavement." With that rise of the modern state and the current capital system, a system of "axiomatics" takes precedent over a system of "intuitionism." Finally, the authors use Virilio to describe the "technoscientific 'capitalization'" that reigns over the entire culture/system. This discussion becomes important as we try to consider the role of capital in the cinema-computers-war assemblage. Perhaps the economy undergirds the interconnections among these technologies.

Finally, “14: The Smooth and the Striated” expands on one of the most well-known binaries Deleuze and Guattari discuss. The authors explain the binary (which includes two terms so interconnected as to make the term 'binary' inaccurate) with several examples. Of the examples mentioned above, the nomad band occupies the smooth space, distributing itself as it goes. The State, on the other hand, striates space so as to occupy it. Deleuze and Guattari remind us that striating factors and groups often territorialize smooth space, but that the more striated a space becomes, the more likely a smooth space is to emerge from it. Again, the interrelationship between poles of binaries becomes important in discussing the cinema-computers-war assemblage. The lesson of the smooth and the striated is that the relationship between these elements is dynamic and shifting.

The second particularly useful thread from Plateau 14 is the discussion of the smooth practice and its relationship with close-ups (versus the striated uses of optical space). “It seems to use that the Smooth is both the object of a close vision par excellence and the element of a haptic space. . . . The Striated, on the contrary, relates to a more distant vision, and a more optical space—although the eye in turn is not the only organ to have this capacity”(493). In other words, the close, decentered, non-totalizing aspect of nomad art helps it stay smooth, a representative of local focus and view. The distant vision, a totalizing one, striates and dominates space.

The resonances between this passage and the technologies at work in the cinema-computers-war assemblage is striking. de Landa describes the totalizing maneuvers of the military machine just as classic Hollywood style seeks to totalize screen representations, to control continuity and image meaning. One might describe some trends in com-

puter programming as drawing from nomadic practice. The study of self-organizing systems is one such practice.

These six scholars each inform my understanding of the cinema-computers-war assemblage. They illuminated the interrelated development of the assemblage's technology, and help inform my use of those technologies for my method.

Technological Innovations and Electracy

The media of electracy have influenced one another in their technological development; computers and cinema have also been intertwined with a third technological system: war. The interconnection among these technologies is explained by a group of theorists, each of whom writes about this assemblage. These theorists explore the development of these technologies, their interrelationship, and their ramifications in culture. They also point to touchstone developments (critical thresholds) in the technologies of electracy and outline the emergence of the technologies that define the way we engage with texts.

This project suggests that such touchstone technologies, understood in light of electracy, can provide methods for understanding cinema in a new way. Drawing from work done by McGann, Ray, and the Surrealists, the following chapters engage with thresholds in the cinema-computers-war assemblage to experiment with a new kind of writing about cinema. In doing so, I explore more deeply how one turns a technology into a method, and whether such a practice can provide an example for future film scholars working on electrate criticism.

In chapter two, "Modularity and Monsters from the Deep," the concept of modularity structures my exploration of *Creature from the Black Lagoon* and *Jaws*. Each

"module" focuses on a small idea, from rationalized labor (in "Ford/ Taylor") to the process of sound editing ("Sound"). Several modules also focus on the two films and explore how modularity figures in narrative and editing. The chapter finds notions of modularity, which were integrated into factory spaces after the War of 1812, reflected at many levels of cinematic production, from shots to marketing.

"Cybernetics and Sinking Ships" uses the study of command and control systems to build another method for film study. The chapter focuses on the question of surprise—an integral idea for communication theory—to look at two movies about the Titanic disaster: *Titanic* (1953) and *A Night to Remember*. The segments, which use Dali's paranoiac critical method to explore idioms from the two films, suggest a variety of critical intersections; in particular, they draw connections between the cybernetic approach to machines and the moralizing of the Titanic films.

While the science of communication and control emerged in the 1950s, the technology for chapter four was developed more recently. "The 'A.I. Effect'" uses developments in game-playing machines and other artificial intelligence research to examine Steven Spielberg's *AI: Artificial Intelligence.* The chapter uses Craig Reynolds' simulated birds, Boids, to construct rules for "film studies boids." It springs from Roland Barthes' notion of the 'punctum'—the part of the image that stings the unconscious—to select moments from the film to examine. The resulting nine fsBoids connect, among other things, Spielberg's play for legitimacy with Kubrick and the progressive cinema of the late 1960s.

Chapter five addresses the question of war explicitly, suggesting that war's oblique relation to many of the other chapters relates to its influential yet subtle relation-

ship with media technologies. "Secret Agents and Cryptography" draws explicit connections between traditional interpretive criticism and the practice of cryptanalysis, offering steganalysis (the examination of images for hidden messages) as an alternative way to approach texts. The chapter demonstrates this method by examining "clues" found in *The Ipcress File* and *From Russia with Love*.

Finally, "Parallel Distributed Processing, the 'And, And, And'" turns to practical application, suggesting that parallel processing and its human-level counterpart (Open Source development) provide a strong model for collaborative work in the digital age. The chapter demonstrates the parallel model on a small scale while arguing for its implementation among academic researchers and in the classroom. It also offers *The Commitments* as an example of how groups can implement such practices.

CHAPTER 2
MODULARITY AND MONSTERS FROM THE DEEP

Modularity in Programming

> Structural programming allows computer programmers to be more efficient. A piece of code can be re-used in multiple ways; its re-usability saves time because it needs only be debugged once but can be used many times throughout the program.

Lev Manovich argues that new media's modular structure is one of its key characteristics: "Just as a fractal has the same structure on different scales, a new media object has the same modular structure throughout"(30). Programmers construct digital works using modules, which consist of isolated "objects" which users can swap out, expand, or remove easily. For instance, web pages often include an HTML text file, an outside CSS style file, and many outside image files or plug-ins (such as Quicktime or Flash files). Manovich suggests that this modularity defines new media (30-31).[1]

Object-oriented programming functions much like the web page mentioned above. It uses outside modules, or "objects," to perform bits of calculation in lieu of in-program code. This coding style allows programmers to assemble "toolkits" of valuable code; such toolkits can be easily integrated into multiple programs. An object-oriented program might consist of some variable definitions, some calls to outside objects, and some of its own processing. It is not unusual to have an object-oriented program in which most of the work is done by outside objects, rather than in the program itself.

Modularity in computer games also allows for a versatility available to few other media productions. Manovich describes its advantages for game designers:

> This modularity makes it easier for a designer to modify the scene at any time. It also gives the scene additional functionality. For instance, the user may "control" the character, moving him or her around the 3-D space. *Scene elements can be also reused in later productions*. Finally, modularity allows for the more efficient storage and transmission of a media object. (140, my emphasis)

Modularity gives games a plasticity that allows them to be scalable and alterable throughout their development. Manovich suggests that modular methods enable programmers to save themselves time by reusing elements in later productions. Of course, other media have re-usable elements—film sets such as the Oval Office that appears in both *Dave* and *The American President* or theater props—but new media objects are both external to the document and *designed* to be re-usable.

But from whence does modularity come? How does it influence the aesthetic and narrative structures of the objects in which it plays such a crucial role? Does *modular thinking* change one's approach to media objects? Can modularity alter one's thinking about such media objects?

***Creature from the Black Lagoon* (1)**

> Genre conventions allow filmmakers to be more efficient. A convention can be re-used in multiple ways; its re-usability saves time because it needs only be introduced once but can be used many times throughout the genre.
>
> It's pretty much formula, for the kind of horror stories we used to do in those days, except in this particular case I added the "Beauty and the Beast" theme. (Weaver 148)

Creature from the Black Lagoon (1954) typifies the B-movie horror genre as it developed in the 1940s and 1950s. Its creators drew on a variety of filmmaking traditions in writing their story; but they were most clearly influenced by horror and science-fiction. Indeed, *Creature* resembles a cross between *The Thing from Another World* (a science-fiction story about scientists trying to understand, then capture, an extraterrestrial seaweed man) and *King Kong* (a horror story about a giant primeval gorilla who falls in love

with a human woman). *Creature* draws on many other films from these genres as well. *Creature*'s typicality is visible both in its story, which is "pretty much formula" (Weaver 146), and in its aesthetics; it uses several of the most effective of the horror and science-fiction tropes. Among these are the scientist protagonist, the ignored girlfriend, the primeval man/beast, and the "Beauty and the Beast" storyline. These conventions serves as mainstays for *Creature*'s plot.

The scientist protagonist appears as the most common 1950s module in *Creature*. Dr. David Reed is a thoughtful scientist, intent on his work, a character sired by dozens of cinematic predecessors. Among the more prominent films featuring scientist protagonists are *The Thing From Another World, Frankenstein,* and *It Came From Outer Space* (the last also written by Harry Essex). Vivian Sobchack suggests that these scientists generally serve one of two purposes: they represent either the modern magician or a cautionary tale about man's hubris. The science hero is the most essential of the science-fiction modules included in *Creature from the Black Lagoon*.

If the science hero trope is the most important one included in *Creature*, the title character comes in second. The creature's primordial genealogy makes King Kong the most obvious *paterfamilias*, given that both monsters share a hatred for men and a love of women, as well as a susceptibility to drugging. In form, the creature looks much like the seaweed man in *The Thing From Another World*. Both are humanoid and walk with a stumbling gait; as such, Frankenstein's shambling monster also appears to be an influential ancestor. *Creature*'s gill man epitomizes the "monster" trope.

Like both King Kong and Frankenstein's monster, *Creature*'s creature has a lusty attitude toward human women. His first full-body appearance in the film comes as Kay

draws him from hiding (Figure 2-1). While the horror of a sexual encounter between monster and woman intrigues, I am more interested in the film's use of this trope. Essex's comment about adding the "Beauty and the Beast" theme seemingly simplifies the formulae of genre horror. Essex added his theme like a programmer might add a feature: he used the "Beauty" module.

Figure 2-1: The creature is drawn from hiding when he sees Kay swimming (0:30:40). *Creature from the Black Lagoon.*

Kay represents the final modular structure at work in the *Creature* screenplay. She provides both romantic entanglements and the motivation for the "Beauty" module; however, she also invokes the gender issues at stake in 1950s culture. Cyndy Hendershot argues that "David's hesitancy about his relationship with Kay may relate to sexual intimidation in the face of an educated, beautiful, and sexual woman" (96). While Hendershot's concerns are valid, I suggest that the "ignored girlfriend" module developed in a much wider spectrum of films than 1950s science fiction. Indeed, similar modules surface in horror and in westerns: the protagonist's need to divide time between (narrative) work and distractions of love lies at the heart of many Westerns (see *High Noon*).

Creature from the Black Lagoon illustrates Manovich's assertion about the fractal nature of modularity; the film utilizes modularity on more than the level of narrative. Its aesthetic form also draws on tropes of science fiction and horror films. One such trope is

the “glimpse of the monster” module that still populates contemporary horror films. In place of the monster itself, the film’s beginning features only a sinister claw scrabbling at the sand by the lagoon’s edge; the monster also blows ominous bubbles from below. Both of these tricks alert the audience to the monster’s presence without showing the full horror of the creature. This module lasts—the mind is scarier than the monster.

Creature also features a garish soundtrack, another key module of science-fiction and horror films. In the best horror movie tradition, the score develops a “theme of the monster” that alerts the audience when the monster nears. The brash three-note signature of this theme, consistently coupled with the creature’s appearances, conditions in the audience a Pavlovian response. Thus, as the film closes, the filmmakers can run the “sound” module to signify the monster’s presence without any other signs of it. As with the “glimpse” module, this tried and true formula surfaces in many recent films.

A third module the film makes liberal use of might be dubbed the “screaming woman.” As with many other horror films of the day (and more recent films as well), the narrative uses the female character mostly to scream when she sees the creature doing monstrous things. The screaming woman alerts the male protagonists of the creature’s activities and shifts the narrative from suspense (will the creature get them?) to action (they are fighting the creature!). The screams also work like a sit-com laugh track—they instruct the audience about how to react to a particular shot or scene. Whatever its purpose, the screaming woman module is integral to science-fiction and horror films.

Creature exploits a veritable catalog of modules for horror and science fiction. It inherits its primary elements from other familiar horror films, elements that appear in

later films as well. This intense genre modularity may account for some of the film's popularity.

Ford/Taylor

> Standardized production allows manufacturers to be more efficient. A production process can be divided in multiple ways; its simplicity saves time because its workers need only be trained a little and can be replaced easily.

Standardized mass production began with the military need for interchangeable weapons. After nearly losing the War of 1812, the American military institutionalized production processes developed by Frenchman Jean Baptiste Gribeauval. These processes standardized weapons production to create weapons with "perfectly interchangeable parts" (de Landa 31). These techniques depended upon a shortened chain of command that gave direct control to the upper echelons of military authority. Thus, when the non-military industries of the mid- and late-nineteenth century adopted rationalized production practices, they were also adopting a *military* structure of command (de Landa 31-2).

As the cinema industry emerged in the 1920s and early 1930s, its most powerful proprietors adopted Ford and Taylor's production practices:

> Indeed, as Thomas Schatz has described, the Hollywood studios set the tone by explicitly imitating the organizational system developed in large-scale manufacturing. Mass production, standardized designs, concentration of the whole production cycle in a single place, a radical division of labor, the routinizing of workers' tasks, even the after-hours surveillance of employees—all of these Fordist practices became Hollywood's own. (*How* 2)

In other words, American industry's rationalized labor shaped Hollywood production habits and policies. Schatz and Ray even suggest that MGM's Louis B. Mayer sought out the "scientific rational" process of aesthetics—the science of art.

Given rationalized labor's origin in the need for interchangeable parts, Hollywood could hardly avoid developing formulae for its productions. *Creature from the Black La-*

goon thus begins to resemble a production-line product. It has the science-fiction/horror genre elements (scientist hero, monstrous creature villain, screaming woman) as well as some extras such as "Beauty and the Beast." The formulae for *Creature*'s genre serve as modules for Hollywood's filmmakers: they incorporate a variety of modules to a script, run it along the assembly line, and turn out a film.

Manovich suggests that modern electronic media, made of multiple "discrete levels," reflects the early American interest in Taylorism; the assembly line's two major principles were standardization of parts and division of labor (29). *Creature*'s production could be seen as the use of a variety of standard parts by a divided group of workers including Jack Arnold, Harry Essex, the composers, and others.

***Creature from the Black Lagoon* (2)**

> Shot duplication allows filmmakers to be more efficient. A shot can be re-used in multiple ways; its re-usability saves time because it needs only be filmed once but can be used many times throughout the picture.

Creature from the Black Lagoon's uses one module most remarkably: it repeatedly re-uses shots throughout the film. To the observer, sections of the film seem like a gag from *Monty Python and the Holy Grail*.[2] While only one of the sequences I have found involves re-use of specific footage, the other two are so close as to indicate that they were probably shot in sequence and separated in editing. This technique increases the production's efficiency in two ways. First, it requires fewer set-ups; since producers used the same type of shot in multiple places, they could shoot the shot twice (or perhaps use two different takes of the shot) instead of staging different shots. Second, including nearly identical shots saves creative energy. Once the filmmaker knows how to show the creature's angry presence (its hand in the sand), he can do so whenever he likes.

The first repeated shot is of the creature's hand clawing the beach. This shot appears twice: once after Dr. Maia discovers the skeletal hand of the creature's ancestor and once as the creature prepares to prey on Dr. Maia's hapless helpers (Figure 2-2).[3] A careful study of the two shots reveals them to be different only in the length of the shadow near the hand; the filmmakers likely did one take, then dimmed and lowered the light source and did another take. Given their distance in the film (about six minutes), this is a pretty successful re-use of shots. Later such instances in the film are less carefully articulated.

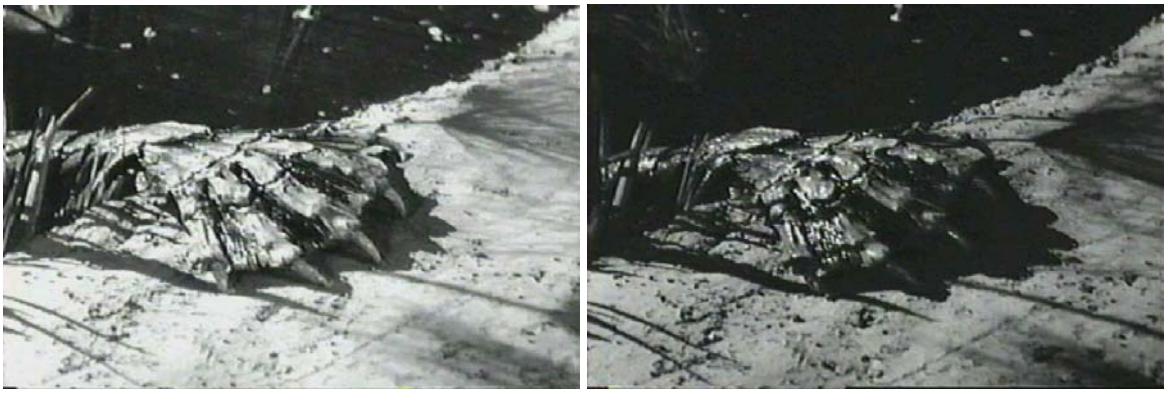

Figure 2-2: Two shots of the creature's hand (Left, 0:04:01; Right, 0:10:32)
Creature from the Black Lagoon

The two later instances of repeated shots I have found both involve the diving sequences which, one can assume, were relatively difficult and expensive to shoot. In the most dramatic underwater scene, David and Mark don their aqualungs and hunt the creature using spear guns. Mark shoots at the creature twice, as does David (Figure 2-3). All four spears are fired toward the camera, with the camera occupying the place (but not the point-of-view) of the creature. Narratively, Mark's shots appear to be taken from different locations in the lagoon. The sequence between the two shots depicts Mark in pursuit of the creature, but the shots themselves are clearly duplicate footage. In both cases (1:04:50 and 1:05:24), the seaweed hill behind Mark is present.

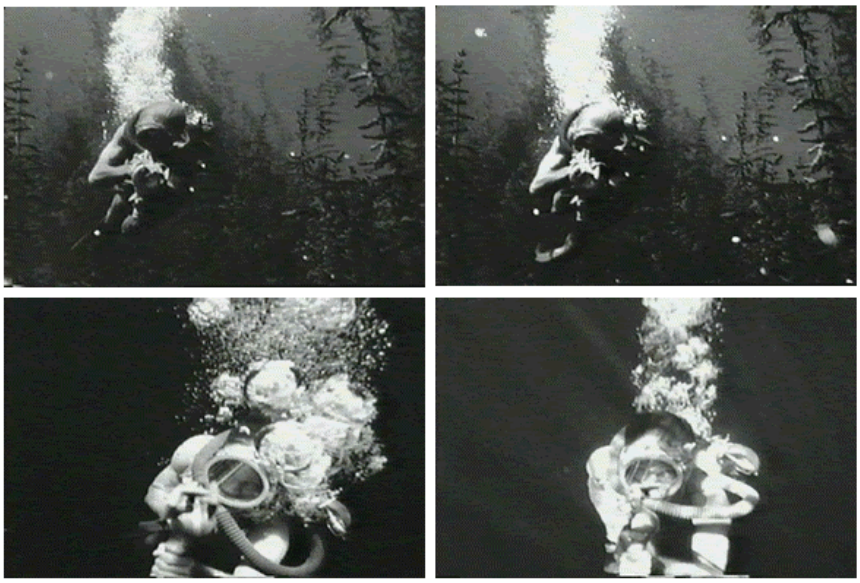

Figure 2-3: Mark and David both take multiple shots with harpoons.
Top: Mark (1:04:50 and 1:05:24); Bottom: David (1:07:07 and 1:07:18)
Creature from the Black Lagoon

David's spear shots repeat quickly, separated by only eleven seconds of footage (1:07:07 and 1:07:18). These shots are so similar that in a more recent film, one might assume them to be artistic re-play (as in John Woo films) rather than re-used footage. While not identical (the bubbles are different), the shots match so closely that one must assume they were shot in sequence. Several other sequences featuring the monster, such as the monster swimming through masses of seaweed, may include repeated footage, but these examples will suffice.

Repeated shots allow the film's cinematographer to use them like a structural programmer would use a modular subroutine. Rather than require that the second unit shoot an additional menacing monster shot or that Richard Carlson fire two spears, the editor can use the original footage of "Mark firing a spear" as a module, and include it where necessary in the film. This modularity increases efficiency for both the editor and the filming units. It also makes good use of second and third takes, which can become new shots later in the film.

***Jaws* (1)**

> Genre conventions allow filmmakers to be more efficient. A convention can be re-used in multiple ways; its re-usability saves time because it needs only be introduced once but can be used many times throughout the genre.
>
> [*JAWS* is] nothing more than a creaky, old-fashioned monster picture reminiscent of *The Creature from the Black Lagoon.* (*The New York Times,* Qtd in Baxter 140).

Given the phenomenal box office receipts of Steven Spielberg's shark movie, *The New York Times* is at least partly mistaken. On the other hand, a variety of elements in *Jaws* encourage the description "creaky old monster picture." A close examination of the film's structure reveals that it uses many of the same horror film modules that *Creature* used. Indeed, most of the elements in *Jaws* seem closely related to elements in *Creature from the Black Lagoon*.

The "monster" module stands out as the most evident trope used in *Jaws*. While numerous monsters informed the shark's depiction, it shares numerous similarities with the gill man in *Creature*. Both live under water and kill numerous people indiscriminately. More significantly, both prove to be more resourceful than the protagonists expect; both monsters pursue the protagonists after they have begun to retreat. In *Creature*, the gill man blocks the harbor to keep the boat from leaving; the shark in *Jaws* attacks Quint's boat and chases the men as they flee. Each creature bears primeval intelligence. This intelligence gives the monster a focus not present in the brainless destruction wrought by monsters in many movies, such as *King Kong* or *Frankenstein*. One difference between the shark and the gill man is the former's disinterest in sex. While the gill-man lusted after Kay in *Creature*, *Jaws*' shark merely hungered for Christine Watkins (the swimmer eaten at the beginning of the film).

The two films also share the dynamic between the men hunting the monster. Ignoring Brody for the moment, Hooper and Quint are analogous to David and Mark. Some examples:

Table 2-1: Character comparisons between *Jaws* and *Creature from the Black Lagoon*.

	David	**Hooper**
First Sighting	Takes photos while diving	Takes photos from boat
Underwater encounter	Survives while Mark doesn't	Survives while Quint doesn't
Conventional means aren't working to kill the monster	Agrees to drug the water	Attempts to drug shark w/ spear
Shows restraint in battle	Wants to leave the harbor	Tells Quint to be easy on engine
	Mark	**Quint**
First Sighting	Shoots gill man with harpoon	Shoots shark with harpoon
Overall goal	Kill the gill man	Kill the shark
Ahab complex	Won't leave without trophy	Won't slow boat down
Demise	Killed in fight w/ gill man	Killed by shark on the boat

Despite the differences between these characters and those in other horror movies, the characters overlap enough that we can certainly suggest a modularity in character-type, if not a direct reference by to *Creature* the writers of *Jaws*.

Both films use the aesthetic modules of horror cinema extensively. As in *Creature*, *Jaws* utilizes the "glimpse of the monster" module with aplomb. As it happens, the reason for this module's prominence in the film was the malfunctioning mechanical shark. Nonetheless, the shark does not appear in the film until the third attack, and even then only in glimpses. Only after Quint's hunt begins do we see the shark for more than a moment or two. Because *Jaws* exploits the primeval fear of water—the fear of the unseen creatures that float below the water—the "glimpse of the monster" module affects audiences particularly well.

Another module put to brilliant use in *Jaws* is the "theme of the monster." John Williams' memorable score works so well that it has been repeated in a multitude of cultural references. The recurring two-note beginning of the theme heralds the shark's pres-

ence on screen, just as the *Creature*'s brash three-note theme told audiences to look for the gill man. The major difference between the use of this module in these two films is that in *Jaws*, Spielberg often allows the module to play the part of the shark, whereas *Creature*'s theme usually accompanies an on-screen depiction of the monster or part of it.

The "screaming woman" module, prominent in *Creature*, does not play a significant part in *Jaws*. Despite this difference, *Jaws* clearly relates to *Creature from the Black Lagoon*. Their plot structures, characters, and storytelling modules parallel one another. *The New York Times* was right when it suggested that *Jaws* is reminiscent of *Creature from the Black Lagoon.*

Sergei Eisenstein

> Techniques of montage allow filmmakers to be more efficient. A technique can be re-used in multiple films; its re-usability saves time because it needs only be found once but can be used many times throughout the filmmaker's career.
>
> There are parts of Jaws that suggest what Eisenstein might have done if he hadn't intellectualized himself out of reach—if he'd given in to the bourgeois child in himself. (Kael 691)

For Sergei Eisenstein, montage holds the key to all cinema. Of his many descriptions of montage, the following fits my use of the term best: "montage is characterized . . . by collision. By the conflict of two pieces in opposition to each other"(37). Montage juxtaposes shots that differ distinctly from one another. These elements, united *because* they collide, lead to meaning in cinema. Such was Eisenstein's approach.

In his many pieces on the subject, Eisenstein evaluated the effect of montage on himself and on audiences. He sought to make a science it, to find a system for emotion, to codify intellectual cinema. For instance, he suggested that different "methods of montage" enable different manipulations of the audience. These methods (Metric, Rhythmic,

Tonal, Overtonal, and Intellectual) give the filmmaker different levels of control over audience reactions, "outbursts," and—with "Intellectual montage"—even thoughts (72-83). While Eisenstein does not suggest that one might easily and objectively measure the effect of a given shot, his work implies that a skilled filmmaker can control his viewer's responses to his films.

There are three reasons Eisenstein studied montage and its effects. One is artistic—the filmmaker cultivated his own understanding of cinema; he learned how the medium can be manipulated and shared that knowledge with other filmmakers. His research is also pedagogical. Eisenstein explains how films should be made, a goal that fits Soviet politics of the 1920s and its need for skilled party filmmakers. Finally, Eisenstein codified his theories of montage and cinematography to help understand cinema rationally; he devised systems for making cinema produce specific results. In striking similarity to Ford and Taylor's rationalization of labor, Eisenstein seeks to scientifically codify and rationalize cinema.

In "The Structure of the Film," Eisenstein argues that *Battleship Potemkin*'s effectiveness stems from two places, the film's "organic-ness" and its "pathos." He examines *how* the film is produced "organically" and how it produces pathos in its scenes and viewers.

> In its five acts, tied with the general thematic line of revolutionary brotherhood, there is otherwise little that is similar externally. But in one respect they are absolutely *alike*: each part is distinctly broken into two almost equal halves. This can be seen with particular clarity from the second act on…. And it should be further noted that the transition within each part is not merely a transition to a merely *different* mood, to a merely different *rhythm*, to a merely *different* event, but each time the transition is to a sharply opposite quality. (165)

Each act of *Potemkin* splits around a "*caesura*" with opposing qualities on either side. The two halves of each act contrast and produce *pathos*. The essay suggests that pathos in cinema is both codifiable and universal; Eisenstein makes little reference to the fact that different people might react differently to the same film. He describes emotions and responses as though they are universal.

Eisenstein's techniques justify Thalberg's search for a system to make the perfect film. Perhaps Thalberg should have researched Eisenstein's *pathos* modules. A look at well-known screenwriters handbooks still in use today might suggest that such techniques are not as laughable as they first appear.

***Jaws*(2)**

> Shot duplication allows filmmakers to be more efficient. A shot can be re-used in multiple films; its re-usability saves time because it needs only be conceived once but can be used many times in many pictures.

Given their narrative similarity and use of genre conventions, it is hardly surprising that *Jaws* and *Creature from the Black Lagoon* have a similar look and feel. However, closer examination reveals a more direct link between the films. *Jaws* explicitly borrows specific shots from *Creature*. This replication allows Spielberg to capitalize directly (by re-using shots) and indirectly (via audience familiarity) on frightening tactics used by Arnold twenty years earlier.

One replication appears just as the film opens, with Chrissie Watkins swimming in the ocean. In general, *Jaws* uses many of the same techniques *Creature* used to make the audience afraid for the swimmer: the music (and the film's pre-promotion) tells us something lurks under the water, we know the "something" watches the swimmer because we see its point of view, and we are frightened for her because we see her react to

being touched. In shooting this sequence, Arnold used two shots which Spielberg borrowed for *Jaws*. The first depicts the monster's point of view, an underwater shot of the woman swimming directly overhead (Figure 2-4). The second shows the woman treading water. In both cases, the camera hovers overhead, filming no other objects in the frame (Figure 2-5); these shots make Chrissie and Kay look small and alone—they accentuate the frightening nature of deep or murky water. In both cases, the audience empathizes with, and fears for, the swimmer. The attack commences.

Figure 2-4: Chrissie (right, *Jaws*, (0:03:52))[4] swims overhead just as Kay did (left, *Creature from the Black Lagoon* (0:28:57)).

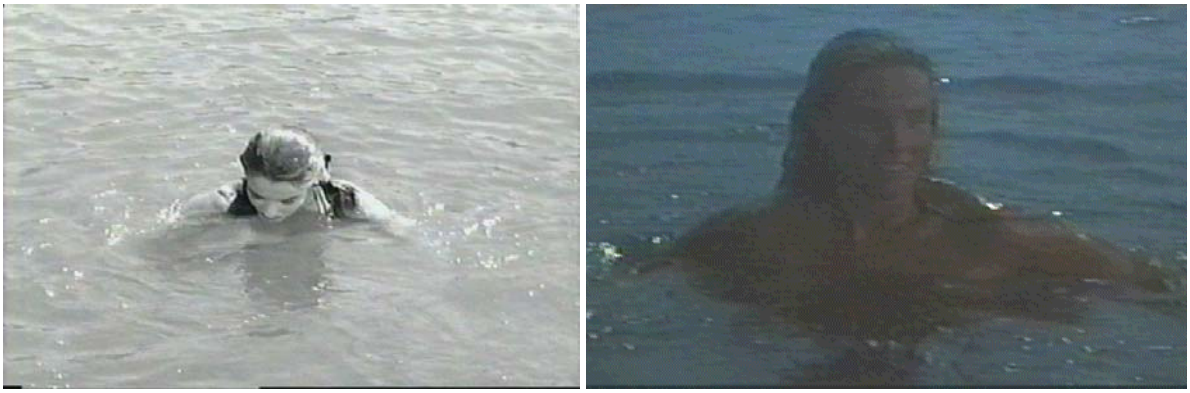

Figure 2-5: Chrissie (right, *Jaws*, (0:04:03)) treads water just as Kay did (left, *Creature from the Black Lagoon* (0:31:06)).

Jaws' scene in which the shark gets tangled with Hooper's shark cage also replicates some shots in *Creature from the Black Lagoon*. This sequence echoes two scenes in *Creature*: the first in which the gill man tangles himself in the fishing net, the second

in which the creature attacks the log-lifting device rigged by David. Several elements from these two scenes in *Creature* have been borrowed for *Jaws*. Among them are the winch, the hook arm, and the thrashing line in the water. Both films also depict the monster caught in the underwater equipment. The confrontation between monster and equipment underscores the characters' impotence in dealing with the monster—its raw power overwhelms their mechanical devices. These scenes also confront the characters with a moment of doom; our heroes realize they are at the monster's mercy (Figure 2-6).

Figure 2-6: The crew looks grim when they realize the equipment is broken. *Creature from the Black Lagoon* (1:02:16), *Jaws* (1:55:41).

Finally, both filmmakers include a sequence in which their monster leaves behind a part of its body. In *Jaws*, the tooth left behind by the shark frightens Hooper because he recognizes that the tooth comes from the jaws of a great white shark. In *Creature*, a similar sequence develops foreboding because the character *does not* recognize the body part in question (the claw). In both cases, the body part left behind brings the characters to the point of suspense the audience has been at for some time.

The shots and narrative elements featured in both *Jaws* and *Creature* work well. The shots involving Kay and Chrissie develop a sense of suspense and fear in the viewer while the images of machinery failure impart a sense of doom among the monster-

fighting characters. In both cases, Spielberg borrows clever tactics from Arnold, re-using proven methods of developing suspense.

Epigraphs

> Epigraphs allow writers to be more efficient. A piece of text can be re-used in multiple ways; its re-usability saves time because it needs only be written once but can be used many times throughout academe.
>
> In the last decade . . . the epigraph has flowered among even the most conservative critics. As quotations mount up at articles' beginnings and section breaks, collage juxtaposition begins to sneak in. . . . Epigraphing is the Trojan Horse of the traditional essay. (Ray, *Avant-Garde* 127-8)

As Ray suggests, scholars perform "acceptable" collage juxtapositions with epigraphs. A quotation at the beginning of an article functions like hard-copy hypertext, provoking connections between the text at hand and the epigraph's parent. It may set groundwork for an argument or build a straw man for the author to attack. The *mot juste* epigraph appears in multiple places, just as good subroutines or modules appear in multiple programs. Epigraphs are modules for scholars.

Sound

> Sound libraries allow sound editors to be more efficient. A sound can be re-used in multiple films; its re-usability saves time because it needs only be recorded once, but can be used many times by sound editors.
>
> It is the heart and soul of the department. You can be the best sound editor in town, but if you don't have a library, you have nothing to work with. You're solely dependent on it. (Crutcher, Qtd in LoBrutto 55)

Sound is perhaps the most modular element in cinema. Large sound banks (or libraries) enable editors to use sounds in multiple films; many editors approach their film work by viewing the project and searching their libraries for sounds that fit the narrative. Norval Crutcher, the supervising editor for many films including *Terms of Endearment* and *The Karate Kid*, describes his approach in this way,

> I run the film with the director and make very, very specific notes. . . . Then, I have a 3/4-inch video-cassette of the film, and I will go through it again. I will make my own notes and add to that because there are things in the film the director didn't think of when we were running it, but they think of when we're mixing it. I also try to add something they didn't ask for which will enhance the film. . . . I give my librarian the list; she selects all the sounds. When she gets it all done, I'll go in and sit there and listen to all of it. I'll either approve them, or we'll look for other sounds. After I approve a sound, I have to make a decision of how many prints I want on each sound effect. (LoBrutto 56)

Crutcher lists the required sounds and then selects clips from his library to use in the film. After he views his selections, he adds or removes sounds that do not quite work. A variety of technological advances make this approach possible, but its modularity stands out as its most central format. Crutcher imagines sounds as isolated elements that he can swap in and out as needed.

Sound engineers record many sounds created for their libraries, not for specific films; the sounds are interesting in themselves, and may be useful later. "You never know when you are going to need a sound. We collect sounds for our library as much for their inherent interest as the practical value that they might serve later on"(273). These clips are considered isolated events, filed (digitally) by category or description, and made available for use in later films. Recent advances in computer technology has heightened the modularity of these libraries, as all-digital libraries enable editors to "access any sound in [the] library in seconds" (225).

Sound libraries also lead to secondary meanings for sound clips.[5] Among the more famous examples are the "Universal Telephone Ring" and "Castle Thunder"—both clips from sound libraries that have been used so often they have become clichés. "Castle Thunder", originally recorded for *Frankenstein*, has become so cliché that it evokes fifties horror films and haunted houses, rather than actual thunder —hence its use in Dis-

ney's Haunted Mansion attraction at Disney World and Disney Land (Lee "Castle"). The "Wilhelm Scream" also carries secondary meanings. Sound editor Steve Lee describes the scream's origin:

> A series of short painful screams performed by an actor were recorded in 1951 for the Warner Brother's film "Distant Drums." They were used for a scene where a man is bitten and dragged underwater by an alligator. The recording was archived into the studio's sound effects library—and it was used in many of their films since. (Lee "Wilhelm")

Lee explains that Ben Burtt adopted the scream as a "signature sound," subsequently using it in many films since the mid-seventies. Sounds like "Castle Thunder" or the "Wilhelm Scream" carry additional meanings for viewers who are familiar with them.

Jaws features an interesting use of a sound library clip from an earlier Steven Spielberg film. In the finale of *Duel*, a Mack-truck monster film, the grungy truck tumbles over a cliff to a soundtrack of a dinosaur roar. Spielberg describes the roar as a sound taken from "an old dinosaur movie" (Spotlight). Spielberg re-uses this sound at the end of *Jaws*, giving the sinking shark an aural link to the truck from *Duel*. The dinosaur roar also brings to mind the primal nature of the shark itself.

***Jaws* (3)**

> Marketing strategies allow film companies to be more efficient. A film can be pointed at multiple audiences; targeted marketing saves money because it allows one film to be shown to many people.

Jaws is more than just a well-built horror film. Its phenomenal success cannot be attributed wholly to its director's eye, its consistent use of horror film modules, or its engaging story. Much of the success of *Jaws* has been credited to its brilliant across-the-board marketing campaign; many describe *Jaws* as one of the first real "Blockbusters." Indeed, the marketing campaign for *Jaws* built a new strategy from several successful strategies of the past and helped create what Justin Wyatt calls "High Concept" cinema.

The foundational strategy under which *Jaws* came to the screen is the adaptation. Filmmakers have always used novels and plays as source material. Some did so to attempt to legitimate cinema among the middle and upper classes. André Bazin suggests that such work attempts to "raise . . . cinema to the level of literature"(66). But two primary issues drive adaptation: audience and story. Stories can be adapted, and thus need not be built from scratch. And since some people already know the story—and presumably like it—a built-in audience awaits. (Bazin also points out that novelists happily allow adaptations of their books because it often increases the sales of the novel.)

Peter Benchley's best-selling 1974 novel provided an enormous built-in audience:

> By 7 p.m. on the first day [of its publication], *Jaws* was [California's] most successful book. . . . Within weeks, paperback rights went to Bantam for $575,000 and *Jaws* was climbing toward an eventual 9.5 million sales in the US alone. The book's enormous success surprised the publishing world, as best-sellers usually do (Baxter 120).

The novel also supplied a very cinematic tale; Hollywood's heavy-hitters salivated over the monster shark. An executive at Universal explained that after he read the book, he thought, "This is going to be a smash movie"(121). Between its movie-ready plot and its best-seller status, *Jaws* screamed for adaptation.

Another key strategy in preparing *Jaws* for box-office success was to slim it down. Benchley's book features a variety of sub-plots and developments that stray from the main story (of man vs. shark). With each draft of the script, Spielberg and his writers cut down on the sub-plots and the references to Melville; they hones the story to concentrate on "the four or five elements that made the book so enthralling"(McBride 238). This simple plot became the keystone idea behind *Jaws'* marketing strategy.

The simple plot opened the door for another key marketing strategy: iconic advertising. The image of a giant shark surging toward a naked swimming woman "encapsulate[s] the film through a single image . . ." (Wyatt 113). The simplicity of the film's plot, along with its characters and its "arresting imagery"(114), allowed advertisers to tie their television ads, print ads, reprint of the novel, and movie trailers together in a single campaign. While iconic marketing certainly surfaced before in horror films (as in the poster and trailer for *Creature from the Black Lagoon*), *Jaws* was one of the first films to make such successful use of "saturation" marketing.

Finally, Universal marketed *Jaws* with the wide release module. In some ways, this technique is the most innovative of those used with *Jaws*, as it had not been used very often with films of this caliber.

> *Jaws*' [saturation pattern] opening was viewed as . . . bold; opening in a fairly wide (at the time) 409 theaters, the film received a saturation television advertising campaign. Whereas in the past, this type of opening had been reserved for films which the studios had judged to have little playability, the opening of *Jaws* signified the adoption of this release and marketing pattern for high-quality studio pictures. The strategy worked extremely well for *Jaws*, which grossed $7.061 million in its opening weekend. (111)

Jaws' wide release opened the door for a multitude of wide releases to follow. It is not uncommon for major Hollywood blockbusters to open on more than 3,000 screens today.

With its wide release, its iconic advertising campaign, its simplified plot, and its built-in audience, one should not be surprised that *Jaws*' run in theaters gave it the title of highest-grossing picture ever (at the time). At the heart of *Jaws*' success, though, lie not just its marketing campaign, but also its producers' skilled use of multiple modules from the horror genre, from *Creature from the Black Lagoon*, and from movie marketing history.

Blockbusters

> Blockbusters allow film companies to be more profitable. A blockbuster will be seen by multiple audiences; blockbusters make money because they build on one formula for many films.

"High Concept" films, blockbusters[6], are easily represented by a short phrase, easily marketed with iconic images, and likely to appeal to a wide audience in a general way. These films seek to be the films Louis Mayer was looking for at MGM—guaranteed winners.[7] It is no accident that high concept films repute to be "critic proof." But what makes these films so popular?

Wyatt proposes that such films, usually chosen for star power or previous success (as with sequels), succeed because they meet audience expectations. They are also easy to market. He writes,

> Given their marketability and the reliance upon past successes, it is probable that the high concept films would be more popular than other films. In addition, given their modularity and "recycled" quality, statistical modeling, based on coding the film into several constitutive variables, might be able to predict their box office performance with more precision than that for the "low concept" films (20).

Wyatt suggests that three factors determine whether a film is "high concept" or not: "the look, the hook, and the book." He describes these as "the look of the images, the marketing hooks, and the reduced narratives" that make a high concept movie work (22). But Wyatt's explanation ignores what Lev Manovich describes as the "fractal" nature of modular media. In short, the fact that modular elements reflect similar structure on all levels.

For instance, the idea of the assembly line as devised by military leaders and rationalized labor proponents (like Taylor and Ford) reflects its own concept and structure throughout the system. The assembly line met the need for interchangeable parts for

military weaponry; these parts needed to be identical so they could be swapped out if they malfunctioned. Thus, factory owners divided each piece of manufactured equipment into distinct parts which were machined identically. At the same time, Taylor studied the movements of workers themselves, breaking down their work into constituent parts and their projects into smaller and smaller bits of labor. In doing so, he not only made each worker more efficient, he removed skill and craft from the work they did. Each worker did only a small part of the job, needed less training, and thus became more easily replaced. The assembly line uses interchangeable workers to build interchangeable parts. Its modularity is fractal.

In a similar way, high concept films use modularity in a fractal way; these films are created using a variety of modules on a variety of levels. As Wyatt suggests, blockbusters need the look, hook, and book modules, but they also need genre and aesthetics. Because these films use a variety of modules, both narrative and aesthetic, from films audiences have seen previously, they appear familiar and thus become part of the films' hook.

Blockbusters, or "High Concept" films, have reached a high level of modularity. These films combine Taylor's rationalized division of labor (introduced to the movie industry by Louis B. Mayer) with the benefits of careful genre study and targeted marketing. The resulting films are popular because they are familiar; audiences know what to expect and enjoy getting it. Blockbusters epitomize modular filmmaking.

At the same time, blockbuster films like *Jaws* sometimes exceed the aesthetic limits that a strict adherence to modularity would occasion. Perhaps, in these moments, scholars of new media can find clues that explain how invention and innovation occur in

modular authorship. In other words, when film makers working from a "database" of modules assemble an innovative film, they embody new media authorship.

Notes

[1] The fractal nature of modularity makes it substantially different from previous structural models that relied on reuse of tropes, such as Vladimir Propp's *Morphology of the Folk-tale* or Joseph Campbell's *The Hero with a Thousand Faces*. While previous models stemmed from the oral composition tradition of repeated tropes (as in Homer's works), modularity integrates this structural practice fractally: at all levels. Thus, while folk tales are modular on the level of narrative, new media objects use modular narrative, construction, distribution, and storage.

[2] *Holy Grail* features a shot-reverse-shot sequence in which guards watch Lancelot charge toward their castle. Each shot of Lancelot uses the same footage; instead of getting closer with each reverse shot, he repeatedly crests the hill at great distance from the castle. Then he suddenly sets upon the guards.

[3] The times are estimated hours, minutes, and seconds (HH:MM:SS) from the opening credits of the film. Where possible, I've included screenshots of presented images.

[4] Images from *Jaws* have been cropped from widescreen format where necessary.

[5] On a personal note, the first film in which I noticed the re-use of a sound was Spielberg's *Jurassic Park*. The clicking growl sound of the velociraptor is the same sound made by the title alien in *Predator*.

[6] The term *blockbuster* originally described a bomb big enough to destroy a city block. While *bomb* indicates a cinematic failure, *blockbuster* signifies a very successful film. Incidentally, *blockbuster* also carries meaning in real-estate circles. The term, used as an epithet, describes someone who sells a home in an all-white neighborhood to minority homeowners—a development that the term implies "opens" the block to minority families and will drive down property values.

[7] British Screenwriting lecturer Sue Clayton has published the "scientific formula" for the most popular British film. She says a film should have the following components: "30 percent action, 17 percent comedy, 13 percent good-versus-evil, 12 percent romance, 10 percent special effects, 10 percent plot and 8 percent music" (Associated Press).

CHAPTER 3
CYBERNETICS AND SINKING SHIPS

> In a very real sense we are shipwrecked passengers on a doomed planet. Yet even in a shipwreck, human decencies and human values do not necessarily vanish, and we must make the most of them. We shall go down, but let it be in a manner to which we may look forward as worthy of our dignity. (Wiener *Human* 40)

One

In the 1950's, in North America, several forces converge that would shape the development of science, technology, and industry in the following decades. On a technological front, both the computer and the atomic bomb had recently entered the national consciousness; politically, U.S. ideology moved from the Second World War into the Cold War, complete with fears of the "red menace" and the arms race; culturally, America started watching television. Technology seemed likely to be both panacea and anathema for humanity's future. Finally, science developed a theory of electronic information that coped with the psychologically challenging Uncertainty principle and recent thinking about entropy. Each of these factors played a role in—and were significantly affected by—the development of the new field of communication and control: *Cybernetics*.

This chapter takes Cybernetics as its subject and its guide. We begin with a passage from Norbert Wiener's seminal 1948 work, *Cybernetics*,

> We have decided to call the entire field of control and communication theory . . . by the name *Cybernetics*, which we form from the Greek . . . [f]or *steersman*. In choosing this term, we wish to recognize that the first significant paper on feedback mechanisms is an article on governors, which was published by Clerk Maxwell in 1868, and that *governor* is derived for a Latin corruption of [the Greek term for *steersman*]. We also wish to refer to the fact that the steering engines of

> a ship are indeed one of the earliest and best-developed forms of feedback mechanisms. (11-12)

Wiener's book marks a beginning moment for the field of communication and control theory. Wiener's use of the nautical term for steersman and its homage to ship governors provides one impetus for the choice of films to be studied herein: *Titanic* (1953) and *A Night to Remember* (1958).[1] I selected these films for several other reasons as well, including: that they were produced in the 1950s and provide interesting historical relevance to the emergence of cybernetics, and that both films explicitly address technology, history, and humankind.

Finally, my reason for choosing these films can be explained by *The Onion: Our Dumb Century*.[2] Here are the headlines from April 16, 1912: "World's Largest Metaphor Hits Ice-Berg. Titanic, representation of man's hubris, sinks in North Atlantic. 1,500 dead in symbolic tragedy"(13). While this morbid humor makes explicit the obvious *interpretation* of the Titanic movies, it also underlines metaphor's role in shaping our understanding of the place of cybernetics in these films. Using some of the dominant concepts in the field—entropy, feedback, homeostasis, and noise—I work through these films to explore the influence of cybernetics on the field of media studies, the interconnection cybernetics enables among cinema, computers, and war, and the usefulness of cybernetics as an *overt* (rather than covert) way to explore cinema.

Entropy and Noise

The concept of entropy may be the most important concept in cybernetics. In *Cybernetics* and *The Human Use of Human Beings*, Wiener explains the concept of entropy and its effect on our understanding of the universe. He suggests that the Second Law of Thermodynamics and the concept of entropy fundamentally restructured the way science

understands the universe. Entropy, by upsetting the solid, closed system that Newton proposed, disrupted the easy assurance with which physicists worked; instead of sureties, they now faced probabilities (8-10). The Heisenberg uncertainty principle exemplifies this instability; it demonstrates that in observing a phenomenon, one acts upon it. The principle creates a system in which there are no certainties—the very activity of looking changes what one is looking at. Marshall McLuhan understood the import of the theory, suggesting that "technical change alters not only habits of life, but patterns of thought and valuation"(65). In short, the uncertainty principle does not just apply to the observation of electrons; it has significance for the philosophy of science itself.

Wiener equates the development of this unstable point of view to Freud's discovery of the unconscious. He writes,

> This recognition of an element of incomplete determinism, almost an irrationality in the world, is in a certain way parallel to Freud's admission of a deep irrational component in human conduct and thought. . . . Freud, and the proponents of the modern theory of probability together as representatives of a single tendency; . . .in their recognition of a fundamental element of chance in the texture of the universe itself, these men are close to one another. . . . [T]his random element, this organic incompleteness, is one which without too violent a figure of speech we may consider evil; the negative evil which St. Augustine characterizes as incompleteness, rather than the positive malicious evil of the Manicheans. (11)

Wiener suggests a parallel between Freud's work and the discoveries of early twentieth century science. He asserts that humankind must struggle against the "organic incompleteness" of science's irrationality. Indeed, *The Human Use of Human Beings* and *Cybernetics* contain a strong undercurrent of the theme of human versus machine; Wiener repeatedly returns to his fears about the dangers of the technologies emerging in the post-war era. He envisions cybernetics as working in the "local enclaves of organization"(12) that surround life. Cybernetics promotes and studies such organization.

The study of communication and control connects with the study of information transmission. Indeed, Wiener sees the two areas as inseparable, since “the transmission of information is impossible save as a transmission of alternatives” (*Cybernetics* 10). Further, entropy plays a key role in the study of transmission and “just as the amount of information in a system is a measure of its degree of organization, so the entropy of a system is a measure of its degree of disorganization; and the one is simply the negative of the other”(11). In short, entropy is both the problem and the solution. David Porush, in his treatment of the influence of cybernetics on literature, *The Soft Machine*, describes the goal behind Wiener’s work. He observes, “Wiener et al. suggested a way uncertainty itself could be resolved. All codes, all the structures of information, could be accounted for, as well as man's relationship to the universe as cosmic cryptographer”(55). Yet entropy remains a problem, both in terms of information theory and in terms of the ontology such theory asserts.

The distinction between noise and information is primarily a matter of context. Porush explains that cybernetics does not make any distinction between noise and data. Both fall under the category of entropy. “The only distinction between [noise and information] is whether or not a purpose or code is entailed by the signs and intended through them. . . . [I]nformation can only be distinguished from noise by the relationship of the phenomenon in question to an intelligent agent”(74). Cybernetics, only measures change or surprise; it does not matter whether or not the receiver understands. In an organized signal, the unexpected—the disorganized—holds the most significance(65). Porush, following phenomenological philosophers, suggests that meaning rests primarily in context and interpretation; communication lies with the intelligent agent.

He notes the irony that people can only communicate by being inefficient. The paradox: "information is quantified in proportion to its variety only, but humans rely upon redundancy in order to perceive meaningful patterns in their communication with the world and each other"(59). In essence, our ability to understand information stems from our ability to understand patterns—patterns being generated by redundancy (non-information).

Feedback and Homeostasis

The problem of entropy and noise arises in the process of investigating feedback loops, the founding issue at work in cybernetics (recall Wiener's acknowledgement of Maxwell's article on ship governors). Wiener describes feedback mechanisms as follows: "when we desire a motion to follow a given pattern the difference between this pattern and the actually performed motion is used as a new input to cause the part regulated to move in such a way as to bring its motion closer to that given by the pattern" (*Cybernetics* 6). In other words, feedback systems relay commands and their action back and forth.

Wiener's interest in feedback loops developed while he worked to create an automated tracking device for shooting down German planes during the Second World War. Kittler calls cybernetics the "theory of the Second World War," suggesting that it was the use of computers to predict and guide weaponry that brought the military into a new era of command and control (259-60). Steve Heims emphasizes that feedback loops allow military planners to view people as parts of a system—humans as machines. He records

> the cycle involving feedback: information from a radar screen is processed to calculate adjustments on gun controls to improve aim; the effectiveness of the ad-

> justment is observed and communicated again via radar, and so on. If the calculations are automated, one is dealing with a self-steering device; if not, the whole system including the participating human beings can be viewed as a self-steering device. (Qtd in de Landa 43).

Feedback loops allow scientists to theorize and predict how systems will operate. They also reduce the status of the human operator to that of a part in the system. In fact Wiener and Vannevar Bush aimed at the reduction of human control when they built their tracking system—they reconceived the pilot as "servo-mechanism" (Mirowski 60).

Outside their immediate military applications, though, feedback loops had widespread ramifications for the understanding of communication and control. On a local level, feedback loops must govern any sort of automation process. Wiener describes that feedback "telltales" play a key role at railroad switching stations. Without them, signalmen would not know if the commands they had sent were carried out. "This is the mechanical equivalent of the repeating of orders in the navy, according to a code by which every subordinate, upon reception of an order, must repeat it back to his superior, to show that he has heard and understood it"(*Cybernetics* 96). Feedback enables cybernetic engineering work.

The concept of feedback loops also plays a significant role in the cybernetic understanding of culture. McLuhan argues that

> anybody who begins to examine patterns of automation finds that perfecting the individual machine by making it automatic involves "feedback." That means introducing an information loop or circuit. . . . Feedback is the end of the linearity that came into the Western world with the alphabet and the continuous forms of Euclidean space. (354)

Despite McLuhan's generally optimistic tone about the electronic age a dark cloud appears here, with the author reminding us that the likely network of all these automated machines demands "full understanding in advance of coming structural change"(355).

McLuhan believes the purpose of this "full understanding" conflicts with the traditional cyberneticist's understanding of feedback loops. For McLuhan, understanding the "coming structural change" works to help change along, to foreclose the more dangerous possibilities of increased communication and control. While Wiener would certainly agree with the sentiment, cybernetics researches feedback loops not to anticipate change, but to foreclose and control change. Indeed, feedback loops work to maintain homeostasis. Cyberneticists look to nature's homeostatic systems as models of complex, effective feedback. The animalian ability to maintain specific states of toxicity, temperature, and other life-necessary conditions provides a highly developed model from which cybernetics can draw inspiration (*Cybernetics* 114).

Academic Writing and Cybernetics

In many ways, the institution of academic writing functions much like a cybernetic system. If one considers scholars, publications, courses, and conferences as part of a single system (as Norbert Wiener and Vannevar Bush did with military applications), a clear system of feedback and homeostasis emerges:

Table 3-1: Academia as a cybernetic system

Element	**Feedback Mechanism**
Research	Publication provides various levels of response—peer reviewed journals and books are more brilliant "telltales."
Teaching	Students and peers fill out course evaluations.
Performance	The job search provides the first of several benchmarks. Promotion reviews follow, examining "telltales" as they go.

The vicious competition in the academic job market also ensures the efficiency of this system by providing "replacements" for "broken parts."

The most striking aspect of academic cybernetics is the system's homeostatic function. Recall an editor's response to *Understanding Media*: "seventy-five per cent of your material is new. A successful book cannot venture to be more than ten per cent

new" (4). Zachary Karabell floats a similar complaint, suggesting that academia functions like a medieval guild, spending so much of its time indoctrinating its members tradition that they have no choice but to reproduce those same traditions when they are in power. The conservatism Karabell and McLuhan lament provides homeostasis for the academic institution, protecting it against changes to its life-giving conditions.

Hermeneutics and Cybernetics

Cybernetics shares several characteristics with hermeneutic interpretation. Though most cyberneticians would disagree with such a comparison, the operative processes at work in hermeneutic interpretation relate closely to those at the root of cybernetics, particularly with regard to communication and information theory. In particular, both systems ground their operative metaphor in understanding, decoding, or discovering hidden messages.

In film studies, hermeneutic interpretation often consists of the writer leading the reader through an interpretation of a given film. David Bordwell describes the process quite thoroughly in *Making Meaning*. Bordwell notes four types of meanings critics can "construct" as they write about films. The first, the "*referential* meaning," explains the diegetic world of the film, as the critic perceives it. The "*explicit* meaning" is the "conceptual meaning or "point" to the . . . diegesis." Bordwell suggests that these first two are "usually considered "literal" meanings" that the work's authors intend to communicate (8). The third and fourth interpretative models are the "*implicit*" and the "*symptomatic*" meanings; each of these plays more subtly, and must be proven with a rhetorical strategies and evidence for the reader (8-9). In short, Bordwell suggests that writers doing interpretative criticism *construct* the meanings they reveal.

The process at work in the practice of interpretation itself is communication. The film scholar, having seen a film made collaboratively by a diverse body of craftsmen and artists, takes note of a variety of messages within the film. The s/he probably examines all four levels of meaning at work, aware of the "literal" meanings of the film and likely interested the "implicit" and "symptomatic" messages s/he finds. The scholar discovers these messages at various levels in the film, both obvious ("literal") and hidden. Interpretative critics, then, do not just read, but they work at of "revealing hidden, nonobvious meanings"(2), at de-coding, at cryptanalysis.

Cryptanalysis, the act of decoding communications, lies at the heart of cybernetics. During the Second World War, as burgeoning cyberneticians worked on anti-aircraft control devices, they wrestled with the problem of prediction (Wiener, *Cybernetics* 5). By re-conceiving the airplane and gunner as a single system, they re-casted "the prediction problem as one of extracting "signal" from "noise" in a communication channel . . ."(Mirowski 62). In other words, enemy aircraft became enemy signals, "scrambled" by the "noise" of evasive action. Engineers working in cybernetics became information theorists.

Both cyberneticians and hermeneutic scholars work from the premise that there is a message to be decoded. But cybernetics and hermeneutics also differ in their treatment of a key element: entropy. Bordwell argues against interpretative criticism by noting that critics finesse the elements of films that don't fit their thesis. He suggests that they develop hypotheses to make their cases, and then use a variety of institutionally-accepted rhetorical strategies to make "*recalcitrant data*" fit their argument (31-32). He also as-

serts that these scholars rely on inductive processes and heuristics, conditioning themselves to see evidence that helps their case and ignore evidence that does not (33).

In cybernetic terms, these scholars work to ignore the "noise" in the message. By focusing on the details of the film relevant to their argument, they decode the message of the film for their readers. The problem is that this understanding of information theory assumes that noise and signal are distinguishable; they may not be. The question of intention becomes one of the biggest challenges to interpretive hermeneutics. To put it bluntly, how do we know that our interpretation is what was *intended*?

New Critics eluded the problem of intention by means of the "Intentional Fallacy," a notion that close readings provide the *only* access to what the text says. Historical research, diaries, letters, interviews or other external material perpetuate the intentional fallacy. Since we cannot access the author's intention, we must only go by what the author said. While critics writing after New Criticism's apex criticized the ideological blindness of New Critical methods, the use of close readings remained, now supplemented by theoretical perspectives.

These new views of communication and interpretation work in the sort of relativism that Bordwell argues against. If the act of communication only acquires meaning based on its context, the objectivity of that act (a point-of-view essential for the answerable questions Bordwell posits) comes into question. Of course, the debate about objectivity has been held before; I only mention it here to highlight connections between the question of intention in information theory and its parallel question in interpretation.

But what if one were to think of the element of information in communication not in the terms Porush mentions above—in which the context of the signal determines its

validity—but rather in terms of surprise alone? Ray explains the central problem communication engineers face as one of

> . . . how to strike the balance between a message whose high degree of redundancy made it easy to understand (even when received through a network weakened by military attacks and jammed by deliberate "noise") and one whose high proportion of entropy (redundancy's antonym) filled it with information. At the poles lay the traps to avoid: the purely redundant message (perfectly understandable, but useless) and the purely entropic one (purely informative, but illegible). (*Avant Garde* 11)

Ray explains the continuum along which cyberneticists work. But he still assumes that the transmitter of the message is reliable and intentioned. What happens if we drop that assumption?

The Cybernetic method?

In *The Soft Machine*—a title he openly pilfers from Burroughs—Porush argues that the postmodern writers of the 1950s and 1960s, particularly William Burroughs and Kurt Vonnegut Jr., were influenced by cybernetics in their writing about technology. He writes, "Burroughs and Vonnegut combine cybernetic paranoia with the more general apocalyptic mythology of the period to create baldly didactic satires on the situation of technological civilization"(85). In essence, Porush suggests that the complex linkages and paranoid narratives of Vonnegut and Burroughs (and Pynchon) are explicitly constructed to explore the philosophical cultural implications of the rise of cybernetics.

Porush suggests that these authors see paranoia's all-encompassing certainty as one way to explore the ramifications of the cybernetics' totalism. They saw "paranoia as the natural response to a corrupt power and to an apocalyptic world"(106). Thus, when they wrote in a paranoid way, they were "resting the rise of totalitarian order and its concomitant control through deliberate randomization, the introduction of noise or en-

tropy"(103). Porush explains that, "To a paranoid, like a cyberneticist, everything is a message and nothing is neutral . . ."(107). For Porush, then, Burroughs and Vonnegut used paranoia to access the difficulties of cybernetics and explore them; the paranoid understands all noise as information.

Others have used paranoia in this way. Salvador Dali embraced paranoia as a way to understand the world in *How to Become Paranoia-Critical*. Like other Surrealist efforts to focus on details, Dali uses a single object (the Perpignan train station) as a clue that explains the entire Universe. He writes,

> Under the impulse of my paranoiac delirium, I have had attentive analyses of the monument made. . . . [S]tarting from my delirious impressions I will be able to set up a kind of seismographic system of the relationships of the universe with itself. The point is to bring total truth out of this microcosm of the universe. I am persuaded that the bible of the world is symbolically represented in the Perpignan station; I know this in my innermost self: all that is needed is to find the decoding key. (Qtd in Scholes 300)

Scholes, Comely, and Ulmer note that "Dali imitated the systematic associations particular to paranoid behavior, which he turned into an experimental method of research . . ."(298).[3] Dali's need for a "decoding key" to understand the station's clues resonates with the cryptanalytic processes of cybernetics. It seems remarkably prophetic, even, when one considers Wiener's explanation of cybernetics and nature: "Nature offers resistance to decoding, but it does not show ingenuity in finding new and undecipherable methods for jamming our communication with the outer world" (*Human* 36). Porush suggests that Vonnegut and Burroughs used paranoia to gather details in stories about protagonists seeking to decode the world.

Paranoia also functions as a key element in Frederic Jameson's understanding of conspiracy theory. In *The Geopolitical Aesthetic*, Jameson suggests that conspiracy film

helps culture with its project of cultural mapping, and does so using paranoid narratives that suggest connections between all details. These films offer

> the discovery that we are caught in a collective network without knowing it. . . . There are no longer any ontological hiding places of that kind: the conspiracy wins, if it does (as in *The Parallax View*), not because it has some special form of 'power' that the victims lack, but simply because it is collective and the victims, taken one by one in their isolation, are not. (66)

Conspiracy films allegorize communications media, but do so without the sort of didactic hope that Vonnegut has.

The prominence of cybernetics since the early 1950s suggests that a method attentive to cybernetics can illuminate new areas of knowledge about films. Some ground rules:

Table 3-2: Ground rules for writing cybernetically

1. Attend to cybernetic structures themselves. Pay attention to feedback loops, homeostatic structures, and media technology. Be sure to note cybernetic understanding of human-machine systems.
2. Information systems make no distinction between noise and information. Both are factors of surprise (vs. redundancy). Attend to both surprise and redundancy.
3. Though meaning is an issue of context, the paranoid assumes all signals to be significant. Porush asks, "in order for a message to make sense, must we consider the integrity of the source?" (98) The paranoid answer is *no*.

The final impetus for this method is "Primal Sound," an essay from 1919. In it, Rainer Maria Rilke proposes a ghoulish experiment touching on key elements of both Dali's and Wiener's work:

> As will be seen, what impressed itself on my memory most deeply was not the sound from the funnel but the markings traced on the cylinder; these made a most definite impression.
>
> I first became aware of this some fourteen or fifteen years after my school days were past. At that time I was attending the anatomy lectures in the Ecole des Beaux-Arts with considerable enthusiasm. . . .[M]y attention always reverted to the study of the skull, which seemed to me to constitute the utmost achievement, as it were, of which this chalky element was capable. . . . It was as a passing glance . . . which I suddenly checked in its course, making it exact and attentive. By candlelight—which is often so peculiarly alive and challenging—the coronal suture had become strikingly visible, and I knew at once what it reminded me of:

> one of those unforgotten grooves, which had been scratched in a little wax cylinder by the point of a bristle! . . .
>
> The coronal suture of the skull . . . has—let us assume—a certain similarity to the close wavy line which the needle of a phonograph engraves on the receiving, rotating cylinder of the apparatus. What if one changed the needle and directed it on its return journey along a tracing which was not derived from the graphic translation of sound but existed of itself naturally—well, to put it plainly, along the coronal suture, for example. What would happen? A sound would necessarily result, a series of sounds, music. . . .” (Qtd in Kittler 41)

Because cybernetics explores systems of communication and control, it can provide key metaphors for understanding film. In order to elude the expected message of hermeneutic readings, we must focus our decoding abilities not on the overt message, but on both message *and noise*. Examining, paranoiacally, all details directs analytic energy in new directions while remaining attentive to traditional methods; this plays the coronal suture instead of the grammaphonic groove. This chapter uses cybernetics and the paranoid method as a needle with which to play the primal sound of two films.

Two

Human language functions via both redundancy and context; it relies heavily on both to convey meaning. Porush describes it thus, “In order to get meaning from language we must leap between the logic of what is presented and the meaningful whole of our personal knowledge by elaborating on our uncertainty”(81). In other words, knowledge of our context enables us to decode language as we hear it. No communicative situation relies more heavily on personal knowledge and uncertainty than idiom.

The idioms at work in *Titanic* create an interesting network of linguistically incomprehensible phrases. Gif Rogers makes the most use of strange lingo. The tennis player Indiana carries with him simultaneously middle-class America—“everybody thinks it’s Princeton, but it’s Purdue!”—and yet easily mingles with the upper class.

Given our paranoid premise that all elements of these films signify, I will use the film's idioms to structure the remainder of this piece.

"It's a mathematical certainty."

Redundancy. Thomas Andrews, the ship's designer and the first to mourn her, assures *A Night to Remember*'s Captain Smith that the ship will founder; *Titanic* features a similar sequence, but denies Andrews the prominent role he had in the later film. *Night*'s Andrews examines the plans of the ship with absolute confidence. He swiftly calculates the amount of time left and begins moping around the deck. The designer's declaration of the ship's doom rivals the confidence with which J. Bruce Ismay remarks "But this ship can't sink!"

Both films make a point of acknowledging the way the passengers responded to the prospect of sinking. While *A Night to Remember* scolds viewers for our overconfidence, neither film maps false lessons onto real events. Indeed, "the sinking rocked the British establishment complacent in the belief that nature herself could be tamed"(Hyslop 4). Both films affirm *The Onion*'s assessment of the moral lesson in the disaster (that the Titanic[4] represents the folly of man's hubris about nature). But the morals say more than just "do not trust too strongly in man's ability to defeat nature." Andrews' invocation of mathematical certainty poses direct contradiction to cybernetics' understanding of physics as *probability*, rather than certainty. The entropy at the heart of cybernetics seems to haunt these films.[5]

"I'd better hurry and get my blue suit pressed."

Redundancy. Gif's excited declaration about his dancing clothes reminds me of the officer uniforms in the films. Though shot in black-and-white, one can assume the

officers' uniforms are blue. Gif's excitement about his blue suit might be an oblique reference to his own impending need for an officer's uniform—the Great War waits just around the corner—or to the blue suits the men in the audience had just removed.

In "The Taylorisation of Intellectual Work," Mike Cooley suggests that industrial management techniques are neither the best nor the most humane. Instead, he suggests that "management is not a skill or craft or a profession but a command relationship, a sort of bad habit which we have inherited from the army and the church"(57). The relationship between military command and civilian authority evinces itself nowhere more strongly than on a passenger ship. The clear structure of the shipboard command hierarchy (as well as the necessity for rule outside of national waters) explicitly relies on military roots.

Wiener suggests that ship command structures function as a cybernetic system. He writes that mechanical telltales on railroads are the "mechanical equivalent of the repeating of orders in the navy, according to a code by which every subordinate, upon the reception of an order, must repeat it back to his superior, to show that he has heard and understood it"(96). This repetition creates a cybernetic feedback loop, assuring those in control that the device (ship) is acting properly. Both films make explicit use of this military practice, showing sailors loudly repeating the orders they have been given.

"You don't understand the corporate mind."

Surprise. The narrative of Hollywood's *Titanic* could be described as much more concerned with the relationships among a few characters than with the disaster itself. As should be evident, *A Night to Remember* takes much more care to match its details to the historical record. Indeed, the tag line of the British film is "The greatest sea drama in liv-

ing memory told as it really happened!"("Night"). Sturges' comment to Julia about the corporate mind might be a prescient comment to the creators of *Night* who explicitly bill their film as being accurate (and thus impugn *Titanic* as fiction).

However, *Titanic*'s friendly removal of J. Bruce Ismay (the White Star executive given heavy blame in *A Night to Remember*) puts the film's thinking about corporations in a different light. By giving control over the speed of the ship to the captain as it does, the film posits the ship as a system maintaining homeostatic equilibrium. Since Hollywood's interest in rationalized labor could certainly benefit from increased communication and control, Hollywood film distributes disaster evenly and places blame nowhere. Like a smoothly functioning cybernetic system, the film distributes blame (entropy?) throughout. One might also suggest that Sturges and the friend he recruits to help the steerage passengers act as intelligent agents for the corporate cybernetic system. They seek areas of disequilibrium and balance them—calming their loved ones, helping the steerage passengers, and comforting the discomforted.

The idea of the "corporate mind" also provides a decoding key for many of the differences between the two films:

Table 3-3: Corporate mind decodes Titanic movies

Event	***Titanic***	***A Night to Remember***
Ice warnings	Got through, slightly misunderstood	Some got lost, others did not get recorded
Steerage passengers	Did not understand the purser, refuse to come up	Are blocked from coming up to the deck
Lifeboat shortage	Men were sad, but calm; a few acted cowardly	Some were calm, most were panicked; many acted cowardly
Rescue attempt	Made by the closest ship	Closest ship did not help, mostly through ignorance
Crowd at the end	Calm, sang "Nearer my God to Thee;" almost all men	Panicked, shown drowning some women and children

The differences between these films almost always aid the corporate "spin" of the disaster, even 40 years after the fact. The shifting of the blame from people to accident, the calm quiet with which the men—and only men—faced their death, and the absence of any mention of the Californian make *Titanic* an excellent primer in the corporate mind. The relationship of the corporate mindset to automation and cybernetics in the 1950s makes it difficult to ignore the dominant metaphor of the Titanic story. The notion above, that the corporate mindset pushes the film in a direction beneficial to its interests, is somewhat frightening because it makes excuses for the metaphoric failure of technology. The birth of cybernetics seems like an odd moment to hedge one's bets.

"You're very very unique"

Surprise. When Richard Sturges and his friend charge down the stairs to find his steerage family, they are confronted with a strange sight. One of the stewards stands on the staircase (in the same spot the accordion player stood in an earlier sequence), instructing the passengers that they need go above deck. The passengers are standing in small groups, mostly without life vests. When Richard scolds the steward for letting the people stay in the steerage area, the steward protests, "But Mr. Sturges, they won't go up on deck. They don't understand!" Sturges intervenes and grabs one of the children from the family he is guarding, bringing it upstairs with the family trailing behind. The other rich man stays behind to try his hand at Italian.

This scene underscores *Titanic*'s emphasis on proper language. Gif Rogers and the priest both speak articulately, despite Gif's continual idiomizing. The drunken priest corrects himself when he uses *very* with *unique*. He does so despite the fact that the change does not alter the meaning of what he said to Julia. But what of the people who

do not speak properly? The Molly Brown character crosses borders here, able to communicate with her fellow first-class passengers (because of the money?), but still retaining her indelicate accent.

The steerage passengers do not have it nearly so well. The film relegates them not just to the steerage bunks, but to the ranks of the uncivilized. Of course, Sturges' snobbery at the beginning of the film, when he tells the man from steerage to "go into one of your tribal huddles and convince your wife," intends to show more about Sturges' character than about the Basques. On the other hand, the family falls victim to the same language-paralysis as the rest of the steerage passengers at the end of the film.

The "tribal huddle" comment also brings to mind the "hottest jig the kids do"—the "Navajo Rag." The song, filled with the most droll of Native American stereotypes and danced to a stereotypical beat, draws an unusual connection to the tribality that Sturges saw in the steerage passengers. When Julia mentions the song, she explains that she did not dance to it because she did not know how—the other girls "seemed to bounce automatically." Indeed, when Gif claps and sings the song, he teaches Julia the dance very quickly—she moves "automatically" too. What is this connection between communal activity and tribality? Does it oppose literate subjectivity (with its concomitant attention to detail of grammar)?

"The band's slicker than beets!"

Redundancy. Both films embrace one of the most enduring legends of the Titanic disaster, that of the heroic ship band, playing as the ship sank beneath their feet. While eyewitness accounts generally agree that several of the ship's musicians were playing during the hours after the collision, most agree that they stopped about thirty minutes be-

fore the ship sank (Lynch 114). Given the ubiquity of the legend, though, it is not surprising that both films show the band playing throughout the disaster to keep the passengers calm. Surprisingly, *Titanic* featured an entirely fictional band. *A Night to Remember*'s orchestra has five or six men playing various string instruments. This fits the historical record: "The ship actually had two small string ensembles"(114). *Titanic*, on the other hand, features a brass quintet instead. Why?

Gif Rogers rated that the band "slicker than beets" because it played, among other things, "the hottest jig the kids do!" While *A Night to Remember* shows us that a stringed instrument can certainly play a jig, the blare of brass fits more closely with the all-American dance steps Gif would teach Annette later. Brass instruments are also wind-driven, and thus physically resemble (in miniature) the steam-vent in the Titanic's stack. *A Night to Remember* punctuated the ship's foundering with a regular blast from the steam vent, explained in the narrative as a way to keep the boilers from exploding. Since *Titanic* did not give overt representation to the literal letting-off-of-steam that *A Night to Remember* did, *Titanic* needed a metonymic reminder of the impending explosion of the boilers. Oddly enough, it was *Titanic* that explicitly showed the boilers exploding: the one technical element that Hollywood's film did more accurately than Britain's.

The presence of wind instruments on the ship (brass in *Titanic* and the steam-vent in *Night*) also evokes the pipe organ. Neal Stephenson suggests, in *Cryptonomicon*, that the pipe organ serves as an important conceptual ancestor to the digital computer, as its combination of valves and stops makes it a model of a finite-state machine.

“Why do the British find it necessary to announce dinner like a cavalry charge?”

Redundancy. This line, featured in both films, occurs in response to a steward’s brash horn. No gong or bell here, the steward stands by the door to the dining room and blasts his trumpet. In *Titanic*, Richard responds to the trumpet call with an angry shrug and the memorable line; in *A Night to Remember*, Thelma Ritter’s Molly Brown character, Maude Young, grumbles about it. This shift tells. Young epitomizes gauche Americanism. Clifton Webb’s effete accent and presentation (not to mention the character’s dislike of Mackinaw, Michigan) mark him as European in spirit, if not nationality.

The shift of the line to the Brown character serves two purposes. The film’s Britishness, declared so boldly in the end titles (PRODUCED IN LONDON), implies that the film-makers wanted to downplay the line. Young’s *nouveau-riche* indelicacy displaces Sturges’ snobbery. Narratively, the shift also sets the ground for the boisterous activity of Ms. Young aboard her lifeboat, activity that was well-documented in the popular press at the time of the accident. Incidentally, Molly Brown gained fame after the event as “lady president of the committee of survivors” (Bryceson 286) and was the subject of a pseudo-biographical musical made in the 1960’s.

But the shift of the line serves another purpose as well. It functions as an unconscious renunciation of the overly didactic nature of the narrative. Like the slips Freud noticed in his patients’ dialogue, Maude Young makes unintentional noise that countermands the film’s overt preaching. It is a surfacing of the film’s unconscious, an admission by the filmmakers that Lightoller’s heavy-handed speech at the end of the film blows a cavalry charge they cannot resist.

"You can trail at a respectable distance."

In 1997, James Cameron released *Titanic.* Like Sturges' daughter, who did not want to be seen entering the dining room with her little brother, the Cameron produced his film nearly forty years after *A Night to Remember*. While the filmmakers worked very hard to make the film as "realistic" as possible, the work clearly derives from the two 1950s films. In fact, with its attention to the detail of the sinking (*A Night to Remember*) and its fictional plot (*Titanic*), Cameron's film combines the two (its 194 minutes are only 27 fewer than the other two films combined):

Table 3-4: Elements in *Titanic* (1997)

Event shown in *Titanic* (1997)	**From which film?**	**Real?**
Drunken sailor survives cold water	*A Night to Remember*	Yes
Cavalry charge dinner call	Both	Unknown
Poor guy teaches honest girl to jig	*Titanic*	Unlikely
Man in blankets sneaks onto lifeboat	Both	Yes

Cameron included many other elements from both historical record and from the films. One of the most dramatic moments in the recent film does not appear in the other two. Just before the ship sinks, the weight of the bow rends the ship in two, providing a few dramatic moments before the final plunge. Despite eyewitness accounts attesting to the split, both of the earlier films endorsed the "exploding boilers" theory rather than the (at the time) unproven idea that the ship broke in two. Why do the films from the fifties refuse to break the ship?

"I don't think the board of trade regulations visualized this situation"

Redundancy. Both *A Night to Remember* and *Titanic* explicitly address the ship's shortage of lifeboats. However, while *Titanic* seems to acknowledge no one as to blame for the problem—Captain Smith acquires a blank look of sadness when he learns that

there are not enough lifeboats—*A Night to Remember* explicitly blames the Board of Trade Regulations. Is this blame accurately placed? It seems to be. Lynch writes,

> Outdated British Board of Trade regulations for vessels of over 10,000 tons required a minimum of 16 lifeboats with a capacity of 5,500 cubic feet plus rafts and floats equal to 75 percent of the lifeboats' capacity. This meant the 46,328-ton Titanic, which could carry a total of 3,511 passengers and crew, was required to carry boats for only 962 people. In fact, White Star had exceeded the regulations by including 4 collapsible boats, making room for 1178. (Lynch 102).

Why did the regulations allow for such a wide gap in passenger safety? The passengers and ship were, to industry and trade, a single system. They functioned like the automated servo-mechanism of the pilot-plane that Wiener would conceive during the Second World War.

This conception of ship-and-passengers as a single unit that would cross, disgorge, re-load, then cross again puts the board of trade regulations in new light. The regulatory use of ship weight as the determining factor in lifeboat requirements makes sense only in two instances: first, that the corporations (see "corporate mind") had strong influence on the board of trade regulations or second, that the board of trade's regulations work cybernetically.

Given the structural similarity between Hollywood and Industry, Hollywood's *Titanic* must have been structured to defend the shipping industry. Hollywood's vertical integration—intact until the Paramount decision in 1958—functions much like the integration of American railroad interests with the shipping companies of North America. In fact, White Star was part of the conglomerate J.P. Morgan had created. International Mercantile Marine was "a huge American owned shipping syndicate that would dominate the Atlantic, and connect it with the US railroad and lake steamer system"(Hyslop 14); J. Bruce Ismay, publicly vilified over the catastrophe (both at the time and in *A Night to*

Remember), served as a managing director of IMM. In addition, Wiener suggests a monetary connection between the leaders of Industry (entertainment or otherwise). He writes that the means of communication are restricted by capital forces. ". . . [T]he fact [is] that these means are in the hands of a very limited class of wealthy men, and thus naturally express the opinions of that class . . ." (*Cybernetics* 161). The opening sequences of the films make clear from the start who to blame for the disaster.

Titanic, in defense of industry and human hubris, begins with a giant piece of ice cleaving itself from a vast ice cliff, somewhere in the North. The cracking and booming of the soundtrack, along with the slow-motion rise and fall of the ice give it a majestic, ominous air. The sequence screams doom and blames nature for it. One might even suggest that the ship stumbles into the ice-berg's path—a hapless hit-and-run victim. The opening of *A Night to Remember* could not be more distinct. The British film opens with the shipyard dedication of the Titanic, complete with fetishistic shots of the hull, the blocks and rails it slides upon, and an image of its giant propeller sliding into the water. The sequence anticipates the similar opening sequence of *Dr. Strangelove*. The mid-air refueling sequence in Kubrick's film admires hardware in a similar way—though Kubrick makes his satire explicit with an humorous pop-song soundtrack.

Our cybernetic analysis urges us to attend to these differences. In this case, the opening sequence provides one set of decoding keys for the entire films.

"All roads lead to Rome"

Surprise. In *A Night to Remember*, one of the crewmen gives his seat on a lifeboat to one of the passengers. He retires to his cabin, where he takes out a bottle and methodically gets drunk. While we see similar characters in *Titanic*, there are none so

clearly delineated. The character appears from time to time throughout the narrative, providing a little comic relief in a comment or a look. His presence, though, is not entirely fictional; the character seems to have been based on Chief Baker Charles Joughin, who "owed his survival to the considerable amount of alcohol he had consumed before the sinking, which had functioned as an effective antifreeze"(Lynch 152). At one point in the film, as some steerage passengers are looking for a way above decks, they stumble upon the drunkard. He answers their question with "Go whichever way you like. All roads lead to Rome."

In *A Night to Remember*, though, all roads—indeed, all transportation—leads not to Rome, but to the Titanic. The film takes explicit care to show every kind of transportation imaginable en-route to the ship. Among the travelers at the beginning of the film are: Lightoller traveling by train; the Duff Gordons leaving their stately manor in a procession of valet-drawn carriages; the Irish (Scotch? Welsh?) immigrants walking alongside their single-horse cart; and the young bride and groom riding from their wedding to the docks in a chauffeur-driven car. Perhaps the multiple modes of transport suggest the importance of the final destination; the film substitutes a vessel for a destination. The Titanic is a city, a microcosm of culture like Dali's train station.

The importance of roads to human civilization cannot be overestimated. McLuhan suggests that the development of cities ties to the construction of roads and the trade they allow. These cities enable the division of labor and specialization of skill (enabling a man like Joughin to become a Chief Baker) but also increase intensity and competition of those skills. McLuhan suggests that these increased "irritations" spurred man to produce

> his greatest inventions as counter-irritants. These inventions were . . . [a] means of concentrated toil, by which he hoped to neutralize distress. The Greek word *ponos*, or "toil," was a term used by Hippocrates, the father of medicine, to describe the fight of the body in disease. Today this idea is called *homeostasis*. . . . (98)

Homeostasis thus emerges as a process by which cities keep their systems in check. So how does the system of the ship, a city unto itself, maintain its own equilibrium?

"What's the use, no one's listening."

Surprise. One of the most glaring charges *A Night to Remember* makes is that the communication system set up in the North Atlantic, and those human servo-mechanisms assigned to handle it, was vastly inadequate for the task of protecting the Titanic's passengers. A multitude of human errors permeate the film: the busy radio-man aboard the Titanic "shushed" the Californian's radioman and buried one of the ice warnings; the radioman aboard the Californian slept through the night while the Titanic foundered; the crew aboard the Californian, though in sight of the sinking liner, failed to recognize numerous distress signals or to come to the rescue.

The question of transmission and integrity become key here. The crewmen on the Titanic fail to understand the message in the Morse lamp from the Californian.[6] Similarly, the men on the Californian mistake distress rockets for "company signals." Wiener stresses that communication relies on communal information (*Cybernetics* 158) and, thus, on context. The inability of crewmen to "hear" the messages from the other ships highlights the gaps in the cybernetic organization of the North Atlantic (gaps which would be fixed by the legal inquiries in America and Britain after the tragedy).

The moral at work in *A Night to Remember* takes *The Onion*'s view that the Titanic symbolizes man's hubris. Another translation notes the cybernetic traces haunting

these films and views them as a specific message about the cybernetic worldview and the 1950's A-bomb culture. Whichever translation one chooses, the musician's lament that no one is listening clearly functions self-referentially; the audience needs to listen to its art, not just its unsinkable science.

"Because we were so *sure*. I don't think I'll ever feel sure again, about anything."

A Night to Remember's Lightoller mourns the ship in the early-morning light at the end of the film. This didacticism, which points fingers at many people and organizations, also reminds us of the uncertainty principle haunting science and technology of the 1950s. Cybernetics, operating under the opinion that, ultimately, we are "shipwrecked passengers on a doomed planet," can only work in probability now. The idea that one could be certain might be played off as hubris, but it also might be understanding. Ironically, cybernetics provides methods for control of cybernetic devices, be they mechanical, organic, or both. Wiener's humanism aside, there exists immense potential for disaster in cybernetic science—a message clearly at work in *A Night to Remember*. In a strange way, though, the film alleviates us of guilt for the impending train wreck. The reassurance to Lightoller than he was merely a functionary in a failing system rings hollow—the film asks whether we really want a system in which the greatest comfort one can receive is that "You did all that was humanly possible."

Notes

[1] *Titanic* places a family drama on a sinking ship. The majority of the narrative occurs before the ship hits the ice berg. Richard Sturges and his wife Julia are at odds about Julia's plan to remove their children from the European social circuit and raise them in Michigan. Sturges sneaks aboard the ship by buying a steerage ticket from the father of a Basque family moving to California. A secondary storyline develops between collegian Gif Rogers and the Sturges' eldest daughter, Annette.

A Night to Remember is much less melodramatic, spending less time on any one or two characters and more time on the events surrounding the sinking of the ship. The film details the numerous mistakes made by radio operators and ships crew before the colli-

sion and the miscommunications between the Titanic and the Californian during the hours while it sank.

[2] *The Onion* is a weekly newspaper that satirizes news media. Its stories lampoon regular news media. *Our Dumb Century* compiles imagined headlines *The Onion* would have published between throughout the 20th century.

[3] Ray also shows interest in Dali's method. In *The Avant Garde Finds Andy Hardy*, Ray relates Breton's use of details in *Nadja* to Dali's paranoia-critical method. Ray explains how Dali's use of a paranoiac's attention to detail reveals subconscious emotive qualities in the painting that are later revealed to be accurate. (78-9)

[4] Standard rules of punctuation dictate that ship names should be italicized. However, since the ship's name matches the title of a movie, I've chosen to leave the ship's name in plain text and the film's name in italics. Thus, *Titanic* refers to one of the two films by that name and Titanic refers to the ship itself. For consistency's sake, I shall not italicize the other ships mentioned herein.

[5] More explicit in its use of entropy, *Jurassic Park* teaches many of the same lessons about humankind's inability to control nature.

[6] Until the Titanic wreck was found in 1985, it was commonly thought that the ship visible from the Titanic's deck was the Californian, as *A Night to Remember* suggests. However, when the wreck was found, it became evident that the Titanic's final reported position was mistaken and it was unlikely that the Californian was the ship visible some ten miles from the Titanic. Lynch explains the mystery: "[A]t least one other ship was in the vicinity of the Titanic that night, probably somewhere between her and the Californian. Certainly the sea was full of vessels. The next morning, several were visible while the Carpathia picked up survivors." (191)

CHAPTER 4
THE A.I. "FRAME PROBLEM"

> I love stuff like this. Over the weekend world chess champion Garry Kasparov was defeated by the IBM computer Deep Blue. Deep Blue defeated Garry Kasparov. In a related story earlier today the New York Mets were defeated by a microwave oven. (Yasser Seirawan IBM)

When Deep Blue defeated Gary Kasparov in 1997, the grandmaster's loss was hailed by many as the failure of man against machine. Despite the somewhat apocalyptic tone taken by many media outlets, Deep Blue did not fulfill the ambitious goals Artificial Intelligence researchers have pursued in the last half-century; in fact, the two strains of rhetoric in the match coverage draw two distinctly different pictures of Artificial Intelligence (AI) and scientific progress toward it. Both these views—the apocalyptic and the redemptive—ultimately re-assert the value of the human over the machine. Most academics understand science fiction AI in similarly humanistic terms; AI in films and novels becomes either broad allegory for "man vs. machine" or a more specific caution against over-indulging our technocratic tendencies. Even in utopian texts, scholars see AI as an exploration of the human rather than the machine.

In previous chapters, I have explored how different technologies at the crossroads of computers, cinema, and war provide alternate methods for writing about cinema. This chapter approaches its "method from technology" by suggesting that traditional approaches to AI research mirror traditional approaches to cinema studies and that, analogically, recent productive approaches to AI will provide new ways to understand cinema.

Framing

> . . . "perceiving the world," involves intelligence in general: learning from experience, being able to frame problem-solving strategies at different levels of complexity, developing a primitive form of "common sense" to disregard irrelevant details, having access to knowledge about the world to ground inductive inferences and so on. (de Landa 215)

One of the most difficult problems an artificial intelligence researcher faces is getting the computer to make basic assumptions and draw common-sense conclusions based on the real world. Despite the ease with which computers can perform incredibly complex tasks, the "naïve physics" available to very young children are extraordinarily difficult to program. In short, AI programs have a difficult time with the multitude of variables involved in real-world situations. Researchers have dubbed this difficulty the "frame problem."

The frame problem is essentially one of context. Daniel C. Dennett explains the frame problem as follows,

> One utterly central—if not defining—feature of an intelligent being is that it can 'look before it leaps.' Better, it can *think* before it leaps. Intelligence is (at least partly) a matter of using well what you know—but for what? For improving the fidelity of your expectations about what is going to happen next, for planning, for considering courses of action, for framing further hypotheses with the aim of increasing the knowledge you will use in the future, so that you can preserve yourself, by letting your hypotheses die in your stead. (150)

Computers only know what we tell them about the world. This means that anything the computer might need to know has to be installed in its memory. The computer also needs an efficient method to retrieve that information. Dennett explains, "The task facing the AI researcher appears to be designing a system that can plan by using well-selected elements from its store of knowledge about the world it operates in"(155). In other words, the AI researcher needs to program common sense. But how?

Marvin Minsky, a particularly optimistic AI researcher, proposed a system of "Frames" through which the computer uses patterns to deal with normal situations, saving time so it can concentrate on exceptional situations. John Hogan describes Minsky's frames,

> A frame is a kind of skeleton concept, like an application form with a lot of blank spaces needing to be filled in. Minsky referred to these as *terminals.* A terminal is a connection point for attaching further information. . . . The information to attach to a terminal can come from all kinds of sources; particularly noteworthy, it could be another frame that comes complete with its own set of terminals. . . . Thus the whole system is hierarchical (263).

The artificial intelligence program refers to a series of interconnected templates that provide a background—or "frame"—of information for the program. Many researchers were excited about the possibilities Minsky's frames opened up.

Frames and Literary Criticism

Minsky's hypothetical frame system mirrors the standard literate model for film studies, particularly since the 1960s. Hermeneutic close readings, operating either explicitly or implicitly from theoretical perspectives, support their arguments with ideological frameworks or positions. These perspectives parallel Minsky's frames for AI programs. This chapter works on the analogy that the film scholar, his/her film, and the theory correspond to the AI program, its database, and its frame.

The tensions film scholars place on interpretive criticism also fit this analogy. David Bordwell argues that interpretation relies too much on templates. He suggests that film critics work by theory first, picking and choosing the facts they will use based on the frame they use. He writes, "To the same textual element, different critics assign not only different meanings but also different *sorts* of meaning"(10). Bordwell dislikes interpretive criticism because its 'truth' is manipulated by its critics' frames. This objection mir-

rors one of the problems with Minsky's frame solution for AI: the frame limits the program's scope, corrupting the program's interaction with the world.

Robert Ray also points to "template film studies" as a cause of the field's stagnation. However, his response opposes Bordwell's call for "answerable questions." Ray situates this opposition in the context of the classical and the baroque.

> In effect, classicism represents normal science, the implementation of ideas whose revolutionary formulations typically involve baroque strategies: new metaphors ("survival of the fittest"), refocused attention (from the cause of biological varieties to their selection), interdisciplinary borrowing (see the recent merger of biology and electronics). The baroque revives when the effectiveness of a particular classicism begins to wane. What gets abandoned is not knowledge *tout court*, but classicism's insistence on a single investigative method. (*How* 33)

The baroque and classicism are interconnected and cyclical, feeding and opposing one another. Ray suggests that Bordwell's call for "historical poetics" takes the classicist stance, invoking scientific empiricism in the face of the baroque's "style."

The direction Ray suggests for film studies highlights another problem with the AI frames solution. Following Barthes (who follows Mallarmé) in "yield[ing] the initiative to words," Ray invokes a tactic that avoids the "classicism" of Bordwell's study in favor of the "baroque"(51); yielding to words leads to *intuition* as research practice. But intuition is the *last* thing an AI using templates can achieve. Because its world is defined by the templates it uses (however deeply nested they may be), it cannot make choices unless they are explicitly outlined by those templates; it can *only* make choices and take action based on its working frame.

Artificial Intelligence in Cinema

Early depictions of artificial intelligence in science-fiction cinema tend to be interpreted through two traditional frames. The first is the mindless automaton—a large bit of clockwork that moves about under its own steam but has mind of its own. Many of the

robots of the 1950s come to mind—Robbie (*Forbidden Planet*), the evil Maria robot (*Metropolis*), or Gort (*The Day the Earth Stood Still*). The second category is the intelligent creation gone bad. Dr. Frankenstein's monster or HAL 9000 (*2001: A Space Odyssey*) might be members in this category.

In both cases, these depictions of artificial intelligence tend to be examined not in terms of technology, but as *allegory* for technology. Susanna Hornig, for instance, argues that AI in these films reflects "popular fears that unchecked technological growth can have ominous consequences. . . . Technology can erode, as well as enhance, self-determination . . ."(207-8). Her position is not an uncommon one. This commonality seems particularly fitting given the fact that in order to depict such AI, filmmakers and novelists often ignore practicalities of technology in favor of aesthetic description. Thus, most allegorical exploration of science-fiction AI uses one of a limited number of frames.

The most common frame is that of "Man versus Machine." For instance, in Donald Lloyd's "Renegade Robots and Hard-Wired Heroes," Lloyd uses the frame of "Man versus Machine" to examine the meanings at play in *Terminator.* Lloyd argues that *Terminator* elaborates on the *Frankenstein* myth, in which humankind is slowly mechanized while machines are humanized. (Made evident in the move from the stiff, unsympathetic monster in *Frankenstein* to the overly-sympathetic friendly monster in *The Bride of Frankenstein.*) Lloyd also explores the passive dangers of technology and the question of integratng technology into the body. With all three questions, though, he focuses on the issue of ". . . the mechanization of the human and the humanization of the machine . . ."(227).

Another common frame of analysis might be called "the Man/Machine Border." Where the "Man versus Machine" frame explores the battle between humankind and its technology, this alternate frame explores questions of humanity itself. Films such as *Blade Runner* and *2001* are often considered through questions about the 'essence of humanity.' In Philip K. Dick's fiction, "the distinction between human and android produces an ontology grounded in *morality* and not *biology* . . ." (Bukatman 248). Some cultural theorists—like Baudrillard and Haraway—have even explored this boundary with their own science-fictional writings. Jay Boylan's article about *2001*—which argues that Hal, the ship's intelligent navigation computer, tries to kill the humans before they reach Jupiter to keep them from evolving *past* the need for tools—also uses this frame.

Yet despite the rich readings and discourse drawn from these frames, they still do not engage with the AI in these films *as AI*. Instead, they see AI as allegory for something else. Perhaps by using an understanding of new approaches to AI (and a related field, Artificial Life (AL)) we can find new ways to write about AI in cinema.

Games

Using an artificial intelligence program to play games (like Chess or Checkers) has been a part of research in that field since Charles Babbage contemplated his analytical engine in the 19th Century. Despite their long pedigree, only recently have the attempts to generate champion-level machines reached fruition.

The programmers commonly teach computers to play games by considering each possible move and choosing the best one. This strategy, dubbed "brute force," works splendidly for games with limited outcomes, such as Tic-Tac-Toe. Since only 126 possible outcomes for Tic-Tac-Toe games exist, a computer program can scan through each

choice and make the optimal move (Rapoport 45). However, The number of spaces and pieces involved in more complex games like Chess (or even Checkers) reveal the impracticality of the brute force strategy; the number of positions and strategies quickly becomes inconceivable as the game progresses. Hogan writes about Checkers, ". . . a machine capable of analyzing a billion checkers positions a second would take something like 2^{38} centuries to complete an exhaustive search. . . . Yet checkers is played on only half the board. [The] 10^{120} for the number of possible chess games makes the above figure insignificant . . ."(110). These vast numbers made the brute force method impractical. (An AI's inability to easily dismiss moves out of hand reveal one place where the frame solution might help.)

Some programmers have attempted to surpass this problem by means of "machine learning." Arthur Samuels, whose learning Checkers machine held the "machine checkers" title for sixteen years, devised a two-tiered learning system for his program. The first tier was a method of rote learning. The program 'remembered' all of its previous positions and evaluations, and could call forth the information when necessary. Thus, when it encountered a position it had already seen, it could automatically 'deepen' its search by including the data it had gathered before. The second tier enabled generalization by which the program modified "its own evaluation function" (114-5).

Despite Samuels' advances in learning systems, the Chess world came to be dominated by another kind of program. Hogan writes,

> Although employing [a] . . . method to prune out the more extreme possibilities, along with a mechanism for recognizing repeated positions, the philosophy of the redesigned system . . . was basically to exploit the faster processing speeds and larger memories that were becoming available. . . . [The new program] was eventually unseated when its own philosophy was taken a stage further and turned back upon it (125-7).

This ‘quick and dirty’ program style would stay at the center of the computer-chess world, making use of faster-and-faster processors to increase its brute strength.

Brute Force Research

The analogy between film scholarship and AI research continues to hold with the notion of brute force. In “The Bordwell Regime and the Stakes of Knowledge,” Ray suggests that as the baroque challenges classicism’s claim to objectivity, classicists resort to their “second line of defense, the demand for coverage” (*How* 54). In recent years, this demand has become more difficult to satisfy given the incredible volume of work in any given field. Nonetheless, Bordwell’s call for answerable questions, “the study of how, in determinate circumstances, films are put together” (266) restricts the scope of the field, demanding depth (coverage) from its scholars.

Indeed, the field of film studies can be equated with the strongest of the “brute force” machines, which mimic the human brain, structurally. Friedrich Kittler describes the brain’s structural advantage over a single computer,

> The computer and the brain are functionally compatible, but not in terms of their schematics. . . . [E]ven if . . . the neural, but not the hormonal, conduits operate according to a digital model, their information flow is still five thousand times slower than that of computers. The brain, however, compensates for this loss of transmission through the parallel processing of whole sets of data. . . . (249)

The use of this process in computers, though not nearly as developed as in the human brain, has been introduced into game-playing computers to amplify the “brute force” method. I explore parallel processing more thoroughly in the concluding chapter of this project, but for the moment consider this analogy: *the machine/discipline functions by dividing its task into numerous smaller tasks which can be tackled by individual proces-*

sors/scholars. Of course, as Ray points out, for this analogy to hold the discipline has to move in *one* direction, seeking *one* answer at a time.

Deep Blue and "The A.I. Effect"

'Quick and dirty' AI chess machines find their exemplar in IBM's Deep Blue, the follow-up to Deep Thought. Deep Blue runs 256 processors, each of which can analyze 2-3 million positions per second (Hogan 135). After losing its first match with Gary Kasparov in 1996, it surprised the world by defeating him in 1997. Despite the multitude of processors in Deep Blue, the improvement made between matches was not in searching algorithms or speed, but in evaluation routines.

Deep Blue's victory rang, for some, the metaphoric death knell for humankind. However, many reporters (not to mention the IBM Deep Blue team itself) engaged in what Hogan calls "the AI effect." He explains,

> At the outset of a project, the goal is to entice a performance from machines in some designated area that everyone agrees would require "intelligence" if done by a human. . . . If [the project] succeeds . . . the subject is dismissed as "not really that intelligent after all" (129).

In other words, the media demystifies the "Artificial Intelligence," exposing it as just "clever programming." Giorgio C. Buttazzo puts it another way: ". . . we can say that Deep Blue plays chess in an intelligent way, but we can also claim that it does not understand the meaning of its moves . . ."(48).

The "AI effect" countered the dominant image of the Deep Blue/ Kasparov match presented by popular media. In particular, it reduced the amount of tension placed on the human/machine competition. IBM materials prefer to stress that a team of designers made Deep Blue, strongly contrasting *Time* magazine's 1997 pre-match article that anthropomorphized Deep Blue as "the infamous chess program that one year ago threw a

stunning uppercut to human self-esteem" and Kasparov as the man who was able to "save mankind" (Krantz).

After the computer won, though Kasparov himself continued to use heroic rhetoric ("I also think IBM owes me, and all mankind, a rematch"), most everyone else fell in behind "the AI Effect." For instance, Michael Castelluccio concentrates on the useful side effects of the "evolving experiment in computerized problem solving," rather than continuing to use the apocalyptic language of the pre-match articles. The IBM team stressed the man-made nature of the computer. "'The machine is just a machine to us,' says team leader C.J. Tan. 'People give it more meaning than we do'"(*People)*.

The "AI effect" defends humanity itself. It is a reflexive action that works to displace the disquiet around the human subject that such technology seems to cause. Writers engaged in this defense usually qualify the descriptions of AI in terms of their limitations. One of the primary limitations of contemporary AI is that researchers have stopped dreaming "of finding the "eternal laws" of thought and capturing them in a computer program" (de Landa 132). Instead,

> in the 1970s AI switched its emphasis to the creation of large bodies of engineered, domain-specific knowledge. Machine reasoning was liberated from a search for eternal laws of thought and began to yield practical results. No magical essence of thought was found. . . . In its place, a synthetic version of the "idiot savant" appeared, bringing expert know-how to bear on the process of mechanical problem-solving. (132)

In other words, recent AI research has concentrated on creating better expert systems rather than creating an artificial "person." This shift in focus is strong fodder for those shoring up the wall between human and machine. However, as the expert systems become more comprehensive, another issue arises: intention.

When Alan Turing wrote his landmark essay, “Computing Machinery and Intelligence,” he asked whether or not machines could think. He proceeded to offer a test—later dubbed ‘The Turing Test’—to answer that very question. He proposed that an observer be put in one room, given two teletype terminals, and allowed to ask questions of two people outside the room. One of the people questioned would be the machine. Turing posited that if a machine could mimic human responses well enough to fool the observer as often as not, it was thinking.

In response, John Searle wrote an article posing a problem now known as the “Chinese Room.” He imagined a room filled with baskets of Chinese ideograms, an English instruction book, and an English-speaking person inside. Someone on the outside would pass in some ideograms, the person inside would consult his rulebook and pass some ideograms back. Searle argued that while the Chinese-speaker outside the room might receive intelligible responses, the person in the room does not *know* Chinese.

The debate between these two positions has dominated the philosophy of artificial intelligence research ever since. If a computer program were to *know* what its output *means*, it would become intentional, have agency. But Turing’s test indicates the futility of detecting such intentionality; after all, if a computer passes the Turing test, it has become a convincing simulation. And if a program can *simulate* intelligence, how can we argue that it is anything but intelligent? How can we argue about its intentions?

Intention

The questions of intention and reality are, in some ways, at the heart of modern media studies. Kittler describes the problems with filming inmates to make case-studies: “The age of media (not just since Turing’s game of imitation) renders indistinguishable

what is human and what is machine, who is mad and who is faking it" (144). In other words, the question of reality becomes moot when one watches a film. (I'm reminded of a friend who recently told me, with some indignation, what he had heard about Michael Moore's *Bowling for Columbine*. My friend was surprised to learn that sequences showing NRA rallies were actually collections of clips from different rallies, edited to look like one. The biggest surprise for me was that my friend, an astute programmer who works for IBM, was shocked.) Indeed, as Paul Willemen has argued, the very *fact* that digital imagery exists brings into question the indexical value of all imagery ("Reflections"). While most film scholarship does not specifically address the question of the "reality" of the image, it often concerns itself with questions of intention.

Cultural scholars have also found reason to question not only the texts and films they encounter, but the scholarship. In 1996, NYU physicist Alan Sokal published an article in *Social Text* which was, unbeknownst to the journal's editors, satire; shortly afterward, he wrote a follow-up piece in another journal revealing his hoax. Sokal wrote his essay to address "the proliferation, not just of nonsense and sloppy thinking *per se*, but of a particular kind of nonsense and sloppy thinking: one that denies the existence of objective realities, or (when challenged) admits their existence but downplays their practical relevance" (Sokal par 12). My intention here is not to enter the debate about Sokal's piece (on which *much* has been written), but rather point to it as a literary theory Turing test. Sokal's satire invoked the Chinese room question; if the publishers of the journal did not detect the satire, how do we know it is satire?

Artificial Life

The field of artificial life has not, in the past, gotten much attention from AI researchers. Artificial life attempts to create systems that simulate replication and evolution. AL researchers often mimic complex systems found in nature by instilling (relatively) simple rules in their agents.

Though computer scientists and biologists generally dominate the field, a few researchers in Artificial Life have proposed systems of self-replicating robots. These systems would be communal structures that include resource-gatherers, construction factories, repair facilities, and expansion procedures. In one NASA study, researchers posited a system of robots that could build a colony on the Moon (or other distant surface), mine minerals, replicate, and send raw materials back to Earth.

The study went on to document some of the probable dangers of creating Artificial Life. For instance, they noted that evolution, necessary for the machines to survive, "would inevitably encourage behavior that suited the machines and not necessarily its creators" (Levy *Artificial* 40). In the end, evolution "introduces the possibility that our creations will be our competitors" (39). In other words, the danger of making self-replicating robots is that once we begin, we might not be able to stop.

On the other hand, some scientists don't mind the idea of flesh-and-blood humans being usurped by other, mechanical counterparts. Hans Moravec writes,

> Sooner or later our machines will become knowledgeable enough to handle their own maintenance, reproduction, and self-improvement without help. When this happens, the new genetic takeover will be complete. Our culture will then be able to evolve independently of human biology and its limitations, passing instead directly from generation to generation of ever more capable intelligent machinery(44).

This utopian vision of man and machine hand-in-hand is rare, given the technophobic climate of today's culture. Nonetheless, it is interesting to consider the "bright side" of a world full of self-replicating machines.

Boids

One of the most interesting (and oft-noted) Artificial Life projects was created in 1986. Craig Reynolds, working on models of animal herds and flocking behavior, wrote a relatively simple system for simulated birds called "Boids." His project exemplifies the qualities of AL that contrast the traditional goals of "intellectual AI." Reynolds describes his Boids,

> The basic flocking model consists of three simple steering behaviors which describe how an individual boid maneuvers based on the positions and velocities its nearby flock mates:
> Separation: steer to avoid crowding local flock mates
> Alignment: steer towards the average heading of local flock mates
> Cohesion: steer to move toward the average position of local flock mates (par 1)

Reynolds' boids also used simple obstacle avoidance routines and were run through a variety of simulations. Amazingly, though each boid was just instructed to follow its three rules, the group as a whole mimicked herding patterns and behaviors remarkably well.

The Boids garnered a lot of attention for several reasons. Reynolds' paper about them was published just months before the first conference on Artificial Life and was received with success there. Its algorithm convinces the eye so successfully that Hollywood and computer game companies have used it (and its descendents) to simulate flocking behavior ever since. However, its most exciting qualities are due to its clear demonstration of the principles of AL. Reynolds writes,

> Flocking is a particularly evocative example of *emergence:* where complex global behavior can arise from the interaction of simple local rules. In the boids model

> . . . interaction between simple behaviors of individuals produce complex yet organized group behavior. . . . The result is *life-like* group behavior. A significant property of life-like behavior is *unpredictability* over moderate time scales. (par 6-8).

In short, though each Boid performs only a simple operation to orient itself by means of the flock, complex behavior emerges. Boids are the antithesis of the top-down, hierarchical AI of cinema and game-playing. Instead of directing the activities of the entire program by means of a frame, the Boids model focuses on simple rules for single elements, allowing significant behavior to *emerge* from the "chaos" of movement.

De Landa's method in *War in the Age of Intelligent Machines* provides the instruction for my use of Boids in the context of film studies. De Landa writes,

> [M]y approach will remain more analogical than mathematical: I will begin with an image that has a clear physical meaning (turbulence, for instance) and then apply it analogically to warfare and computers. . . . What would we expect to find in such a map? Since critical points (of speed, temperature, charge and so on) occur at the onset of self-organization, this map should locate some of the critical points of warfare. (9).

De Landa's instructions enable him to make use of self-organization to explore the role of technology in warfare and computers. In the piece that follows, I use Boids as my model of self-organization to explore the convergence of AI research with the film *AI: Artificial Intelligence*.

Reynolds' Boids provide some basic instructions for writing about them. Rather than writing in a top-down hierarchy (as the frame model encourages), create individual elements that operate according to simple rules. These rules will produce autonomous agents who "flock" together, resulting in *emergent* behavior; in terms of my study here, my Boids follow Reynolds' rules (analogically) and thus "flock" together toward new knowledge. This flocking should allow the "critical points" de Landa seeks to emerge.

Rules for Film Study Boids:

Separation: steer to avoid crowding local flock mates Each film study Boid (fsBoid) progresses over the landscape by itself. While it should relate to the other fsBoids in the flock, it should not overlap them. In particular, fsBoids should distinguish themselves from other fsBoids near them.

Alignment: steer towards the average heading of local flock mates. While avoiding overlap, each fsBoid should orient itself in the same direction as its flock mates. Alignment can be gauged by judging movement against a static position. For this project, the author becomes the magnetic pole—not as direction, but as reference point.

Cohesion: steer to move toward the average position of local flock mates. Make explicit connections with other fsBoids. In hypertext writing, this can be done by means of hyperlinks. Otherwise, use textual markers or other indicators to draw connections among fsBoids.

The last rule needed to create film study Boids is the rule of selection. In order to gain knowledge from fsBoids, the scholar (and presumably the reader) needs to recognize the knowledge emerging from the "flocking" of the fsBoids. To help increase the likelihood of this recognition, which will operate as much on an intuitive level as on a rational level, the selection of the fsBoids should occur intuitively. Ulmer suggests that the age of electracy augments human memory (and thought) via images. Building on Barthes' "punctum" ("that which stings or pricks one emotionally" (Ulmer 44)), Ulmer urges readers to identify key moments by means of the private memories evoked by photographs (44-45). FsBoids use the same selection technique. The punctum triggers personal and disciplinary memories guiding me in selecting which fsBoids to introduce.

FsBoids

1. The War Room

Steven Spielberg released *AI: Artificial Intelligence* to much fanfare as a collaboration with Stanley Kubrick (the latter was dead, but had been working on the project for a long time). The beginning of the film proclaims *AI* to be a "Spielberg/ Kubrick" production, and Spielberg does his best to sprinkle "signifiers" of Kubrick throughout the film [section 7]. These images evoke my favorite Kubrick film, *Dr. Strangelove.*

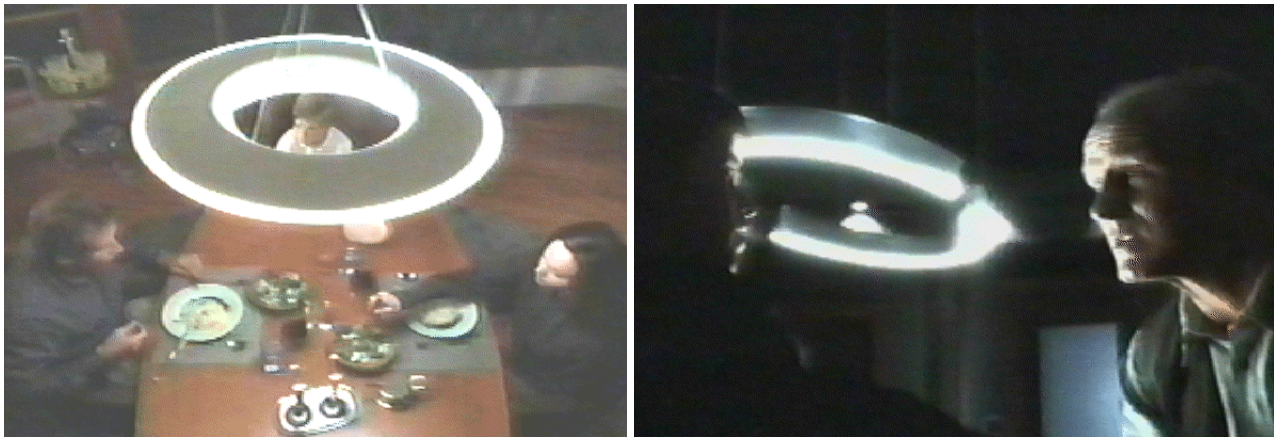

Figure 4-1: The circular light over the dinner table and in Dr. Hobby's office (*AI*).

Dr. Strangelove is, in some ways, Kubrick's first film about AI. The Russian "Doomsday machine" is a sort of AI, an apocalyptic machine that cannot be turned off and will respond to aggression regardless of the cause. The circular overhead light in *AI* recalls the overhead light in *Strangelove*'s War Room. In both films, the overhead light witnesses ridiculous fighting and madness. *AI*'s kitchen table is the setting for the "food fight" between David and Martin, a petty battle over nothing; the War Room features a scuffle between General Turgidson and the Russian Ambassador, prompting the president to scold them: "Gentlemen, you can't fight here. This is the War Room!"

It is also in the War Room that the post-bomb plan to save the upper echelons of US society are cemented into place. The fevered planning and frenzied saluting of Dr.

Strangelove echoes in *AI*'s second scene mirroring the circular light. The War Room light in the back of the Dr. Hobby's office draws forth the satire from *Dr. Strangelove*. In particular, it impresses the idea of madness onto Hobby's vain posturing and arrogant attitude toward AI. When asked about what responsibility a person has toward an AI that is programmed to love, he replies "Didn't God create man to love him?"

Figure 4-2: "Gentlemen, you can't fight here! This is the War Room!" (*Dr. Strangelove*)

William Hurt's portrayal of Dr. Hobby follows his usual style of muted tones, soft voice, and tender touch. He gives impassioned speeches to his colleagues, but ultimately does not display any of the expressionist qualities of madness that most AI research scientists do. He stands in stark contrast to Colin Clive's famous Victor Frankenstein shouting "It's alive!" or to Rudolf Klein-Rogge's Rotwang building his evil Maria robot in *Metropolis*. Nonetheless, the War Room light's appearance in *AI* works metonymically, drawing forth the madness of high technology at the heart of *Dr. Strangelove*.

2. Cityscape

Two kinds of city appear in *AI*. The future city (shown at the beginning of Joe the Gigolo's story and in the Rouge City sequence) and the destroyed city (flooded New York). These two city images haunt my study of cinema. As an undergraduate, my honors thesis focused on two Terry Gilliam films, *Brazil* and *12 Monkeys*. In studying *Bra-*

zil, I read a lot of criticism about *Blade Runner*, of which Joe's city is strongly reminiscent. I also researched *12 Monkeys*, which begins in a desolated Philadelphia that looks much like the flooded New York at the end of *AI* (with snow instead of water).

Figure 4-3: Joe the Gigolo walks down a street (left) reminiscent of Deckard's L.A (right). (*AI*, *Blade Runner*)

AI and *Blade Runner* both construct the city as a place of danger for AI beings. In *Blade Runner*, the city provides some anonymity, but ultimately allows them to be found. Deckard, a good detective if lousy fighter, reads numerous clues and tracks the replicants through the city. Similarly, the Rouge City police emerge out of nowhere to capture Joe outside the Dr. Know booth. We literate subjects are not surprised by this efficient policing. The detective, after all, is a figure born to "make the world, and particularly the urban scene, more legible"(Ray 20). In concordance with science fiction since *Frankenstein*, the literate world (the city) finds the border-blurring *Intelligence* of AI beings repulsive and easily distinguished. But both films also find utopian spaces in uninhabited regions. The theatrical cut of *Blade Runner* ends with Deckard and Rachel retreating from the populated city into the surprisingly green countryside. In a similar move, *AI*'s flooded, empty New York provides the answers to David's quest.

An interesting correlation, then, arises between three sets of binaries: the city and the non-city, the human and the mecha, the literate and the electrate. The cities are dangerous for AI—they are regulated by people and legible to detectives (recall Ong's assertion that detectives are the avatars of literacy). These binaries bring to mind another set of binaries proposed by Deleuze and Guattari: smooth and striated spaces.

> In contrast to the sea, the city is the striated space par excellence; the sea is a smooth space fundamentally open to striation, and the city is the force of striation that reimparts smooth space, puts it back into operation everywhere. . . . The smooth spaces arising from the city are . . . of a counterattack combining the smooth and the holey and turning back against the town. . . . (481)

The ideas of smooth and striated spaces are ideas of organization. Striated and smooth are metaphors for organization that facilitate thinking about information and culture in different eras. In the move from literacy to electracy, the striated aligns with the orderly, linear, rational logic of literacy; smooth meshes with concepts of non-linearity, intuition, and the rhizomatic.

The flooded plain [section 5] of New York and the open grass at the end of *Blade Runner* seem to be smooth spaces, evoking the possibility that the advances of computer technology *could* allow for new structures to emerge.

3. Water

Accompanied by a voice-over describing the flooding of the world due to global warming, the opening images of *AI* are a roiling sea; waves crash in the foreground and send spray into the frame. The voiceover explains how population controls and economic conditions demanded that robots be built. Later, at the Flesh Fair, one of the doomed robots tells David that the resentment over mecha (*AI*'s term for artificially intelligent robots) stems from the fact that humankind built too many mecha and were now resentful

of them. "So when the opportunities avail themselves, they pick away at us; cutting back our numbers so they can maintain numerical superiority." This language (along with the gruff character of the General Circuita himself) invokes the question of military aims in a film where national politics are generally absent.

Figure 4-4: Waves crashing in the opening sequence of *AI*.

AI research, and computer science in general, has been funded and directed by military interests since the Second World War. De Landa begins *War in the Age of Intelligent Machines* with the caution that the military keeps track of AI research. He writes,

> Although the existing prototypes of robotic weapons . . . are not yet truly autonomous, these new weapons do demonstrate that even if Artificial Intelligence is not at present sufficiently sophisticated to create true "killer robots," when synthetic intelligence *does* make its appearance on the planet, there will already be a predatory role awaiting it. (1)

De Landa warns that unless we, as a culture, understand the current use of computers and their integration in the war machine, we might find ourselves experiencing a "science fiction nightmare." *AI*'s subtle invocation of war with its War Room lights [section 1] and its military mecha seems to note this possibility, even if the overtone of the film is unconcerned about it.

Does the film advocate a machine revolution? The punctum of this image for me arises from disciplinary memory—one of the most important movies in film studies is Sergei Eisenstein's *Battleship Potemkin*, which also begins with a sequence showing crashing waves. In Eisenstein's film, the water establishes the turbulent atmosphere in the air; it suggests the impending revolution [section 6]. The invocation of *Potemkin* highlights, for me, the question of the military in *AI*.

4. Helicopter toy

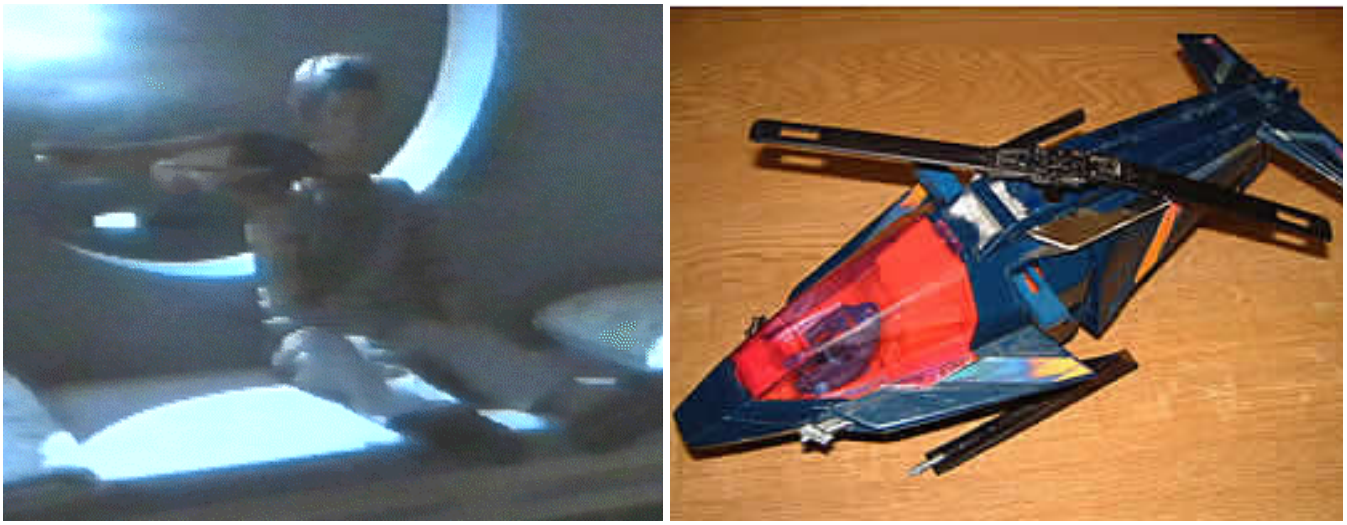

Figure 4-5: David plays with his helicopter toy (*AI*, left)
that looks remarkably similar to my helicopter toy (right).

As a child, my favorite toys were a series of shape-shifting vehicles called MASK (Mechanized Armored Strategic Kommand). The toys came from one of the 1980s toy lines marketing children's' television shows. The most prized toy in my collection was a hybrid helicopter/airplane called "Switchblade." One could change Switchblade to an airplane by tucking its rotors into its tail and pressing a button to release the wings (which folded into the tail while the toy was in helicopter mode); finally, one folded the landing struts up under the wings. Early on, I discovered two things: first, that the landing struts were detachable [section 9]; second, that the coolest position the toy could take was an

intermediary one: rotors tucked in, wings *not* deployed, landing struts removed. The result was a sort-of sleek plane with no wings.

This toy also resulted in my first "run-in" with the law. When I was eight, I took a trip to Washington DC with my mother. I took several of my favorite toys along since we were going to stay with my aunt and uncle for two weeks. (They lived near Washington because my uncle worked at the Pentagon.) As we passed through Minneapolis Airport security, the x-ray screener asked to open my carry-on bag. She had seen something inside that was gun-shaped and wanted to know what it was. My mother and I were both astonished: toy guns were not allowed in my household. I did not own *any*. After rooting around in my bag for a few terrifying moments, the screener pulled out one of the landing struts for my helicopter. The strut was vaguely "L" shaped, and she cautioned me not to play with it while I was on the plane. Perhaps she was pointing out the ethical connection between high technology [section 8] and its funding by military industry; on the other hand, maybe she knew it was called *Switchblade*.

5. Underwater

As we remember from "Modularity and Monsters from the Deep," Steven Spielberg is a master of filmic conventions. *AI* seems to be no exception. The cityscape [section 2] evokes *Blade Runner*, the circular light [section1] evokes *Dr. Strangelove*, the waves [section 3] evoke *Battleship Potemkin*. The most surprising disciplinary punctum, though, is the moment when David sits alone in the pool, staring up at Henry and Monica as they work to revive Martin. The shot sequence evokes the moment in *The Graduate* during which Benjamin escapes from his graduation party to the pool bottom.

Figure 4-6: David watches from underwater as Martin is revived (*AI*).

Thomas Schatz describes the short period in the late 1960s as a key moment in which groundbreaking film tapped into the baby boomer audience that "had gleaned the grammar of screen narrative and learned film history from hours spent with television; and in their film going they sought increasingly esoteric or sophisticated [section 3] fare"(190). Schatz suggests that these viewers, who went to the cinema often, were the primary audience for the "serious" movies of the late 1960s. He writes,

> A number of films that were, at least for that time, highly unconventional and seemingly designed for the youth market proceeded to emerge as substantial hits. Arthur Penn's *Bonnie and Clyde*, made in 1967 . . . became so popular first with kids and later with the general audience that it was . . . given a cover story by *Time* magazine. . . . Late that same year Mike Nichols' *The Graduate* was released, and it was an even bigger success. . . . The trend continued with Stanley Kubrick's *2001: A Space Odyssey*. . . . In retrospect, these and other films of the period have come to mark it as one of the most significant in American film history. (197)

In short, the late sixties ushered in an era in which intellectual films carried significant weight at the box office.

By the late 1970s a new generation of filmmakers had emerged. Led by Francis Ford Coppola, George Lucas, and Steven Spielberg, these new filmmakers understood the craft of filmmaking by way of university education. They re-vitalized the "block-

buster" film by creating some of the biggest moneymakers in film history. However, critics at the time (and since) have suggested that the "whiz kids"—particularly Spielberg and Lucas—earned their success by means of childish fantasy. Schatz quotes James Monaco:

> It's now clear, too, that the film-student generation—Bogdanovich, Friedkin, Lucas, Spielberg, DePalma, Scorcese, and others—had learned everything about film, and nothing about life. The result has been a cinema that is formally extraordinarily sophisticated at the same time that it is intellectually preadolescent. (212)

Monaco blames Lucas and Spielberg for "dumbing down" American cinema, a view that persists to the present. In 2002, film critic Ian Grey wrote that Spielberg is "rightfully regarded by critics as the one-man demolition squad that destroyed the ambitious, "mature" American cinema of the 1970s via the creation of product-sprouting lowest-common-denominator blockbusters"(par 1).

Spielberg's invocation of *The Graduate*—as well as his production of *AI* in the first place—might well be a redemptive move, an attempt to lay claim to "serious" filmmaking. This might also explain the over-exposed, washed out tone of the final sequence in *AI*, in which David explores his home in solitude and quiet. The sequence mimics the post-nebula-ride scenes from Kubrick's *2001*; both Davids find themselves alone in a home, eventually visited by an alien presence (either monolith or organic).

6. Weeping Lions

For whom do the lions outside the Cybertronics building weep? The film features many characters who deserve mourning. The mecha at the Flesh Fair, killed because "history repeats itself," are clearly intended to evoke sympathy. So too is David, the typical Spielbergian child looking for his mother in a harsh world. Perhaps we are to

mourn Joe, who unlike David has not been given the ability to love (and who, in his last declaration that he "was," echoes HAL's pleading with Dave or Roy Batty's reminiscences on the rooftop [section 2]).

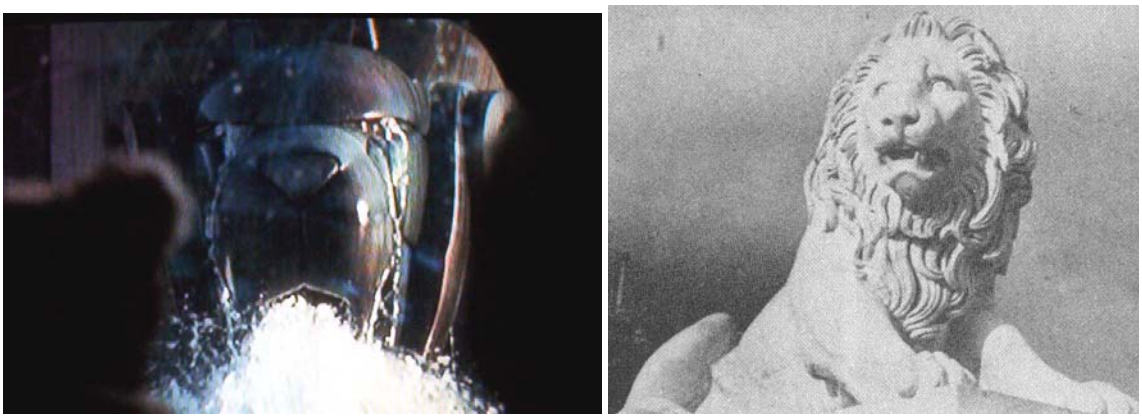

Figure 4-7: A weeping lion and an outraged one (*AI* (left), *Battleship Potemkin* (right)).

Whomever the lions mourn, we know that they are mourning. Having seen the waves [section 3] at the beginning of *AI*, we are already alert for *Battleship Potemkin*'s traces. The monumental lions cannot help but evoke Odessa's lions, who also act as social conscience. Eisenstein explains "In the thunder of the *Potemkin's* guns, a marble lion leaps up, in protest against the bloodshed on the Odessa steps" (56). The rising lion embodies the peoples' spirit, angered by the tyranny of the government. Eisenstein's lion also demonstrates for the audience how they should feel. He writes,

> . . . [C]omposition in this meaning, as we comprehend it here, *is also a construction which, in the first place, serves to embody the author's relation to the content,* at the same time compelling the spectator to relate himself to the content in the same way. . . . [I]n wishing to gain a maximum "departure from oneself" in the spectator, we are obliged in the work to suggest to him a corresponding "guide." Following this guide he will enter into the desired condition. The simplest "prototype" of such imitative behavior will be, of course, that of a person ecstatically following, on the screen, a personage gripped by pathos, a personage who in one way or another, "goes out of himself." (168)

Eisenstein sees montage as the practice of creating emotionally evocative [section 7] pieces that give audiences definite and specific reactions [section 8]; not unlike a televi-

sion laugh track, a guide that tells audiences when to laugh. The lions at Odessa stand in outrage, just as Eisenstein's audience should have.

What does it mean that Eisenstein's response to tyranny is outrage while Spielberg's is mourning?

7. Sex

Figure 4-8: The Rouge City skyline and mouth-shaped entrance "tunnel" (*AI*).

The mouth-shaped tunnel entrance to Rouge City begins the most clear homage [section 1] to Kubrick in *AI*. While there are numerous images that evoke other Kubrick films, the sexual monuments that fill Rouge City are the most obvious homage to Kubrick's style [section 8]. In particular, the city's aesthetic evokes *A Clockwork Orange*'s milk bar. However, despite the lewdness of the entrance to the city, *AI*'s sexual imagery has a distinctly different *feel* to it. Spielberg's city is too erotic.

When *Eyes Wide Shut* was released, its advertising and its PR both focused on its erotic subject matter. The tantalizing ads, the sensual soundtrack receiving wide air play, the stories of Kubrick, Cruise, and Kidman sequestered to shoot sex scenes, the furor over the addition of digital stand-ins during the "orgy" scene, and the film's near NC-17 designation stirred up a widespread public arousal [section 6] for the film. When the film

was released, the public couldn't have been more disappointed. A Minneapolis morning radio personality who had been talking up the movie all week commented on Monday morning that it was horribly "boring."

Figure 4-9: The milk bar's female body-machines (*A Clockwork Orange*); *Eyes Wide Shut*'s misleadingly sensual poster.

My own reaction was mostly that it was un-erotic, almost sterile—not at all what the advertisements suggested it would be. *Eyes Wide Shut* did fit with Kubrick's other films, though, in that it treated sexuality in a forthright, frank manner with as little eroticism as possible. Of the other two Kubrick films dealing much with sex, none are very erotic. Lolita uses sex to manipulate people; while Alex (*A Clockwork Orange*) engages in grotesque, deviant sex with no restraint, reveling in rape as much as consensual coupling. In neither film is sexuality erotic.

My immediate reaction to the Rouge City sequence in *AI* was that if Kubrick had filmed it, it would have been seamier. Although much of the city is clearly *sexual*, it has little of the frankness or lewdness that characterized *Eyes Wide Shut* and *A Clockwork Orange*. Where *A Clockwork Orange* featured sterile white sculptures of naked women that dispense milk from their nipples (body-machines), *AI*'s body-sculpture buildings are built around fetishes—fishnet stockings and <u>silhouettes</u> [section 4] of breasts. Where

Kubrick showed so much of sex that he made it unappealing; Spielberg implies sex without actually showing it.

8. *Tron*

Tron fascinated me when I was young. While I am sure it was not the first science-fiction film I saw, it was one of the first films I became very fond of. Two of the most memorable elements from the film are the light cycles and the uniforms worn by the "programs." The light cycles are sleek bikes rendered in bright colors with simple curves and lines; the uniforms look like corny science-fiction armor etched with glowing circuits. To this day, whenever I see the sleek "future of cars" on television or at an auto show, I think of *Tron*. Two images from *AI* "pricked" my memory of *Tron*: the car Monica drives, with its sleek wheelbase and glowing panels, and the "hounds" used by the Flesh Fair, men on motorcycles lit up by glowing bands that look very much like the circuit-armor from *Tron*.

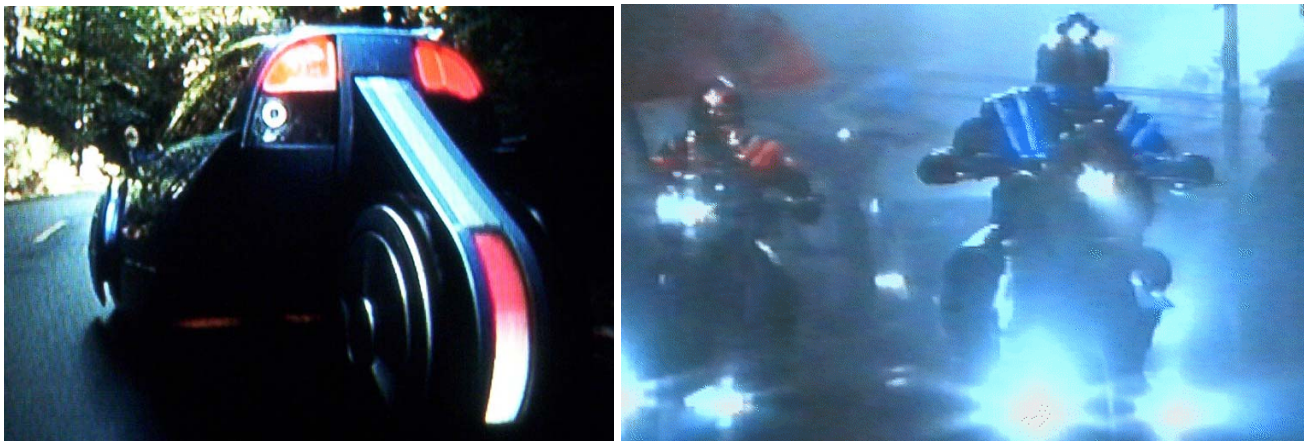

Figure 4-10: Monica's car and the Flesh Fair "hounds" mirror *Tron*'s visual style.

Tron was released in July of 1982, about two weeks after *Blade Runner*[section 2] appeared in theatres. Though groundbreaking in its use of computer animation, *Tron*'s narrative followed the Disney tradition of anthropomorphizing. Instead of talking animals, though, this film focused on talking computer programs, the central villain being an ambitious Artificial In-

telligence program with the ominous name "Master Control Program." The anthropomorphizing had an interesting effect, though. *Tron*'s narrative made it seem like *all* computer programs are intelligent, instead of focusing on the idea that an intelligent AI program would be an anomaly or at least a breakthrough (such as 1984's *WarGames*).

Tron also begins considering AI in practical terms. Films like *Blade Runner* and *2001* treat AI in mostly philosophical [section 9] ways. Thematically, they address questions about what it means to be *human*. These themes, of course, persist in recent films like *AI* or the nauseatingly humanistic *Bicentennial Man*. However, recent films since *Tron* and *WarGames* often consider practical realities of AI as technology; they explore problems caused by AI programs with too much autonomous control. *AI* and *Bicentennial Man* consider the cultural impact of AI as much as the philosophical question of humanity.

Such explorations parallel philosophical studies of AI science, which supplement technical research. For instance, A. F. Umar Khan's "The Ethics of Autonomous Learning Systems" discusses the possibility that A.I. systems will have personalities (he asserts that they most certainly will). Khan explores the problems likely to surface in various forms of machine-morality, such as manual-override, which depends on human reflexes—far too slow—and the 'buddy system,' which could accidentally allow for jointly-learned errors. Finally, Khan asserts that the only reliable set of machine-morals would be an internalized set, a sort-of machine superego (256-8).

Kahn endorses Isaac Asimov's "three laws of robots" as one model from fiction that could be used for ethical systems in artificial intelligences. *Bicentennial Man* has already made use of that very system (probably because the film adapts an Asimov story). Surprisingly, *A.I.* has no such code in its mecha. Kahn also suggests a system for

‘auditing’ robots, and urges that we consider the question of robot ‘rights.’ Given that science-fiction cinema is the primary place in which our culture thinks about AI, it seems appropriate that films like *AI* are beginning to think about technological practicalities.

9. Masks

Figure 4-11: David looks through the empty mask, lit by blue light (*AI).*

At the end of *AI*, David finds an empty face mounted on a headless copy of himself. He walks up behind it and peers through its eyes. The glowing blue light shining on his eyes behind the face strikes me as both beautiful and disturbing.

The image makes several connections for me:

- The *mask* itself touches back to Kubrick’s last film, in which the disaffected doctor watches the orgy through a similarly creepy mask. The mask invokes the question of this film’s relationship to Kubrick’s oeuvre.
- David’s literal *looking through another’s eyes* returns to this film’s relationship with *Blade Runner*. Scott’s film turns on images of eyes; they work like a coda, bringing back the image of the eye and the question of what one sees. At the film’s end, Roy Batty expresses the regret of all sentient beings: that others will not be able to *see* what his eyes have seen.

- Finally, the image works as a visual metaphor for the frame problem. Using templates is like peering through a mask mounted on an immobile body. They give a very limited view of things. The limited "frame" allows for vision, but limits the edges of that vision.

Of course, given the method and metaphor of this chapter, the mask image becomes a metaphor for "template film studies" as well. The view from behind one mask looks much the same as it does from behind another. But the narrative of *AI* itself illustrates a solution to the question of masks.

At the beginning of the film, Dr. Hobby suggests that they can create a robot that will love; in doing so, they will find the final missing piece that allows a robot to proceed into *dreams*. At the end of the film, his joy stems from David's self-driven journey. The structure of David's programming allows him to do things he was not programmed to do. His actions self-organized; he exhibited emergent behavior. Artificial Life research provides the structural background for us to understand how to step away from the template-film-studies mask. By "yielding the initiative to words" or attuning ourselves to the punctum we can discover methods that will utilize the advances of electracy to think about cinema in a new way.

CHAPTER 5
SECRET AGENTS AND CRYPTOGRAPHY

Thus far, the discussion of war in this project has been relatively minor. Despite its presence in the title and its genealogical role in each chapter's subject technology, *war* has not taken center stage in the way cinema and computers have. This chapter confronts way that the relationship between war, cinema, and computers downplays the role of the former in the development of the latter two. Indeed, the structures of funding and innovation encouraged by the 'military-industrial complex' are designed to hide the military's role in technological innovation. Many popular histories of computer technology, for instance, ignore the military's role in funding and focusing innovation in the civilian sector. The "compartmentalization" of information during the Manhattan project, for example, explains how the system works:

> No one would have an overall picture of the nature of the project. This scheme worked extremely well on an industrial level—so well that on the day Hiroshima was bombed the fact that the United States possessed an atomic bomb came as a total surprise to most of the people who had helped to produce it, as well as to the country as a whole. Even though a half-million American citizens worked on the Manhattan Project at some point during the war, . . . only a handful of people actually understood the purpose of their labor. (Goldberg 49)

In other words, the military strategy of compartmentalization—the "need to know"—concealed a giant project from most of those working on it. The security protocols for the Manhattan Project seem analogous to the relationship between war technology and other technologies; the two structures are related, but their relationship defies easy explication.

This chapter, then, embarks on two tasks. First, it explores the war technologies of espionage and draws a potential method from them. Second, it uses that method to examine two films from the 1960s, *From Russia with Love* and *The Ipcress File*. In doing so, it elucidates the relationship of the Cold War to these films, to the technologies at hand, and to this project as a whole.

Cryptography and Cryptanalysis

Cryptography is perhaps the most significant technology of the twentieth-century war machine. While code ciphers have played a part in war for centuries, the development of electronic communications media (in particular, telegraph and radio) amplified the importance of secure communications. These increases in military wireless communication also expanded the need for cryptanalysis and information-processing techniques.

Individuals and governments have long recognized the need for secure communication. One of the primary methods for achieving such communication is the use of codes or ciphers. Ciphers are systems for obscuring messages, or *encrypting* them. The idea is simple: the sender writes out the message, encrypts it using a specified process, and sends it to the receiver, who can read the message by reversing the encryption process. Since the sender and the receiver both know how the message was encrypted, they can both read it; by contrast, an interloper who tries to read the message will be unable to do so. The person who creates such a cipher is a *cryptographer*, while the interloper trying to decipher the message on the sly is a *cryptanalyst*.

Before the emergence of print culture, the need for encryption was relatively small. The low incidence of literacy and the lack of mechanical reproduction meant that there was little need for coded writing. When leaders did need to send important mes-

sages, more effort was placed on hiding the messages than in hiding their contents. Later, with increased letter—and later, telegraph—traffic, there was a greater need to hide the messages being sent. Cryptographers came up with a variety of substitution ciphers that changed around the letters in messages, and cryptanalysts came up with increasingly ingenious ways to break them.

In the nineteenth century, the intellectual challenge of cryptanalysis hooked many readers and scholars. Ciphers were in common use, both in military and domestic applications. For example, young lovers in Victorian England, forbidden from writing to one another, published encrypted love notes in newspapers. "These "agony columns," as they became known, provoked the curiosity of cryptanalysts, who would scan the notes and try to decipher their titillating contents. Charles Babbage is known to have indulged in this activity . . ."(Singh 79). Indeed, Babbage—known for his Analytical Engine that foresaw modern computers—was well known in London as a cryptographer. His private journals show that he was the first to break the era's "unbreakable" code, the Vigenère cipher (66).

It was not until the emergence of new media technologies in the early twentieth century that cryptography made the next leap forward. In *The Code Book*, Simon Singh explains that the benefits of wireless—ease and speed of communication—were hampered by its polydirectionality; in short, friendly soldiers could hear the message, but so could enemy troops. He writes, "All sides were keen to exploit the power of radio, but were also unsure of how to guarantee security. Together, the advent of the radio and the Great War intensified the need for effective encryption"(106). Such encryption would not emerge during the war, but shortly after, in Berlin.

Friedrich Kittler suggests that the large volume of radio traffic demanded a new way to write; the typewriter was the answer. Indeed, the typewriter, in mechanizing writing, also allowed for Arthur Scherbius to invent a new kind of encryption, quantitatively (but not qualitatively) different than codes and ciphers in use before.

> For the first time, hitting a letter key offered numerous combinatory surprises. The 26 letters of the alphabet ran over electric conduits into a distribution system consisting of three (later, for or five) rotors and an inversion rotor, which always selected other substitute letters. With each stroke of the typewriter key, the rotors (just like the second, minute, and hour hands of clocks) advanced by one revolution, only to return to their original position not until 26^7, or 8 billion, hits later. That is how Scherbuis, with his machine mathematics, liberated cryptographers from their manual work. (252)

In other words, Scherbuis' invention, *Enigma*, introduced machines into the process of encryption. Instead of having to work out complicated systems using pencils-and-paper, German soldiers could now use a machine to do so. This step reduced the time needed for encryption and decryption immensely. In response, cryptanalysts from Poland and Britain began working on mechanized code-breakers to defeat the Enigma.

One of the most significant figures in the battle to break Enigma is Alan Turing. Known for his hypothetical proto-computer, the "Universal Turing Machine," Turing was the intellectual heir of Charles Babbage; like Babbage, he also investigated cryptology. Aside from inventing the vocorder, an electric device for scrambling radio signals (Kittler 49), Turing was instrumental in the British attacks on Enigma. Turing's work expanded Polish cryptanalyst Marian Rejewski's efforts to create machines (called *bombes* because they made a ticking noise) to discover the *key* for each day's Enigma traffic. Aside from his mechanical innovations, Turing also helped refine the use of *cribs* (small bits of messages known to be present) to break Enigma traffic (Singh 160-180).

Turing and Babbage were not the only prominent figures to engage in cryptanalysis. Indeed, the process of code breaking seems to hold a strong attraction for many modern intellectuals. Two men instrumental in the emergence of the detective story, for instance, were both keen cryptanalysts: Sir Arthur Conan Doyle and Edgar Allen Poe. Singh describes Doyle's cryptographic writing, "Not surprisingly, Sherlock Holmes was an expert in cryptography and, as he explained to Dr. Watson, was "the author of a trifling monograph upon the subject in which I analyze one hundred and sixty separate ciphers""(81). Doyle's use of cryptography in Holmes stories fits perfectly—the detective's drive to de-code urban space makes him a fantastic cryptanalyst. Ray reminds us that "the detective story differed from its predecessor, replacing the *physiologies*' intolerance for the particular with an insistence on its value. "Singularity," Holmes instructs Watson, "is almost invariably a clue""(*Avant* 32). Sherlock's attention to detail gives him the edge. His attention to singularities serves him well.

Poe had similar interests in cryptography. After challenging readers to stump him using mono-alphabetic ciphers—something they were unable to do—Poe wrote "The Gold Bug," a short story about a hidden treasure and an enciphered note (Singh 81). Shawn Rosenheim explains Poe's interest in cryptanalysis. He writes,

> Poe says that the supreme analyst must be both poet and mathematician, because however great the latter's analytic skill, it is useless without the poet's gift for metaphor—the gift, that is, that allows the poet to establish humanly felt patterns and associations among discrete objects in the world. Because ciphers rely on patterns of association that arise in the human mind, they can never escape human understanding. . . . (164)

In other words, Poe saw homologies between the activity of the cryptanalyst and the detective. Thus, the intellectual challenge of cryptanalysis confronts many of the issues raised by the emergence of the urban in the nineteenth century.

Rosenheim also illuminates another interesting parallel to cryptanalysis. Colonel William Friedman, the founder of the Signal Intelligence Service, was also an avid literary scholar. "For Friedman, literature was always the dark twin of cryptography, alluring and dangerous"(170). While Friedman saw literature as an interesting way to inform cryptanalytic activity, we can also read the relationship in the opposite direction. The practice of literary criticism draws on many of the same techniques and ideas of cryptanalysis. Jerome Christensen suggests that,

> [T]he New Criticism, designed by poets to break the complex codes of other poets, was a form of counterintelligence. Counterintelligence is more than a matter of deciphering discrete messages; it presupposes the apprehension of the entire intelligence system as a complex, multivalent, and dynamic code. (Qtd in Rosenheim 161)

The New Critical drive to decode texts makes many of the same moves as cryptanalysis does. A similar analogy can be made between cryptanalysis and interpretative film criticism.

Indeed, many key concepts of hermeneutic film criticism map nicely onto cryptanalytic concepts (Table 5-1). Even some of the more obscure cryptanalytic concepts fit this analogy quite closely. For example, during the Second World War, "French listening posts learned to recognize a radio operator's *fist*. . . . [E]ach operator can be identified by his pauses, the speed of transmission, and the relative lengths of dots and dashes. A fist is the equivalent of a recognizable style of handwriting" (Singh 103). In other words, each radio operator had a signature that was recognizable to experts. The *auteur* theory's premise that some filmmakers leave distinctive marks on their films is remarkably similar to the notion of a radio operator's fist.

Table 5-1: Analogy of cryptanalysis and film analysis

Cryptographic element	**Film analysis concept**
Ciphertext	Narrative film
Algorithm	Ideology—influences production of the film; creates hidden meanings that demand elucidation.
Key	Theory—undoes the ideology's encryption.

Another method that connects the two systems is the *crib*, or the *cilly*. The crib is a piece of text a cryptanalyst can expect to find in the message. A cilly is a specific kind of crib. Singh describes the discovery of cillies:

> For each message, the operator was supposed to select a different message key, three letters chosen at random. However, in the heat of battle, rather than straining their imaginations to pick a random key, the overworked operators would sometimes pick three consecutive letters from the Enigma keyboard, such as QWE or BNM. These predictable key passages became known as *cillies*. Another type of cilly was the repeated use of the same message key, perhaps the initials of the operator's girlfriend—indeed one such set of initials, C.I.L., may have been the origin of the term.(Singh 164)

Radio operators allowed personal details to influence their encryptions. There are a few places this sort of clue might resonate in film analysis. The most prominent would be in a filmmaker's idiosyncrasies, like Hitchcock's MacGuffins. The idea of the personal (a radio operator's girlfriend) influencing the professional also yields analyses, such as efforts to psychoanalyze the filmmaker.

In film analysis as in cryptanalysis, the analyst seeks to decipher the code from the message. Paul Virilio notes that military technology of the modern era tries to "see" everything. He writes, "the drive is on for a general system of illumination that will allow everything to be seen and known, at every moment and in every place"(4). We might add that while the military seeks to see and know everything, it simultaneously seeks to encrypt its own knowledge and communications against foreign readers.

When Polish cryptanalyst Marian Rejewski made the first steps of progress against Enigma, he did so thanks to the traitorous sale of Enigma blueprints by a German official named Hans-Thilo Schmidt. Without these blueprints, Rejewski would not have been able to hand so much work over to the British, seriously hampering the Allied war effort. Aside from the cryptanalytic lessons the Poles gave to Britain, they also taught that "if intellectual endeavor fails to break a cipher, then it is necessary to rely on espionage, infiltration, and theft in order to obtain the enemy keys" (Singh 183).

As de Landa notes, espionage and analysis, though working toward similar goals, use very different techniques. He quotes Thomas Powers,

> Whereas spies are obsessed with the missing pieces, the analysts are devoted to patterns. The spy (and the counterintelligence specialist, whose mentality is that of the spy cubed) is haunted by the possibility he has been denied the one clue which explains it all. The analyst is convinced the pattern will always jump the gap. . . . (185)

Though de Landa writes about analysts above (rather than cryptanalysts), the premise is the same; cryptanalysts look for patterns, spies look for details. Perhaps, then, spies and espionage can illuminate another way to look at cinema. If film analysis matches so well with cryptanalysis, how might espionage provide a model for writing about film?

Secret Agents

Though intelligence services have been in use for centuries, only recently has the figure of the "secret agent" emerged. De Landa argues that modern intelligence strategies arrived with Napoleon and his use of "annihilation" warfare. The Prussian army modified and advanced this process in the 1870s, bringing new levels of efficiency to intelligence-gathering. These methods became obsolete almost immediately with the quantitative change in intelligence new communications technologies wrought (182-4).

The character of intelligence agencies in the twentieth century has been heavily influenced by fictional accounts of espionage. For example, "popular novels (such as the spy thrillers of paranoid writer William Le Queux) were used in Britain in 1909 to generate a German spy scare in order to defeat public opposition to the assembly of the first intelligence agencies"(189). In other words, fiction was used to influence public policy. While this is by no means unheard of (*Uncle Tom's Cabin*, for instance, has been credited for widespread abolitionist sentiment in the American North), the intimate relationship between espionage literature and espionage agencies surpasses similar uses of literature.

The rise of espionage fiction and its relationship to actual espionage has been explained in several ways. Martin Rubin suggests that spy thrillers ease the arrival of modern warfare. He writes,

> As [Chesterton and Cawelti] suggest, the detective story keeps a sense of exotic mystery and romantic adventure alive in the context of the modern-day technologized, mass-minded urban environment. In a similar manner, the spy thriller maintains a sense of mystery, adventure, and individual heroism in the context of modern, technologized, mass warfare. (227)

In other words, the spy thriller gives individuals the ability to influence the outcome of a modern, technological war. Or, as Michael Denning observes, "The secret *agent* returns human *agency* to a world which seems less and less the product of human action"(Qtd in Rubin 227).

Rebecca Walkowitz sees more sinister ramifications in the perpetuation of the spy narrative. She suggests that spy narratives produced by "conspiracy theories" also create "accused" spies, such as the Rosenbergs, who were punished for their espionage (7). Stanley Goldberg agrees. Goldberg explains that the myth of the "atomic secret" perpetuated the idea of Soviet infiltration. He explains,

> [T]he widely held belief that there had been *a* secret, some deep hidden principle of nature that had been discovered during the war by physicists in America and that no one else could possibly discover in the short term without assistance from those in the know. In fact, there was no such secret. This myth was largely the result of General Leslie Groves' insistent claims, supported by the hubris of some scientists, that it would take the Soviets twenty years to build their own bomb. (51-2)

The common, but mistaken, assumption was that U.S. atom bomb research far outdistanced the Soviets. In reality, Groves thought the Soviets would be unable to get ore (and thus be unable to build a bomb). Thus, when the Soviets successfully tested a bomb, most people thought "they must have been given the secret through traitorous acts of espionage"(48). For Goldberg and Walkowitz, then, the fictitious notion of the secret agent allowed for politicians (on the Right) to persecute those they opposed (on the Left).

Kittler reads the manufacture of the "secret agent" more positively, suggesting that the use of narrative fiction is tied to the need to keep real secrets. He writes,

> During the war, a whole organization emerged for the purpose of delivering the results of fully automatized cryptoanalysis [sic] in coded form to the commanding officers at the front. Otherwise, the most vital secret of the war . . . possibly would have filtered through to the German army, and Enigma would have been silenced. Hence, it became secret agents' last historical assignment to invent radiant spy novels in order to camouflage the fact that interception and the type-computing machine respectively render secret services and agents superfluous. (Which is what spy novels continue to do to this very day.) (261)

In short, espionage fiction covers up the fact that machines have taken over most espionage tasks. De Landa, too, notes that human-gathered intelligence has been replaced with machine-gathered information (184).

Finally, Shawn Rosenheim suggests that spy stories have not only shaped espionage in the public imagination, but have also shaped espionage agencies themselves. He explains that "espionage substantially depends on the self-conscious manufacture of fictions. . . . Espionage depends on cover stories, on doubling, on identical identities" (149).

This close relationship "means that although real-life espionage is not the same thing as espionage writing, neither can it be kept absolutely distinct from it" (15). Rosenheim argues that the heavy use of espionage fiction in the public sector directly influences the activities, operations, and mindset of intelligence agents. He offers two reasons for the close relationship between espionage fiction and agencies:

> The first is that the institutional elaboration of cryptography and espionage was shaped by a rich literary tradition. Popular fiction has long embraced stories that turn on codes and secret writing. . . . The second crucial reason for the ease with which fictional motifs entered the culture of espionage is that cryptography, detective fiction, and spying all center on the problem of knowing other minds. Recall that Morison insisted on the "vital importance" of discovering "not only the capabilities of our political enemy, but also his intentions." (162-3)

Rosenheim explains that the popular conception of espionage directly informed the creation of espionage agencies. For example, Truman gave his agents "black cloaks, black hats, and wooden daggers" when he created the CIA (162). The permeability of the public idea of espionage and its military reality makes espionage fiction a particularly useful resource for thinking about the military.

Agent Technology

Explaining intelligent agent technology can be quite difficult. The definition of *agent* is hotly contested, as is the purpose for which agent technologies can be used. In spite of its permeable definitions, the concept of agent software can provide a useful technological metaphor through which to think about espionage (secret agents) in cinema. The notion of software agents, Murch and Johnson explain, emulates work done by human agents. "A human being is currently the finest agent technology in the world, and as it appears from current research, will continue to be so for quite a while"(5). *Intelligent Software Agents* describes agent technologies as businesses will likely use them, both

conceptually and practically. Their descriptions, among others, build an interesting image of ideas about secret agents and what they should do.

Jock Haswell explains, in *Spies and Spymasters*, that secret agents and their agencies should aspire to meet the "ageless" principles of intelligence. The "system" should be centrally controlled, objective and timely, selective (operating with clear goals), efficient enough to make all its information available immediately, and must be supervised. Finally, a spy must be given specific directions. To whit,

> A spy must be told exactly what information he is to collect, and the time by which he must report it. This will enable him to concentrate all his efforts on a defined task and avoid unnecessary risks. In other words, his mission must be clearly stated (16).

Haswell's call for clarity of direction and system transparency works against the secrecy under which so many espionage agencies work. However, his suggestion resembles descriptions about how *software* agent systems should work. For example, Craig Knoblock and José-Luis Ambite suggest that an agent should do the following:

> Given an information request, an agent selects an appropriate set of information sources, generates a plan to reformulate the plan for efficiency, and executes the plan. An agent can also learn about other agents to improve their overall efficiency and accuracy. (350)

The procedure this software agent follows echoes the plan a secret agent would follow in carrying out a mission (particularly a fictitious secret agent): receiving his orders, creating a plan, and using his contacts to carry out that plan. The analogy holds for many other aspects of software agents as well.

Software agents are programs designed to do work for users. These can be as simple as web-search agents, which coordinate a user's search of the web based on his/her preferences, or as complex as hypothetical "digital butlers," which would learn

their user's habits and handle any tasks that arise. Though there are many competing ideas about how *agent* should be defined, Murch and Johnson summarize the definitions to explain that "agents are, by consensus, autonomous, goal seeking, persistent, reasoning, productive, and communicative"(12). These attributes describe programs that seem pretty advanced and, perhaps, a little scary.

Programmers can get around the more intimidating aspects of agent technologies by making use of anthropomorphic metaphors in their interface design. An appropriate metaphor provides the user with a conceptual schema for the activities of that agent; the agent's personality is, with a well-designed metaphor, transparent. Brenda Laurel suggests that an agent's metaphor should be judged by the predictability it conveys. She writes, "On the conceptual level, an agent is accessible if a user can predict what it is likely to do in a given situation on the basis of its character"(75). This predictability gives the user a curcial comfort with the agent that might otherwise be difficult to obtain. Indeed, programmers should seek to attain that comfort level in their software; since "[i]n social and legal terms, an agent is one who is empowered to act on behalf of another"(71), people will not use agents that make them uncomfortable.

Again, the relationship between software agent and secret agent illuminates some of the fears people have toward semi-autonomous software programs. Ronnie Lipschutz explains that espionage programs created to serve the "national good" often fail to do so. He writes,

> Moreover, defining these activities as being in the national interest almost certainly guarantees that they will *not* be undertaken in broad national interests, but only those of economic and political elites who, after all, imprint *their* subjective notions of interest on the public. . . . [I]n spite of . . . visible failures, the temptation to use covert methods, primarily in order to avoid congressional oversight, public opposition, and foreign disgust, remained overwhelming, and this remains

> the case today. The result has been that most CIA activities have remained unknown or the subject of mere rumor. (61, 74)

Lipschutz suggests that the clandestine nature of espionage activities often leads to corruption and abuse. This proclivity for misuse leads to public wariness about espionage agencies and spies themselves. The public mistrust of espionage agencies and the personal mistrust of software agents stem from the same fear—the worry that one's agent will act inappropriately.

Donald Norman proposes that people will become comfortable with agents in time, and that programmers can take a few simple steps can to ease the process. Norman writes that programmers should: make sure that people feel like they are in control; develop an interface that provides an accurate image of the agent's capabilities; mask complex processes without masking the tasks the agent performs; use safeguards to keep processes under control (50). By following these steps, programmers ensure that users will be comfortable with their agents. Malone et al. propose similar strictures to make agents particularly user-friendly. They suggest that agents should integrate "semiformal systems" and "radical tailorability" so as to mold best with the user's needs. In essence, semiformal systems are flexible methods by which the agent carries out its tasks; radical tailorability suggests that users should have control over as many of the agent's characteristics as possible, so they may "tailor" the agent to fit their needs. Norman, Malone, et al. suggest approaches to agent programming that focus on users (what Norman calls "people-centered design"). This represents one of the strongest distinctions between software agents and secret agents. Where software agents can have built-in safeguards, secret agents cannot. Secret agents can "go rogue."

Steganographic Agents

In *Heuretics*, Gregory Ulmer proposes that agents can help winnow information from our cultural database. In this case, he builds on the idea of software agents, using *agent* to describe a method he uses throughout the book[1]. He writes,

> The challenge of chorography . . . is to design an agent whose "judgment" or intuitions of relevance include the unconscious in its psychoanalytic (*folie*) as well as its connectionist sense. What does the agent need to "know" about the user to tune attention, in order to *supply* what the writer *wants*, especially when the motive is learning, and even invention? How can users customize the agent, instructing it what to look for, since by definition they are unaware of the object of the search at that level? The database needs to be made "stupid," as well as smart, to take into account the operation of the unconscious. . . . The agent can be the means by which the linking of new to old information may overcome the user's "censor," which filters out "irrelevant" items, since the eureka experience of invention works precisely by the surprise shifting of an item from the category of "irrelevant" to "relevant." (221-2, 223)

Ulmer proposes, here, that a well-designed agent can force the unconscious into active participation in analytic work. The task of overcoming the user's "censor" evokes many of the Surrealist projects mentioned earlier herein. The personal unconscious provides the selection method for the project, making the irrelevant relevant.

Ulmer's use of the agent relays my own use of agents in this chapter. Agent technology provides a method that will filter meaning from the database at hand—two spy movies from the 1960s. Using Knoblock and Ambite's model for agent architecture, my agent will have the following characteristics:

> This particular architecture has a number of important features: (1) modularity in terms of representing an information agent and information sources, (2) extensibility in terms of adding new information agents and information sources, (3) flexibility in terms of selecting the most appropriate information sources to answer a query, (4) efficiency in terms of minimizing the overall execution time for a given query, and (5) adaptability in terms of being able to track semantic discrepancies among models of different agents. (369)

In short, the remainder of this chapter builds on Ulmer's idea of the agent as critical "sieve" and use Knoblock and Ambite's model as direction. Thus, my agent will be:

1. Modular—each module dealing with a specific element of the project
2. Extensible—drawing in external information sources (other agents)
3. Flexible—suggesting multiple information sources for its modules
4. Efficient—brief, omitting extended explication in favor of external agents
5. Adaptable—alert to "semantic discrepancies" as most critical texts are

These rules will guide my discussion of spy films from the 1960s. However, as with previous chapters, I still need a means by which to select the moments in the films I will write about.

If cryptography provides a model for traditional textual analysis, perhaps other methods of sending secret messages will provide entry points into the films at hand. Singh describes one such other method: steganography. He writes, "Secret communication achieved by hiding the existence of a message is known as steganography, derived from the Greek words *steganos*, meaning "covered," and *graphein*, meaning "to write"(5). Singh describes various forms of steganography, including invisible ink and messages hidden on the body. One of the more interesting uses of steganography was recounted by Herodotus. "To convey his instructions securely, Histaiaeus shaved the head of his messenger, wrote the message on his scalp, and then waited for the hair to regrow"(5). Singh explains that steganography has been generally abandoned or combined with cryptography because it depends entirely on keeping the message secret. However, steganography seems to be making a comeback.

In information-technology circles, steganography has come to represent any process of hiding information inside a file. Often used in concert with cryptography, internet steganographers hide messages in image code or innocuous messages. Related to steganography are the corporate "digital watermarks" that allow files to be tracked and protected against illegal piracy (Katz). In response to a February 2000 *USA Today* article suggesting that terrorists were using steganography to transmit messages through eBay and pornographic billboards, University of Michigan scientists at the *Center for Information Technology Integration* studied steganographic content on the internet. The study combined password attacks and known stenographic techniques to search images for hidden information. They concluded, "Even though we analyzed two million images that we obtained from eBay auctions, we are unable to report finding a single hidden message"(Provos 14). In spite of this study, the United States Air Force has commissioned research into steganography-detection programs (USAF).

The public discussion of steganography suggests that an electrate way of looking for messages in films might be to eschew cryptanalysis in favor of *steganalysis*. A steganalytic approach to films would operate on the assumption that the film's messages are evident to those who know where to look.[2] Like the Roman guard who catches a messenger, I will find the message if I know where to look.

I will approach *From Russia with Love* and *The Ipcress File* under the assumption that the films provide cues for their agents, much like James Bond's counterparts at the train station, who ask him if he has a light. Thus, I conduct steganalysis on moments indicated by numbers and times in the films. For example, when a time appears in one of the films, it might be a clue about how long to wait for a steganographic message.

From Russia with Love and *The Ipcress File*

50:00 *From Russia with Love*

Clue: The film asserts the number fifty twice: first, Q shows James that there are fifty gold sovereigns in his briefcase; second, the sum of the Lektor machine elements (10kg, 24 symbols, 16 code keys) is fifty.

Figure 5-1: *From Russia with Love*, 50:00. Kerim Bey and James Bond.

This shot, evocative of the clandestine nature of espionage, features Bond and Kerim Bey waiting to take revenge on a Soviet assassin. The broken light of the image and the distinctive costumes fit the standard tropes of the espionage story. Kerim Bey, for instance, is marked as a spy by his dapper suit while being marked as foreign by his exotic white hat. Bond also wears a suit, but stands back further in the shadows.

Bond's position, behind Bey, is metonymic for the presence of first-world country espionage in third-world countries. Martin Rubin suggests that Bond's presence in exotic locales "give[s] the cold war a friendlier, less threatening aspect, displacing the conflict and containing it within a series of picturesque sideshows"(130). This friendly face of the Cold War also hides the unpleasant realities of espionage work in third world countries. Indeed, the somewhat comical elements of Bond films may have existed to hide the

real ethical problems with espionage. Rosenheim writes, describing Truman's gift of black cloaks and hats to his spies,

> Truman's behavior was so clownish that it must have served to disguise genuine discomfort with the task at hand. The CIA would, after all, do work that included assassination, destabilization, and blackmail; what looks like Truman's insensitivity to the gravity of his actions may indicate that the small-town politician simply had no idea what kind of protocol *would* be appropriate for such skullduggery. (162-3)

In other words, Truman embraced the tropes of espionage fiction because their reality was too disturbing. Perhaps the light-heartedness of Bond films perform the same function for audiences.

36:51 *The Ipcress File*

Clue: The number thirteen occurs twice in the film. The first time occurs when Radcliffe is abducted—his train leaves from platform 13. This early alert (aural, not visual and thus not likely the clue) makes significant the appearance of 13 on the door to Palmer's office. The message appears thirteen minutes later.

Figure 5-2: *The Ipcress File*, 36:51. Jean examines Harry's gun.

When Harry returns home and finds Jean in his apartment, he's immediately suspicious—and with good reason. She is indeed spying on him (something we don't learn

until later). Her position in the frame is reminiscent of an interrogation room: she's centered, under the only light source, exposed on a chair in the center of the room.

In that light, Jean reminds us of one of the most prominent Soviet spies uncovered in the United States during the 1940s. The case of Elizabeth Bentley provided the impetus for HUAC to define itself in the crusade against Communist infiltration. Ellen Schrecker describes the Bentley case,

> Dubbed "the Red Spy Queen" by the media, [Elizabeth] Bentley was a thirty-seven-year-old Vassar graduate who approached the FBI's New York field office in early November 1945 to talk about her experiences in the Soviet underground. . . . She named about eighty people—Alger Hiss . . . and an assistant secretary of the treasury . . . among them. . . . [D]espite its all-out efforts to corroborate Bentley's allegations, the bureau had not unearthed enough evidence for a successful criminal prosecution. Accordingly, Hoover did not want to take the case to court. . . . But other venues existed. [T]he charges against them could still be aired by friendly journalists and congressional committees. By the summer of 1948, when Bentley went before HUAC, the committee was still in the process of working out its role in the anti-Communist crusade. (135)

Bentley's revelations helped HUAC establish its position and bolstered the military's efforts to secure more funding and to wrest control of atomic energy out of public hands. Jean's and Tatiana's duplicity in these films evokes the same fears the Elizabeth Bentley case fostered.

Indeed, Jean's presence in Harry's home has the metonymic effect of feeding Communist paranoia: spies like Bentley could be in homes all over Britain and the U.S.

95:20 *From Russia with Love*

Clue: After Kerim Bey is killed, Bond's train arrives at the station at 5:32. The diegesis indicates that it is evening, so the message will appear 17:32 minutes later.

Figure 5-3: *From Russia with Love*, 95:20.
Bond stabs Grant with his hidden knife.

Bond's fight with Grant shows the danger of concealment. Grant, who got into Bond's confidence by waylaying the train station contact, finds himself stabbed with a knife concealed in the briefcase. This is the second time Bond's advanced technology gives him the upper hand—the fight starts when Grant, greedy for an extra fifty sovereigns, opens the second briefcase and got a facefull of tear gas. The concealed knife's danger to Grant reminds us of the dangers held by the concealing aspect of advanced technology.

Indeed, when public efforts in cryptography accelerated in the 1970s and 1980s the NSA, concerned about its ability to hear everything the world says, sought to outlaw cryptographic systems, or to nationalize them. The governmental focus on steganography evinces similar fears today. Bond's hidden knife also reminds us that espionage agencies maintain themselves through deceptive practices. De Landa suggests "that secret service organizations have thrived in times of turmoil. . . . For this reason they survive by inciting social turbulence, spreading rumors and inventing imaginary enemies, fifth columns, and bomber and missile gaps"(190). The notion that governments could be "stabbed" by deceptive intelligence resonates strongly with recent events.

On the other hand, Shaw's agonized look echoes another character the actor will play—Captain Quint. In both films, Shaw's character is betrayed by technology: in this film, by Bond's hidden knife; in *Jaws*, by his sinking boat.

67:30 *The Ipcress File*

Clue: When Harry arrives to spy on "Bluejay," there are 40 minutes left on Bluejay's parking meter. Forty minutes later, Harry finds he is being followed.

Figure 5-4: *The Ipcress File*, 67:30. Harry catches someone tailing him.

Harry's confrontation with the mysterious American agent (who smokes a pipe reminiscent of Basil Rathbone's Sherlock Holmes) invokes the paranoia that spy films court. Recall that Harry tracks the American agent out of a crowded auditorium, cornering him at the top of the stairs. The agent in the auditorium, a normal looking man sans trench coat, recalls Hitchcock:

> In both *Sabotage* and *Saboteur*, . . . disruptive activities take place in movie theatres, as if Hitchcock were trying to extend a sense of destabilizing menace to the very auditorium where we spectators are sitting. In part, this dispersion of menace reflects the democratic spirit of these spy films—the idea that everyone is involved, everyone at risk, everyone a potential if unofficial soldier. It also conveys a more comprehensive paranoia, a sense of shadowy conspiracies whose reach extends far beyond that of even the most extensive gangster organizations. . . . (Rubin 85)

The revelation that the ordinary man in the auditorium is, in fact, a spy tailing Harry imbues all the extras and scenes with a sense of danger and mystery.

This sense of paranoia plays on the same fears that self-serving military officials exploited during the 1940s and 50s, creating a "solidly ordinary world transformed by paranoia and danger"(136). In order to fight the scientific community's assertion that atomic energy belonged in public control, military leaders actively cultivated the idea of the "Communist threat." Ellen Schrecker writes,

> The Communist threat was quite specific: subversion, sabotage, and espionage. . . . [E]nough evidence had accumulated . . . to convince federal officials and then the rest of the nation that the danger was real—that Communist soldiers might undermine military morale, Communist-led unions might cripple crucial defense industries with strikes, and Communists in sensitive positions might give vital secrets to the Soviet Union. (128)

In short, espionage fiction and the military explicitly created and reinforced the idea that Communist infiltrators were actively working to destroy the United States and its allies. In fact, espionage fiction already had a whole stable of tropes on hand for depicting villainy. To whit, "many of these features [in 1950s spy films] depicted Soviet spies and Communist agents with many of the same conventions once reserved for Nazi spies and saboteurs"(Rubenstein 25). It should not be surprising that such depictions heightened public paranoia about Communists and the dangers they pose. Further, that explicit paranoia fed directly back into the military machine, as the military and its intelligence agencies were charged with stopping the very menace whose specter they had conjured.

31:49 *The Ipcress File*

Clue: one of the most blatant clues in the film, the camera rests on Bluejay's license plate for several seconds. The first three digits are 417. Four minutes and seventeen seconds later, Harry meets Bluejay.

Figure 5-5: *The Ipcress File*, 31:49. Harry and Bluejay at the library.

When Harry meets Bluejay in the library, he sits down opposite the arms dealer, a long metal light at his eye level. Their meeting in the library and the disruption of their line-of-sight speaks to the relationship between intelligence and research. While Harry investigates crime and orders raids on warehouses, intelligence analysts work in buildings like this one. Manuel de Landa reminds us that analysts are the counterparts to agents, exploring the intelligence provided by non-agent technologies such as surveillance photographs and radio communications. He writes, "Intelligence collection (by human spies) and intelligence analysis are two very different kinds of activities, with very different historical origins…"(185). Despite the differences in skills needed to do their work, intelligence analysts also have a penchant for deception.

In many cases, intelligence analysts made conclusions based not on their best judgment, but on the interests of their agency. De Landa describes one solution to this problem, "Because of the tendency of military intelligence analysis to reach self-serving conclusions, fueled by never-ending interservice budget wars, Eisenhower decided to create an independent program of scientific intelligence collection and evaluation"(198). It is interesting that an undercurrent of dishonesty runs through all intelligence opera-

tions—projects designed to, in Virilio's words, "allow everything to be seen and known, at every moment and in every place"(4).

71:20 *From Russia with Love*

Clue: When Bond arrives at his hotel, he examines the clock, which reads 7:41, and then he picks up the phone, which has the number 32 in the center of its dial. The message occurs 39 minutes and 41 seconds after Bond makes his phone call.

Figure 5-6: *From Russia with Love*, 71:20.
Kerim Bey and Bond look at the unconscious Russian agent.

Bond and Bey look down at the defeated Soviet spy, who followed them onto the train after they stole the Lektor machine (a clear reference to Enigma). The need to overpower an enemy agent to hide one's presence recalls a British plan to steal the Enigma code keys from a German ship. "Operation Ruthless" sounds very much like a caper Bond would enjoy:

> [The plan involved] crashing a captured German bomber in the English Channel, close to a German ship. The German sailors would then approach the plane to rescue their comrades, whereupon the crew, British pilots pretending to be German, would board the ship and capture its codebooks. . . . After approving [the] plan, known as Operation Ruthless, British Intelligence began preparing a Heinkel bomber for the crash landing, and assembled an aircrew of German-speaking Englishmen. (Singh 183)

Operation Ruthless exemplifies the slippery boundary between espionage fiction and fact; the mission, cancelled by inclement weather, was proposed by a young Naval Intelligence officer named Ian Fleming. *From Russia with Love* enacts the theft of Enigma that Fleming's real charges never undertook.

40:13 *The Ipcress File*

Clue: When Harry calls for a TX82 raid, the squad sent to execute it show up late. Harry's boss, Major Dalby, chastises the leader of the squad because they were 10 minutes late. The message, then, must be ten minutes earlier in the film.

Figure 5-7: *The Ipcress File*, 40:13. Harry makes dinner.

When Harry makes dinner for Jean and himself, the message embedded in the sequence reminds us that espionage has often been an important link in the management of war and materiel. Richard Rowan describes the Prussian army's espionage,

> Roads, rivers and bridges, arsenals, reserve depots, fortified places and lines of communication were his [Wilhelm Stieber] foremost consideration. But he added an intensive interest in the population, in commerce and agriculture, in farms, houses, inns, and in local prosperity, politics and patriotism—in anything at all which struck him as likely to expedite an invasion or provide for the invaders. When at length the Prussians came, bearing Stieber's data, civil requisitions and foraging were made easy. . . . (Qtd in de Landa 184).

In essence, espionage was used not only to gather information about the *military* conditions of France, but about its social and economic conditions. This sort of planning allows the invading force to plan for its sustenance; the army will spend far less to draw supplies from local sources than to depend on supply lines.

The eggs and greenery above also invoke de Landa's assertion that the military establishment fosters and feeds on agricultural and economic growth. He writes,

> Other self-sustaining feedback loops were established between the emerging military and industrial complexes, further pushing the precarious continental balance of power far from equilibrium: as armies became instruments of the State, they helped to bring internal cohesion and order, which in turn produced a marked increase in agricultural and industrial production. This surplus of taxable wealth could then be tapped by the State to fuel the growth of standing armies. (63)

The growth of standing armies improved conditions for agriculture and industry (on the national level), which returned more wealth to the standing armies.

The Ipcress File, with its enemy agents destroying Britain's scientific knowledge, illustrates the relationship between spies and armies: spies work to disrupt the support system for the enemy military machine. Lipschutz describes the work of the CIA and other intelligence agencies in this way: "the goal of covert activity is to somehow influence target governments in a way favorable to one's own interests"(58). He suggests that the CIA's activities since the 40s have been designed to weaken the military institutions of other countries in favor of our allies (66-68). The eggs, then, point to Harry's success as a counterintelligence agent.

77:23 *From Russia with Love*

Clue: Bond goes to the Russian embassy on the 13th, and Kerim Bey sets off the bomb at 3pm. The film calls attention both to the date (in the conversation with Tatiana)

and the time (on the wall, and on James' and Kerim Bey's watches). The message occurs 13 minutes, 3 seconds after the explosion in the embassy.

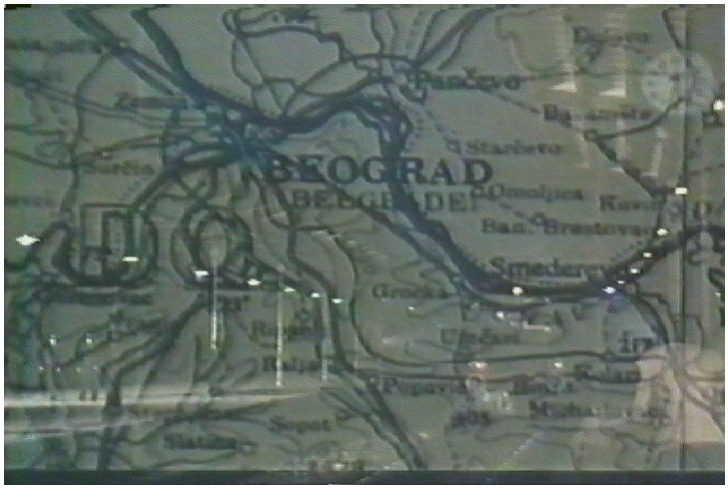

Figure 5-8: *From Russia with Love*, 77:23.
Superimposed map and train station.

This image, the halfway point in a dissolve between a map and a train station, provides several interesting cues. First, it begins another clue. The clock in the upper right corner of the screen reads 5:32pm (or 17:32 in military time). This time leads us to the fight between Grant and Bond on the train (Figure 5-6).

Second, the map evokes the Cold War's consistent return to maps and borders. With the end of the Second World War, the United States and the Soviet Union began to influence designated countries to be either allies or enemies. Simultaneously, American propaganda and espionage agencies began to paint Soviets as the next menace, shifting images of thuggery and immoralism from the recently-defeated Nazis to the new enemies (see discussion of Figure 5-4). The map above, in fact, strongly evokes Frank Capra's *Why We Fight* series, in which Nazi domination of Europe appeared as an animated black ooze slithering over the continent; the arterial lines of rivers and roads on this map menace the province in the same way.

The train pulling into the station evokes not just the early Lumiere film but McLuhan's assertion that railways tie intimately to the acceleration of war:

> Any new medium, by its acceleration, disrupts the lives and investments of whole communities. It was the railway that raised the art of war to unheard-of intensity, making the American Civil War the first major conflict fought by rail, and causing it to be studies and admired by all European general staffs, who had not yet had an opportunity to use railways for a general blood-letting. (102)

Just as railways changed the character of industrial nations, so too did they change war. This image illustrates the connection between new technologies and war, and explains that they often get their first test in war's crucible.

Trains, which appear in both *From Russia with Love* and *The Ipcress File* also function as sites of extreme danger. Dr. Radcliffe's disappearance at the opening of *The Ipcress File* reminds us that the inventor of movies—a Frenchman named Augustin Le Prince—disappeared on a train from Dijon to Paris in 1890; Le Prince vanished carrying all the papers explaining his innovations in cinema technology, innovations similar to those that Thomas Edison would patent a few months later (Ray 92-3). Should we be surprised that espionage contributed to the formation of not only the modern military, but also of cinema?

Notes

[1] Ulmer also uses the concept of an agent in *Internet Invention*, suggesting that students working for the digital consulting firm (the EmerAgency) be *egents*.
Internet Invention: From Literacy to Electracy. New York: Longman, 2003.

[2] Of course, modern steganographers generally encrypt their information before they hide it, but steganography provides a useful metaphoric counterpoint to cryptography.

CHAPTER 6
PARALLEL DISTRIBUTED PROCESSING, THE "AND, AND, AND"

Parallel Distributed Processing

Computers have been associated with rationalized labor techniques for centuries. In the 18th Century, Alexis-Claude Clairaut devised a mathematical process that created a new profession—the computer. Clairaut, attempting to calculate the orbit of Halley's comet, divided the mathematical problem into many small parts and, with 2 friends, spent 5 months doing the calculations for it (Grier). Clairaut's technique was expanded to conduct more expansive calculations in shorter amounts of time:

> A French civil engineer, Gaspard de Prony (1755-1839), borrowed [Adam] Smith's ideas to prepare nineteen volumes of trigonometric and logarithm tables for the revolutionary French government. With the assistance of a small group of mathematicians, Prony divided the computations into a series of additions and subtractions. He then hired about eighty computers to do the arithmetic. Most of these computers had served the former aristocracy as personal servants and knew only the basic rules of arithmetic. (Grier)

De Prony's use of Smith's theory made the immense project more manageable. It also directly connected the earliest computers with the process of rationalized labor.

At the same time, the de Prony computers embodied another aspect of computing technology. These uneducated or barely-educated workers were doing *parallel distributed processing* on the human level. To whit: they were *processing* a series of logarithms in order that the French military could easily calculate its ballistic trajectories; they computed in *parallel*; and they *distributed* the task among many workers. The distributed

method innovated by de Prony held influence throughout the history of computing, re-emerging as a key paradigm in the early 1980s.

Parallel Brain

The study of parallel processing began with the recognition by a variety of scientific disciplines that the human brain is a network. Starting in the 1940s, *connectionism* became a dominant model for the processes describing how the brain works. Computer scientists used these theories were to theorize "neural network" architecture, which would allow a program to "learn" (Bechtel 2-4). These neural networks provided the dominant model for artificial intelligence research until the 1980s. Giorgio Buttazzo explains, "The idea is based on the simple consideration that, to develop self-awareness, a neural network must be at least as complex as the human brain" (48). In other words, if we're able to simulate the 10^{15} synapses present in the human brain, we may be able to create self-awareness in machines.

However, programmers using parallel structures still faced a significant challenge in attempting to replicate the brain's network:

> The brain, however, compensates for [slow] transmission through the parallel processing of whole sets of data; statistical breadth (presumably based on majority gates) for which computers can compensate only through serial processing and recursive functions. (Kittler 249)

Though programmers could emulate the brain's processing practices, they were still stymied by computer hardware limitations. In the 1980s, with the emergence of the home-computer boom and its accompanying influx of capital, new hardware architectures became available that got around the limitations of simulation Kittler describes.

The Technology of Parallel Distributed Processing

Computers performing *parallel distributed processing* (PDP) divide tasks into smaller units and distribute those tasks among multiple processors. Generally, programs using PDP architecture have a controlling mechanism that manages the traffic among different processors and collates the results of separate tasks. Technically, *parallel processing* and *distributed processing* differ. Claudia Leopold explains that "parallel computing splits an application up into tasks that are executed *at the same time*, whereas distributed computing splits an application up into tasks that are executed *at different locations* using *different resources*"(3). Nonetheless, most scholars refer to the general concept of divided-task management as parallel distributed processing.[1]

Leopold outlines several reasons computer scientists have, since the early 1980s, explored PDP. The first reason echoes the de Prony project of the 18th Century: faster performance. Parallel processing allows for slow or time-consuming projects to be executed much more quickly. For example, IBM's Deep Blue chess computer (see Chapter 4) runs 256 processors while considering its next move (Hogan 135). PDP computers are also less expensive to build, since they can use several low-speed processors in concert to perform tasks as quickly as a single high-speed processor. PDP also provides greater scalability, resource sharing, and allow physically disparate organizations to conduct distributed computing projects (Leopold 6-8).

The parallel computer, in its "best" theoretical sense, handles problems in a substantially different way than a conventional sequential computer:

> The creation of machine intelligence involves the design of software that leaves the mechanical plane of "sequential procedures," recipes followed one step at a time, and enters the plane of "parallel procedures" which can deal with several aspects of a problem at once. Parallelism not only achieves a dramatic increase in

> speed but also allows the development of systems that are more "human-like" in that they do not follow a rigidly deterministic sequence of steps, but plan their strategies by considering many factors simultaneously. (de Landa 158)

These alternate programming methods lead to programs that can handle several tasks at once or can coordinate a very complex task among several processing units. The parallelism de Landa describes embodies an entirely different approach to problem-solving and task-management than does the serial programming it replaces.

This chapter addresses three goals. First, it explores the technology of parallel distributed processing as a generator for a method of writing. PDP's attributes make it ideal as an "uber-method" for this entire project, since it integrates or expands on many of the technologies discussed in previous chapters. Second, this chapter uses that method to write about Alan Parker's film, *The Commitments*. Third, it explores my method from a pedagogical perspective, asking how to adopt this dissertation's "methods from technology" to teaching situations.

The pedagogical aspect of this chapter invokes the question of collaboration, a question also begged by some of the technologies explored earlier in this project, as well as by the anecdote that opened this chapter. Just as modularity provided a scalable model for industrial production—guns and films are modular, as are assembly lines and cinema marketing strategies—so does parallelism provide a scalable model for research and collaborative work.

Method

Parallel programming challenges designers to use simultaneous processes and yet maintain a sense of order over the product produced. Some programmers do so by creating "expert systems" that specialize in one sort of task. These systems are called upon to

work individually; their work is then evaluated against one another to positive ends. Such systems, called *demons*, return their answers with indications about how successful they were at solving problems. Oliver Selfridge named this system *pandemonium* to capture the image of multiple "cognitive demons" "shouting out" their solutions to the problem simultaneously. William Bechtel describes pandemonium's function as a letter-recognition system:

> Thus, a cognitive demon would respond most loudly if all of its features were present in the image, and less loudly if some but not all of its features were present. One of the virtues of this type of network is that it would still make a correct or plausible judgment about a letter even if some of its features were missing or atypical. (5)

The simultaneous cooperation of multiple demons provides a striking metaphor for parallel processing. In particular, the idea of demons "calling out" their answers evokes a raucous event aptly dubbed *pandemonium*. A key idea, though, is that the demons shouting most loudly should be the ones who are sure about their answers; with luck, they will be shouting the same thing, in harmony.

The notion of separate individuals working to create a single product scales easily to human collaborative work. Bowker and Star describe the parallels eloquently:

> The idea of socially distributed cognition refers to the fact that participants in collaborative work relationships are likely to vary in the knowledge they possess, and must therefore engage each other in dialogues that allow them to pool resources and negotiate their differences to accomplish their tasks. The notion of socially distributed cognition is analogous to the idea of distributed computing. (Cicourel qtd in Bowker and Star 732)

The differing abilities possessed by members of a collaborative team allow for productive collaboration, just as the diverse specialties of pandemonium's cognitive demons enable broad analysis of letters. What would analytic writing predicated upon PDP and the pandemonium model look like?

This chapter uses a pandemonium method to explore parallel distributed processing by way of *The Commitments*. Like computer programmers working with single-processor programming languages, I *simulate* parallelism in serial form, breaking the project into tasks and distributing them. These tasks are distributed to my "cognitive demons," each addressing an area of inquiry for the chapter: academic research, pedagogy, and *The Commitments*. In this space, the reader will not perform task-management functions; s/he will play the role of the key agent in Selfridge's scenario, the *decision demon*.

The "And, And, And"

> "The tree imposes the verb 'to be,' but the fabric of the rhizome is the conjunction, 'and . . . and . . . and . . .'" (Deleuze and Guattari 25).
>
> "The logic of replacement, characteristic of cinema, gives way to the logic of addition and coexistence . . ." (Manovich 325).
>
> "So what are you calling yourselves?"
> "and and and" (*The Commitments*).

The Parallel Distributed Processing Model

In *A Thousand Plateaus*, Deleuze and Guattari offer two metaphors for book structures (or structures of works in general). The first is the arboreal, the tree or hierarchical root system. Such systems have often been equated with the idea of the traditional, linear book or argument; linear arguments adopt the same hierarchical root system as trees do. Opposed to the arboreal root system is the "radicle-system, or fascicular root," a network of interconnected points(7). Deleuze and Guattari explain that these radicle-systems—what they call *rhizomes*—embody a different way of thinking. They write, "Principles of connection and heterogeneity: any point of a rhizome can be connected to anything other, and must be. This is very different from the tree or root, which plots a

point, fixes an order"(7). Rhizomes disrupt the hierarchy of linear thinking by leaping from any point to any point.

The plentiful and orderless connections among elements in rhizomes have inspired many new media scholars to use the rhizome as a key model of electrate thinking and writing. Since HTML and the Web allow writers to connect any element on any page with any element on any other page, hypertext seems to allow a real-world implementation of the rhizome. In addition, the interdisciplinary activity of late 20th Century academia, particularly of Cultural Studies, also calls for rhizomatic structure. "A rhizome ceaselessly establishes connections between semiotic chains, organizations of power, and circumstances relative to the arts, sciences, and social struggles"(7). Cultural Studies attempts this move, bringing questions of social and cultural situations into conversation with the arts.

Parallel distributed processing implements many of the rhizome's key attributes. The contribution of multiple processors allows for non-hierarchical processing and its scalability allows for growth. As Manovich suggests, processors working in concert solve problems in a different way than a single processor working in a serial fashion. This multiprocessor, non-linear approach allows systems like pandemonium to develop emergent behavior.

The Commitments. The Irish soul band in Alan Parker's 1991 film embodies parallel distributed processing. The film teaches lessons both about how PDP works and how to use it to model collaborative work. The film also connects with this project at other key points. The term *band* makes two critical connections. It connects with Deleuze and Guattari's notion of the "band of nomads"—the group whose wanderings

literally embody the rhizomatic structure and its opposition to the hierarchical structure (which Deleuze and Guattari call "the State"); *The Commitments* embody the nomad relationship to the state. The band also makes a pedagogical connection to Gregory Ulmer's metaphor for collaborative work, the garage band. The collaborative group as garage band counts on "the fact that participants in collaborative work relationships are likely to vary in the knowledge they possess, and must therefore engage each other in dialogues that allow them to pool their resources. . . ."(Cicourel qtd in Bowker and Star 732).

The Commitments also embodies parallel distributed processing in its narrative presentation of the band's music. In particular, the band models a neural net learning system, using parallel processing to run a program. Table 6-1 explores some of the similarities between *The Commitments* and a PDP system in development:

Table 6-1: *The Commitments* as a parallel distributed processing system

Element	**Role in PDP**	**Equivalent in *The Commitments***
Processor	Contributes specific skill to solutions.	Band members play specific instruments.
First run	Neural net fails to meet program requirements.	Band sounds awful. They can't play songs or keep a beat.
Learning	Cognitive demons learn from last run.	Band practices on their own, learn to play soul music better.
Improvement	As individual cognitive demons improve, the program runs better.	As band members commit to their music, the band's act gets better.

The band's progress throughout the movie matches the progress a learning net program makes as it practices its task. *The Commitments* focuses on this learning process in its cyclical narrative, moving from concert to individual learning and back, as though the performances depict the program's output, and the time in between shows its processing. The sequences between concerts use parallel editing, showing band members practicing (learning) on their own. The "output sequences" succeed more thoroughly with each concert, judging by the diegetic audience.

Research. The parallel distributed processing model already applies to much of the work being done by academics and research scientists. The peer-review model used in professional publication work operates much like a pandemonium system. A journal's reviewers respond to submitted articles in the same way that Selfridge's demons respond —they use their specialties to examine the article and "shout out" an answer. The more confident reviewers "shout" the loudest and the editors (decision demons) choose whether or not to print the piece.

This process is particularly apt of the sciences, where many researchers work in concert over vast distances. In recent years, scientists have organized research around new electronic resources. For example:

> The collaboratory concept emerged in the late 1980s from a top-down initiative from the National Science Foundation in Washington. Dr. William Wolf, then director . . . wrote a foundational white paper: "the proposal, then, is to undertake a major, coordinated program of research and development leading to an electronic 'collaboratory,' a 'center without walls,' in which the nation's researchers can perform their research without regard to geographical location."
> (Bowker and Star 717)

Wolf proposed a national movement, enabled by ARPAnet, that would more fully integrate the work being done by research scientists in an efficient manner. The national scale of this project represents a significant move toward making research science emulate parallel distributed processing. If peer-review in print journals provided distributed processing, then adding the Internet's speed provides parallelism.

Pedagogy. The humanities classroom replicates, on a local level, the research paradigm of the academy. Instead of submitting projects for national publication and peer review, students in humanities classrooms submit papers for local review (i.e. teacher grading). This comparison holds up more closely in composition classrooms,

where *collaboration* has been the watchword for some time (as opposed to other areas of the humanities where collaboration is neither so ubiquitous nor so universally accepted). Such classrooms, often using the "process model" of composition instruction, rely on peer review as a key element in teaching students to write. Many theorists roundly embrace such collaboration.

With this wide acceptance of collaborative work, some scholars suggest that theories of collaboration will yield more effective ways to exploit new electronic media in the classroom. For example, Brenton Faber suggests that

> by rediscovering this process of collaborative problem based learning, we can rebuild much of the important social infrastructure that has been lost to rationalist systems. At the same time, we can reintroduce students to the concept of the research community and by doing so, reintroduce ourselves to new methods of innovation, knowledge creation, and inventive problem solving. (37)

Faber argues that pedagogies of real-world problems and collaborative work ground students in actual events. Curtis Bonk and Kira King also argue that collaborative projects shape the way students work and think. They write, "workplaces and schools are finding that new forms of writing and communication engage workers and learners in new patterns of social interaction and promote different standards of productivity"(5). These new forms of interaction will only benefit the students if they have a proper model for collaborative work. Parallel distributed processing is one such model.

Writing in Database Form

In *The Language of New Media*, Lev Manovich suggests that databases are the key information structure of the electrate age. He writes,

> The logic of replacement, characteristic of cinema, gives way to the logic of addition and coexistence. . . . On the level of computer programming, this logic corresponds to object-oriented programming. Instead of a single program that, like Ford's assembly line, is executed one statement at a time, the object-oriented

> paradigm features a number of objects that send messages to each other. These objects are all active simultaneously. (325, 326)

For Manovich, the shift from cinema screen to computer screen exemplifies changes in the way we access data. He suggests that the dominance of the temporal in cinema (which must be presented beginning to end, one frame at a time) gives way to the spatial in computer media, which prioritizes spatial over temporal montage.

Manovich offers the database as the object created in the cinematic object's stead. The database, a collection of elements—documents, text, video, programs—may be accessed in any order its interface allows. With his focus on the database and object-oriented programming, Manovich argues that cinematic objects created in the electrate age will be databases. Ray agrees, at least in regard to the way media texts are composed. He writes, "In particular, twentieth-century technologies (film, video, audio recording) eliminate the need for the consecutive complete performance, replacing it as working unit with the "take," the fragment achievable at any point in the piece's making"(*Avant* 137). This small unit, the take, can be archived for use in its original text but, as with sound effects (see Chapter 2), in any future project.

Research. If a research community emulates a PDP computer, the information it produces most closely resembles a database. Bowker and Star argue that intense collaboration leads scientific research toward database structures. Since "modern, 'big' science consists of scientists addressing problems so large they cannot be solved by a lone scientist"(72), electronic collaboration is not an option, but a necessity. They write,

> Information is not being presented here in linear form, with the word as the center of attention—rather the representation becomes the thing, with linear argument as secondary. At the limit, the scientific product becomes itself a library—the human genome for example—which is to be consulted as a huge interactive database created collaboratively by an array of henceforth anonymous authors. (725)

For Bowker and Star, collaborative scientific research using electronic tools leads to greater information access in the form of databases. They acknowledge, however, the key problem in such equations—that control over databases created will not always be open (and thus available for further research) (727).

The PDP model applies to humanities as well. The bulk of the work being produced, while not exclusive to databases the way corporate-funded work would be, becomes a distributed database for other scholars working in similar fields. In fact, with more libraries moving to electronic resources (sometimes in lieu of physical book purchases), the work being done by humanities scholars resides in databases too.

Pedagogy. The database model can provide a useful pedagogical tool for students using parallel processes in their coursework. Rather than writing traditional argumentative papers, students can compose fragmentary projects based on the database model. Such processes embrace the electrate qualities of networking and non-linearity, but do so within the framework of a conceptual model. While the conceptual models for "database writing" can vary, they all must supply students with an *interface structure*. For, as Manuel de Landa points out, a database's utility depends "on the design of the computer interface . . ."(225). In the context of media studies, an interface determines the sorting algorithm the writer uses to compose the database. For example, in this project I have extrapolated my chapter interfaces from a variety of technological apparatuses.

In *The Avant Garde Finds Andy Hardy*, Robert Ray suggests that Roland Barthes' use of the alphabet as a structuring device in *Roland Barthes* allowed the author to avoid the irritating requirements of literate writing. Ray writes,

> This approach seems ideally suited for film studies. Indeed, it anticipates the notion of cyberspace, which assumes that we are always operating "within information." In the world of Hollywood filmmaking in particular, the strict management of signification makes every object an index, capable of opening at a touch into stores of knowledge. (122)

The alphabet provides a structure that drives the inquiry of the writer. The writer then proceeds to develop a database of entries, presented to the reader through the interface that structured the inquiry.

In courses taught at the University of Florida in the summer and fall of 2003, my students used a similar method. Working from the idea of Walter Benjamin's *Arcades Project*, my students evaluated a hypertext by Shelley and Pamela Jackson called *The Doll Games*. The hypertext documents a series of childhood games remembered by the Jackson sisters. Its interface is an electronic archive, presenting a variety of anecdotes, artifacts, and analyses written in a variety of voices and exploring multiple levels of detail. Student collaborative groups used Ray's dictum that films "make every object an index" and the interface presented by *The Doll Games* to create their own collaborative database projects.

The Commitments. The music performed by *The Commitments* (and recorded on the two volumes of the film's sound track) participate in the database production of music. In particular, just as the moments between the band's performances demonstrate parallel processing of the band's sound—refining and changing it with each performance—so does the band's performance of soul-music standards enter into a larger practice of parallel processing in the music world. In short, the band contributes to the "database" of popular music by performing covers.

Open Source

In 1997, software developers ensured perpetual free access to useful computer code by codifying their previously informal development model. That model, now known as *Open Source*, exemplifies the process of parallel distributed processing on the human level. As such, it supplies ample precedent for how writers, researchers, and educators can harness PDP as a method for collaborative work.

Eric Raymond, the mouthpiece for the Open Source movement, explains that "open-source software [is] the process of systematically harnessing open development and decentralized peer review to lower costs and improve software quality"(xi). Open Source projects are generally proposed by a single developer or core of developers who make the code available to the public and use a system of peer review to test and refine the application. The system depends on the connectivity of the Internet and the multitude of developers who volunteer to work on Open Source projects.

The Open Source model uses many principles of parallel distributed processing to organize projects among people. Clearly, the many developers working on a given project analogize to the many processors working in a PDP system. Michael Truscello notes this similarity. He writes, "This decentralized model of software development took advantage of the collective debugging power of thousands of computer programmers and essentially enlisted 'users' as 'co-developers.'"(6). Such "parallel debugging" gives Open Source projects a speedy bug-elimination rate. Or, as Linux creator Linus Torvalds puts it, "Given enough eyeballs, all bugs are shallow" (Raymond 30). PDP also allows programmers to coordinate a wide spread of resources. Open Source projects do the same, using the resources of a wide scope of developers to tackle a single problem.

Finally, the Open Source model evades "Brooks' Law," a traditionally-fundamental rule that says more programmers working on a project make it significantly *more* likely to run over schedule, not less. Raymond explains that Open Source projects, using "halo" developers outside the small "core" group, get around the substantial slow-down Brooks predicted:

> Brooks' Law is founded on experience that bugs tend to cluster strongly at the interfaces between code written by different people. . . . On open-source projects, the halo developers work on what are in effect separate parallel subtasks and interact with each other very little; code changes and bug reports stream through the core group, and only *within* that core group do we pay the full Brooksian overhead. (34)

Raymond uses the metaphor of parallel distributed processing to explain how Open Source exempts itself from Brooks' Law. His use of PDP fits, since the Open Source model mirrors the pandemonium model.

Table 6-2: The Open Source model and pandemonium

Pandemonium element	**Open Source equivalent**
Text being examined.	Open Source application.
Cognitive demons that examine letters and "shout out" their evaluations.	Halo developers who examine applications and return bug reports and bug fixes.
Decision demons that evaluate Cognitive demon input and return values.	Core developers who collate bug reports and Fixes then re-publish revised software.
Results in far more accurate analysis than a Single demon could produce on its own.	Results in far less buggy software than a single developer could produce alone.

Raymond uses the metaphor of *the bazaar* to describe the Open Source development process. He writes, "the Linux community seemed to resemble a great babbling bazaar of differing agendas and approaches . . . out of which a coherent and stable system could seemingly emerge only by a succession of miracles"(22). Raymond contrasts the noisy, egalitarian bazaar with the coherent hierarchy of a cathedral, and argues convincingly in favor of the former as a development model. It fits that Raymond's "babbling bazaar" resembles parallel distributed processing and its exemplar, pandemonium.

The Commitments. The lessons taught in *The Commitments* reinforce many of the lessons demonstrated by Open Source software. Raymond explains that the Open Source model, with its dependence on heavily integrated peer review, depends equally on the ability of programmers to share code and to take criticism well. He explains that "in shops where developers are not territorial about their code, and encourage other people to look for bugs and potential improvements in it, improvement happens dramatically faster than elsewhere"(50). Open Source's peer review refines software applications much more quickly than would otherwise be possible.

The Commitments shows the value of this sort of group work. In the practices and sequences early in the film, members of the band work together to develop their individual talents as well as the band's music over all. Like a senior programmer or an expert bug-fixer, Joey "The Lips" provides much of the initial help to other band members. In one scene, he helps Dean develop his soulful side, suggesting that Dean should think of his saxophone in an erotic way. Later in the film, when the band is popular but not splintering (yet), we see bandmembers helping one another with individual parts. The Commitment-ettes, for instance, help one another with their dance steps and parts.

But peer review guides innovation only when it has code to examine. Software development in general hinges on programmers' self-motivation. Echoing Marshall McLuhan's suggestion that the work of the future would be "paid learning" (351), Raymond advises aspiring hackers[2] to hone their learning skills:

> You also have to develop a kind of faith in your own learning capacity—a belief that even though you may not know all of what you need to solve a problem, if you tackle just a piece of it and learn from that, you'll learn enough to solve the next piece—and so on, until you're done. (197)

This skill, called "bootstrapping," predicates on the idea that one never finishes learning, that much of the skill of programming lies in *learning* to program.

The Commitments demonstrates similar lessons. At the beginning of the film, each member of the band has talent, but the group members don't really know how to play soul music. During the montages before their first practice, we see the band-members following Jimmy's prescription for "a strict diet of soul." In this section, (which the DVD chapter titles dub "Live, Eat, and Breathe Soul") Derek plays his bass while working in the butcher shop meat locker; Billy practices his drumming on upside-down buckets; and Deco sings over the P.A. of the bus he drives. Such dedication illustrates the same commitment one needs to become a hacker, in which "the hard work and dedication become a kind of intense play rather than drudgery"(Raymond 200).

Research. Raymond connects his analysis of the Open Source model directly with academia when he recognizes that both systems are *gift cultures*. He suggests that both academia and software development became gift cultures because they are

> in populations that do not have significant material-scarcity problems with survival goods. . . . Abundance makes command relationships difficult to sustain and exchange relationships an almost pointless game. In gift cultures, social status is determined not by what you control but by *what you give away*. . . . (81)

The conditions of academic research and software development allow for the development of a gift culture, in which members give away knowledge and acquire reputation based on their generosity. Raymond also suggests that this model's ubiquity makes it "the globally optimal way to cooperate for generating (and checking!) high quality creative work"(107). Both academia and Open Source development benefit from the quality control created by gift cultures.

Academia and Open Source also benefit from their distributed systems of control. Unlike hierarchical research projects, distributed projects lead to a wide range of solutions. First, both academia and Open Source development models allow for divergences. In the Open Source model, programmers who disagree with a project's direction can start a splinter group, or "fork," that takes the application in a new direction. Academia allows for similar splits in its conversation.

Indeed, this versatility occurs in the pandemonium model as well. Manuel de Landa explains:

> Without a Pandemonium a robot must impose on the world a grid of preconceived solutions. . . . A master program and a master strategy determine how a machine behaves. In "parallel" software, on the other hand, the machine becomes more adaptive to new experiences and challenges from the outside world. The world itself determines which demon captures the control of a process, or which particular strategy . . . a robot develops to solve a given problem. (167)

Machines using the pandemonium model develop a versatile set of reactions to problems. The massive parallel processes of both academia and the Open Source movement give those institutions similar flexibility.

Pedagogy. The Open Source model becomes particularly useful for instructors in the humanities when they are considering how to teach collaborative work. As with the database model above, Open Source provides a conceptual model for students embarking on collaborative projects. Such models prepare students for work in the world outside academia. Ede and Lunsford write:

> Writing teachers err if, in envisioning students' professional lives upon graduation, they imagine them seated alone, writing in isolation, misplaced Romantic spirits still struggling in a professional garret to express themselves. Although some of our students will commit themselves to professions, such as creative writing, where solitary writing is the norm, most will work in situations where they are at least as likely to participate in a group brainstorming session for

> a proposal or edit a collaboratively written report on-line as they are to sit alone in their office, pen (or computer keyboard) in hand. (72)

Scholars must prepare students do to collaborative work when they leave school. The traditional hierarchical relationships (as embodied by "cathedral" programming styles) do not provide the most effective means of collaboration. Embracing models of parallel distributed processing, as implemented by Open Source development, will give students practice in effective, efficient group work.

Bonk and Cunningham reinforce this point, arguing that scholars can harness these new models if they understand how electronic tools change the way collaboration can work. They write,

> Because human mental functioning is rooted in social relations and intellectual performance is distributed among members of a learning community, it is critical to begin to understand how electronic tools might enhance the collective intelligence of such a community. (43)

The authors argue that human culture roots in collaboration—giving extra urgency to their call for critical work on electronic collaboration. Since parallel distributed processing and Open Source grew from the home computing boom of the 1980s, it seems quite relevant to consider them as key ways to understand and teach collaboration in the age of electracy.

Using the Open Source Model to Do Collaborative Work

If parallel distributed processing provides a technological model for writing in collaborative groups, Open Source software development provides illustration and translation of PDP to human level projects. This section explores how scholars can use the Open Source model to explicitly formulate and govern collaborative tasks, both in research and in the classroom.

The Commitments. The narrative of the film illustrates many issues at play in collaborative work. The peer-review and individual dedication in the early part of the film illustrate how to use the Open Source model to collaborate. The latter part of the film cautions viewers against potential trouble spots collaborative work can create.

Authorship, for example, becomes a key area of contention in the film. Rather than acknowledging the joint effort made by the band, some members become "territorial" about their contributions. Dean takes on the posture of a jazz saxophonist, cutting his hair differently and wearing sunglasses; Deco becomes egomaniacal, at one point referring to the band as "his back-up band." These affectations illustrate digital age intellectual property problems. The problems of collaboration are not those of the "age of mechanical reproduction," but those of authorship. Elliot Marshall writes,

> It may be hard to establish who an author is, or what percentage of the product he or she may rightly claim, when many people contribute simultaneously to a database or computerized product. Many things, from newspaper articles to airplane designs, are created by joint efforts focused in a single computer's brain. (qtd in Ede and Lunsford 97)

The Commitments demonstrates the music world's partial solution to the problem of authorship—group names. Using a group name to mark authorship of collaborative works eschews the difficulties caused by individual name-listing (100).

The question of personal contribution to the collaborative project, however, is not solved by group names. The Open Source model provides a solution. In pursuing their individual affectations, the bandmembers violate one of the tenets of hacker culture, which "consciously distrusts and despises egotism and ego-based motivation"(Raymond 88). Raymond notes that this distrust of ego-boosting (*egoboo*) seems odd, given the reputation-currency of the hacker gift culture. *The Commitments* answers this conun-

drum—the reputation game allows for/motivates collaborative work while the anti-egoboo mentality smoothes the collaborative process.

Research. Academic researchers have proposed one of the most fruitful translations of the Open Source model—the "open content" or "creative commons" licenses. Eric Raymond suggests that the Open Source development model predicates on "the Lockean theory of land tenure" (65-111). Azeem Azhar explains this idea, which has also been called "commons-based peer production." Azhar writes,

> The commons refers to the sharing of the underlying code or the output that is open to all, akin to the public land that farmers once grazed their livestock upon. Peer production means that producers participate for their own varied reasons and in ad hoc ways, not necessarily via legal contract or management fiat. ("Commons-Based")

In essence, the developers contribute work for their own reasons, each using and adding to the commons.[3]

The Open Source model depends on the collaborative processes detailed above, but also requires one more key element: the GNU Public License (GPL). In short, the GPL is a "terms and conditions" license that accompanies any piece of Open Source software. The license stipulates that anyone may copy, modify, and redistribute the software as long as they follow two rules: they must retain the GPL license and author notices in the original code and they may not restrict others from redistributing code they received. The GPL uses copyright law to maintain the freedom valued by Open Source developers. Hackers call their anti-restrictive use of copyright *copyleft*.

Academic research models create works in ways similar to Open Source models—researchers contribute to journals and publish books that can be used by other scholars to produce more research. However, research models created by the academy do not

have the freedom of the GPL. Charlie Lowe describes concerns many humanities scholars have:

> Scholars object to the hold that the publishing industry has on the intellectual property produced by their scholarship, and they fear the ever-tightening restrictions created by corporate-sponsored extensions of US copyright law. They believe that scholarship can be copyrighted and published, but it should be given back to the public to promote a freer exchange of information for research and educational needs. (par 7)

First, as with proprietary software, publishers often release research under restrictive copyrights. Such practices make some texts difficult to obtain or use to teach with. The last decade's constricting intellectual property laws make things even more difficult, upholding "academic fair use" but providing no protection for scholars exercising the clause—for example, though the clause suggests that small portions of texts may be reproduced for academic critical use, the Digital Millennium Copyright Act makes it illegal to create such excerpts by circumventing copy-protection on electronic media. Second, the exorbitant cost of print publication also restricts the amount of information being published. Academic research that finds a publisher often receives tiny print runs or, in the case of journals, prohibitively high cover prices, ensuring that only libraries will buy the printed materials. Many worry that these two factors seriously jeopardize the project of academic research in the coming years.

Lowe suggests that the Open Source community's use of copyright to enforce the freedoms they value provides a strong model for the academic community. He applauds the *Public Library of Science*'s call for open copyright publication of scientific research and urges humanities scholars to follow suit. Some other models humanities scholars can use include the "Open Content" model and the "Creative Commons" license.

However, while Lowe and others have suggested that the Open Source model maps well to publishing options, few have suggested models integrating the innovative Open Source development model. We would be wise to heed Brenton Faber's reminder that "Open Source is about process"(36). Perhaps Open Source provides the best model when developers follow its example in both process and publication.

At present, Laurie Taylor and I are composing an article proposing just such a project. Extrapolating from the *whole* Open Source model, we propose to build a critical database of information about MOO scholarship. The project will be managed by a group of "core developers" who will publish and update posts. The entries for the database will be composed by "halo developers"—scholars or others in the field—who identify "bugs"—gaps in the database or errors in entries—and submit fixes. As with Open Source projects, the maintenance of the database would continue indefinitely.

This project exploits both halves of the Open Source model, being published under a GPL-like license on the Internet and being composed and peer-reviewed by a large development group. Assuming we gather a substantial group of MOO scholars to help compose the entries, the project will also embody many of the best aspects of PDP, including fast processing of tasks and efficient allocation of resources.

Pedagogy. The Open Source development model provides a fantastic resource for teachers hoping to shape their students' collaborative work practices. Brenton Faber makes an eloquent case for using the Open Source model in the classroom. He writes,

> An open source classroom would present students with half-solved problems, texts in rough draft, meeting notes, failed solutions, and dead ends. From these loose collections of texts, data, and ideas, they would forge their own texts and solutions. . . . Whereas academic essays, exams, and other stagnant projects are addressed to one audience (the professor) for a one-time purpose, open source projects are successful only if people take them on and actually use them. In this

> way, the skills and aptitudes that technical communicators know best: audience awareness, rhetorical purpose, functionality, contextual appropriateness, become forefront in project management. (33, 34)

Faber proposes that students should work on real-world problems in collaborative groups. They should use the Open Source development model to build on projects, perhaps receiving work from groups in previous semesters and handing off their uncompleted work to others in future semesters.

The potential for this model abounds. Students working with classroom Open Source models would not only encounter a different way to collaborate and a different way to approach problems, they would encounter a different view of intellect and property all together. Faber suggests that this alternate view would help battle "proponents of the proprietary university [who] would see the knowledge created by university researchers and students withheld from broad public dissemination . . ."(32). Open Source collaboration would also give students a better way to think about collaborative media texts, like films and music, in which many people play creative roles. Indeed, by working in a truly collaborative environment specifically designed to integrate ideas into a coherent whole, students will gain insight into all collaborative creative processes.

Conclusion

Parallel distributed processing technology provides an important model for writing in the digital age. It also provides a conceptual schema for how do collaborative work effectively, a model that Open Source software developers have taken to heart. In many ways, PDP technology and the Open Source development model also encompass many of the other technologies examined in this dissertation. In order for PDP to work, demons need to communicate in standard chunks, passing tasks and information back and

forth easily. This internal communication requires modular programming at many levels. The control mechanisms in parallel processing devices have been greatly influenced by advances in cybernetic studies; for PDP networks to function across the Internet, encryption must play a crucial role. Finally, parallel processing is most intimately tied to artificial intelligence programming, which currently relies on parallel (and simulated parallel) programs to simulate intelligence. PDP also provides hope for still-optimistic A.I. researchers working to construct a "real" intelligent program.

As this final chapter has suggested, PDP also scales well to the human level. Indeed, using parallel distributed processing as an example, it becomes clear that these technologies may be equally effective as contributors to a *collaborative* method for film studies. These technologies can structure projects and guide group work, just as PDP does. Most importantly, modularity, cybernetics, A.I, and cryptography each contribute to a thorough notion of how to structure writing from a technology.

In engaging with these other modes of writing, scholars can more easily bring into play oppositional ideas and politics. Ede and Lunsford explain:

> Just as collaborative writing potentially challenges the hegemony of single, originary authorship, so do a mix of historical, social, theoretical, and pedagogical forces all centered on a destabilized author/writer and on context, community, and the social nature of knowledge and learning present a series of challenges to higher education in general and to the teaching of composition in particular. (119)

Indeed, by engaging with other modes of writing—as in the method through technology explored here—scholars and students can engage in multiple ways of thinking. These alternate approaches provide key insights into understanding media and electrate culture; they also challenge the dominant hierarchy of traditional educational models, upsetting the notions of solitary authorship and exchange relationships in teaching.

At the same time that we consider the intriguing possibilities of these new ways of writing, we must also keep in mind the fact that all these technologies would not be available for public use if it were not for the close interconnection of military, industrial, and commercial forces in our culture. De Landa reminds us that

> Just as research on interactivity began as part of military research to bring information from the computer's innards to the surface of the screen, . . . so group communications via computer networks was originally devised to solve military problems. And just as interactivity went much further than the military wanted to go, . . . so did the process of collective thinking enhanced by open computer networks. (224)

The military construction of technology did not foreclose alternate uses of it. The opening between intent and use creates spaces for resistance to the military machine that created the technology. Michael Truscello describes this irony:

> The Internet was ostensibly developed by the U.S. Department of Defense but nurtured by the libertarian leanings of early hacker culture. In its originary moment, then, the Internet was emblematic of both control and freedom, the apotheosis of the surveillance society and the dream of anarchistic autonomy. (2)

Truscello suggests that this double-identity makes room for collaborative groups—like Open Source developers—to use the technologies in revolutionary ways. Truscello's analysis echoes Deleuze and Guattari's ideas of nomad cultures. Deleuze and Guattari suggest that nomad cultures operate on a borderland between their own space and the ordered space of the State. Part of their practice involves co-opting State technologies for their own uses. Such co-options are precisely the actions the method from technology attempts. Rather than unconsciously and uncritically adopting the forms of new media for writing, this method explicitly examines technologies and explores how they can lead writers to new forms of knowledge.

Bowker and Star agree that military roots of electrate technologies need not foreclose non-military, democratic use of them. They write, “There is no necessary paradox between military centralism and the democratization of Internet development. The key vision is that of the center of calculation being the node; and the question then is only who controls the nodes”(727). In many ways, this passage echoes arguments made by Open Source advocates against proprietary (or “closed” code). Essentially, they argue that electronic technologies can be remarkably liberating and democratizing, but can also be repressive and constrictive. The difference between the two comes in the way such technologies are used and who controls them.

In the end, this project’s task to adapt new writing methods from technologies seeks to open areas of inquiry for the humanities. These areas will not only lead to new knowledge, but they will lead to new understanding of the age of electracy itself. Such meta-critical work will continue to be important—particularly because of the intimate relationship between the military-industrial complex and media technologies. De Landa describes the task before new media scholars:

> The forces of technology are not easy for institutions to capture and enslave. . . . The Pandemonium . . . is a technology that should be adopted by the military on purely pragmatic grounds. But . . . it will be resisted for a long time, as long as it threatens centralized control and command. In that gap, in the period of time between the emergence of a new machinic paradigm and its incorporation into a tactical doctrine, new opportunities arise for experimentalists outside the war machine. It is important to develop these opportunities in a positive way. . . . (230)

De Landa suggests that systems of control and foreclosure will eventually “capture” the technologies we have explored here, but that until they do, experimentalists have opportunities to use these technologies in ways that elude such capture. These experiments can shape the way such technologies influence thinking and writing.

Scholars of media can be at the forefront of such experimentation, using technologies themselves to drive inquiries into both method and subject. The intimate relationship between cinema, computers, and war urges that media scholars consider such methods to examine these technologies and explore how they can open new avenues of thought for both research and pedagogy.

Notes

[1] I may occasionally refer to *parallel distributed processing* as *parallel processing* or as *PDP*. In the context of this project, the two phrases and the acronym are synonymous.

[2] I use the term *hacker* in the positive sense, as Eric Raymond or Steven Levy do. Raymond writes,

> There is a community, a shared culture, of expert programmers . . . that traces its history back to the first time-sharing minicomputers and the earliest ARPAnet experiments. The members of this culture originated the term 'hacker. . . .' There is another group of people who loudly call themselves hackers, but aren't. These are people . . . who get a kick out of breaking into computers. . . . Real hackers call these people 'crackers' and want nothing to do with them. (196)

See Raymond's *The Cathedral and the Bazaar* for an analysis and explanation of the hacker culture and mindset. See Steven Levy's *Hackers: heroes of the computer revolution.*

[3] Raymond notes that the crucial distinction between the Open Source model and the "village common" lies in the limited use-value of the commons. Software's infinite reproducibility alters the rules of scarcity that govern traditional commons-based peer production.

REFERENCE LIST

AI: Artificial Intelligence. Dir. Stephen Spielberg. DVD. Dreamworks, 2001.

Associated Press Worldstream. "British academic finds formula for perfect feature film." May 13, 2003. (LexisNexis Search for "Blockbuster Film Formula Sue Clayton.")

Azhar, Azeem. "Microsoft Killers" *Prospect Magazine*. February 2004. http://www.prospect-magazine.co.uk/ArticleView.asp?accessible=yes&P_Article=12404 19 February 2004.

Ballard, Robert D. *The Discovery of the Titanic*. New York: Madison Publishing, 1989.

Barthes, Roland. *Image/Music/Text*. Trans. Stephen Heath. New York: Hill and Wang, 1977.

Battleship Potemkin. Dir. Sergei Eisenstein. DVD. Image Entertainment, Inc, 1925.

Baudrillard, Jean. *Simulacra and Simulation.* Trans. Sheila Faria Glaser. Ann Arbor: University of Michigan Press, 1994.

Baudry, Jean-Louis. "Ideological Effects of the Basic Cinematographic Apparatus." *Narrative, Apparatus, Ideology: A Film Theory Reader*. Ed Philip Rosen. New York: Columbia University Press, 1986.

Baxter, John. *Steven Spielberg: The Unauthorized Biography*. London: Harper/Collins,1996.

Bazin, Andre. "The Myth of Total Cinema." *What is Cinema? Volume I.* Trans. Hugh Gray. Berkeley: University of California Press, 1967.

Bechtel, William and Adele Abrahamsen. *Connectionism and the Mind: Parallel Processing, Dynamics, and Evolution in Networks.* Second Edition. Malden, MA: Blackwell, 2002

Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." *Illuminations*. Trans Harry Zohn. Ed Hannah Arendt. New York: Harcourt Brace and World, 1968.

Bicentennial Man. Dir Chris Columbus. Columbia, 1999.

Blade Runner. Dir. Ridley Scott. Videocassette. 20th Century Fox, 1982.

Bonk, Curtis Jay and Donald J. Cunningham. "Searching for Learner-Centered, Constructivist, and Sociocultural Components of Collaborative Educational Learning Tools." *Electronic Collaborators: Learner-Centered Technologies for Literacy, Apprenticeship, and Discourse.* Eds Curtis Jay Bonk and Kira S. King. Mahwah, N.J.: Lawrence Erlbaum Associates, 1998.

Bonk, Curtis Jay and Kira S. King. "Computer Conferencing and Collaborative Writing Tools: Starting a Dialogue About Student Dialogue." *Electronic Collaborators: Learner-Centered Technologies for Literacy,Apprenticeship, and Discourse.* Mahwah, N.J.: Lawrence Erlbaum Associates, 1998.

Bordwell, David. *Making Meaning: Inference and Rhetoric in the Interpretation of Cinema*. Cambridge:Harvard University Press, 1989.

Bowker, Geoffrey C and Susan Leigh Star. "Social theoretical issues in the design of collaboratories: customized software for community support vs large scale infrastructure." Ed. Gary M. Olson. *Coordination Theory and Collaboration Technology.* Mahwah, N.J.: Lawrence Erlbaum Associates, 2001.

Bowling for Columbine. Dir. Michael Moore. Lion's Gate, 2002.

Boylan, Jay H. "Hal in *2001: A Space Odyssey*: The Lover Sings His Song." *Journal of Popular Culture.* v18, no. 4. Spring 1985. p53-56.

Bride of Frankenstein. Dir. James Whale. Universal, 1935.

Bryceson, Dave. *The Titanic Disaster As Reported in the British National Press, April—July 1912.* New York: W.W. Norton, 1997.

Bukatman, Scott. *Terminal Identity:The Virtual Subject in Postmodern Science Fiction.* Durham: Duke University Press: 1993.

Buttazzo, Giorgio "Can a Machine Ever Become Self Aware?" *Artificial Humans: Manic Machines, Controlled Bodies.* Eds. Rolf Aurich, Wolfgang Jacobsen, Gabriele Jatho. Los Angeles: Filmmuseum Berlin, 2000.

Castelluccio, Michael. "Checkmate Humanity?" *Management Accounting*. v. 79. July, 1997. p. 64-6.

A Clockwork Orange. Dir. Stanley Kubrick. DVD. Warner Brothers, 1971.

The Commitments. Dir. Alan Parker. 20th Century Fox DVD. Beacon Entertainment: 1991.

Cooley, Mike. "The Taylorisation of Intellectual Work." *Science, Technology, and the Labour Process.* Atlantic Highlands, NJ: Humanities Press Inc, 1981.

Creature from the Black Lagoon. Dir Jack Arnold. Writ Harry Essex. VHS. Universal, 1954.

The Day the Earth Stood Still. Dir. Robert Wise. 20th Century Fox, 1951.

de Landa, Manuel. *War in the Age of Intelligent Machines.* New York: Zone Books, 1991.

Deleuze, Gilles & Felix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia.* Trans Brian Massumi. Minneapolis: University of Minnesota Press, 1987.

Dennett, Daniel C. "Cognitive Wheels: The Frame Problem of AI." *The Philosophy of Artificial Intelligence.* Ed. Margaret A. Boden. New York: Oxford University Press, 1990.

Dr Strangelove: Or, How I Learned to Stop Worrying and Love the Bomb. Dir. Stanley Kubrick. DVD. Warner Brothers, 1964.

Ede, Lisa S. and Andrea A. Lunsford. *Singular Texts/Plural Authors: Perspectives On Collaborative Writing.* Carbondale: Southern Illinois University Press, 1990.

Eisenstein, Sergei. *Film Form: Essays in Film Theory*. Ed and Trans. Jay Leyda. New York: Harcourt Brace & Company, 1949.

Eyes Wide Shut. Dir Stanley Kubrick. DVD. Warner Brothers, 1999.

Faber, Brenton D. "Educational Models and Open Source: resisting the proprietary university." *Proceedings of the 20th Annual International Conference on Computer Documentation.* Toronto, 2002: p 31-8.

Forbidden Planet. Dir. Fred M. Wilcox. MGM, 1956.

Frankenstein. Dir. James Whale. Universal, 1931.

From Russia with Love. Dir Terence Young. Perf Sean Connery, Daniela Bianchi, Pedro Armendáriz, Robert Shaw. DVD. Metro Goldwyn Mayer, 1963.

Goldberg, Stanley. "The Secret About Secrets." *Secret Agents: The Rosenberg Case, McCarthyism, and Fifties America*. Eds Marjorie Garber and Rebecca L. Walkowitz. New York: Routledge, 1995.

Goody, Jack. *The Domestication of the Savage Mind*. Cambridge: Cambridge University Press, 1977.

Grey, Ian. "Forever Young: Even at 20, *E.T.* Reinforces Its Maker's Eternal Childhood." *Baltimore City Paper*. 27 March 2002. http://www.citypaper.com/2002-03-27/film.html 15 Jaunary 2004.

Grier, David Alan. "The Human Computer and the Birth of the Information Age." *Joseph Henry Lecture, Philosophical Society of Washington.* Lecture, 11 May 2001. Transcript 18 May 2001. http://www.philsoc.org/2001Spring/2132transcript.html 16 Feb 2004.

Haswell, Jock. *Spies and Spymasters: A Concise History of Intelligence.* London: Thames and Hudson, 1977.

Hendershot, Cyndy. "The Bomb and Sexuality: *Creature from the Black Lagoon* and *Revenge of the Creature." Paranoia, the Bomb, and 1950s Science Fiction Films.* Bowling Green, OH: Bowling Green State University Popular Press, 1999.

High Noon. Dir Fred Zinneman. DVD. Universal, 1952.

Hogan, John. *Mind Matters: Exploring the World of Artificial Intelligence.* New York: Ballantine Publishing Group, 1997.

Hornig, Susanna. "Digital Delusions: Intelligent Computers in Science Fiction Film." *Beyond the Stars: Studies in American Popular Film*. Eds. Paul Loukides, Linda K. Fuller. Bowling Green, OH: Bowling Green State University Popular Press, 1993.

Hyslop, Donald, Alastair Forsyth, and Sheila Jemima. *Titanic Voices: Memories from the Fateful Voyage*. New York: St. Martin's Press, 1997.

IBM. "Game 6: 5/11/97 Text version of commentary" *IBM Research: Deep Blue: Overview*. http://www.research.ibm.com/deepblue/games/game6/html/comm.txt 13 Jan 2004.

The Ipcress File. Dir Sidney Furie. Perf Michael Caine, Sue Lloyd. DVD. 1965.

It Came From Outer Space. Dir Jack Arnold. Writ Ray Bradbury, Harry Essex. VHS. Universal, 1953.

James, David E. *Allegories of Cinema: American Film in the Sixties.* Princeton, N.J.: Princeton University Press, 1989.

Jameson, Fredric. *The Geopolitical Aesthetic: Cinema and Space in the World System.* Bloomington: Indiana University Press, 1992.

Jaws. Dir. Steven Spielberg. Perf. Richard Dreyfuss, Robert Shaw, Roy Shieder. DVD. Universal: 1975.

Kael, Pauline. "From Notes on Evolving Heroes, Morals, Audiences—*Jaws, Dog Day Afternoon, The Man Who Fell to Earth.*" *For Keeps: 30 Years at the Movies.* New York: Dutton, 1994.

Kahn, A.F. Umar. "The Ethics of Autonomous Learning Systems." *Android Epistemology*. Cambridge, MA: MIT Press, 1995.

Karabell, Zachary. *What's College For? The Struggle to Define American Higher Education.* New York: Basic Books, 1999.

Kasparov, Garry. "IBM Owes Mankind a Rematch." *Time*. v. 149. May 26, 1997. p. 66-7.

Katz, Jon. "The Rise of Steganography." *Slashdot*. 08 May 2001. http://features.slashdot.org/article.pl?sid=01/05/03/2043244&mode=thread&tid=103 06 Feb 2004.

King Kong. Dir Merian C. Cooper, Ernest B. Schoedsack. VHS. RKO, 1933.

Kittler, Friedrich. *Gramophone, Film, Typewriter*. Trans. Geoffrey Winthrop-Young and Michael Wutz. Stanford, CA: Stanford University Press, 1999.

Knoblock, Craig and José-Luis Ambite. "Agents for Information Gathering." *Software Agents*. Ed Jeffrey M Bradshaw. MIT Press: Cambridge, 1997.

Krantz, Michael. "Deeper in Thought." *Time*. v. 149. March 10, 1997. p. 76-7.

Laurel, Brenda. "Interface Agents: Metaphors with Character." *Software Agents*. Ed Jeffrey M Bradshaw. MIT Press: Cambridge, 1997.

Lee, Steve. "Castle Thunder." *Hollywood Lost and Found*. 27 May 2001. http://www.hollywoodlostandfound.net/sound/castlethunder.html 9 Sept 2003.

- - -. "Universal Telephone Ring." *Hollywood Lost and Found*. 20 March 2002. http://www.hollywoodlostandfound.net/sound/uniphone.html 9 Sept 2003.

- - -. "Wilhelm Scream." *Hollywood Lost and Found*. 26 August 2003. http://www.hollywoodlostandfound.net/wilhelm.html 9 Sept 2003.

Leopold, Claudia. *Parallel and Distributed Computing: A Survey of Models, Paradigms, and Approaches*. New York: John Wiley and Sons, 2001.

Levy, Steven. *Artificial Life: The Quest for a New Creation*. New York: Pantheon Books, 1992.

- - -. *Hackers: Heroes of the Computer Revolution*. Garden City, N.Y.: Anchor Press/Doubleday, 1984.

Lipschutz, Ronnie D. *Cold War Fantasies: Film, Fiction, and Foreign Policy*. Lanham, MA: Rowman & Littlefield, 2001.

Lloyd, Donald. "Renegade Robots and Hard-Wired Heroes." *Beyond the Stars: Studies in American Popular Film*. Eds. Paul Loukides, Linda K. Fuller. Bowling Green, OH: Bowling Green State University Popular Press, 1993.

LoBrutto, Vincent. *Sound-on-Film: Interviews with Creators of Film Sound*. Westport, CT: Praeger, 1994.

Lowe, Charlie. "A Brief History of Open Source: Working to Make Knowledge Free" *Kairos: A Journal for Teachers of Writing and Webbed Environments.* 6:2 (2001 Fall). http://english.ttu.edu/kairos/6.2/binder.html?news/opensource.htm 19 Feb 2004.

Lynch, Don and Ken Marschall. *Titanic: An Illustrated History*. New York: Hyperion, 1992.

Malone, Thomas et al. "Agents for Information Sharing and Coordination: A History and Some Reflections." *Software Agents*. Ed Jeffrey M Bradshaw. MIT Press: Cambridge, 1997.

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

McBride, Joseph. "Chapter 10: A Primal Scream Movie." *Steven Spielberg: A Biography*. New York: Simon and Schuster, 1997.

McGann, Jerome. *Radiant Textuality: Literature After the World Wide Web*. New York: Palgrave, 2001.

McLuhan, Marshall. *Understanding Media: The Extensions of Man*. Cambridge: MIT Press, 1964.

Metropolis. Dir Fritz Lang. UFA, 1927.

Mirowski, Philip. *Machine Dreams: Economics Becomes a Cyborg Science*. Cambridge: Cambridge University Press, 2002.

Moravec, Hans. *Mind Children. The Future of Robot and Human and Intelligence.* qtd in *Artificial Humans: Manic Machines, Controlled Bodies.* Eds. Rolf Aurich, Wolfgang Jacobsen, Gabriele Jatho. Los Angeles: Filmmuseum Berlin, 2000.

Murch, Richard and Tony Johnson. *Intelligent Software Agents.* New York: Prentice Hall, 1999.

Night to Remember, A. Dir Roy Ward Baker. Videocassette. UAV Entertainment. 1958.

"Night to Remember, A (1958)." *Internet Movie Database*. http://www.imdb.com/title/tt0051994/ 03 Dec 2004.

Norman, Donald A. "How Might People Interact with Agents?" *Software Agents*. Ed Jeffrey M Bradshaw. Cambridge: MIT Press, 1997.

Ong, Walter. *Orality and Literacy: The Technologizing of the Word.* New York: Routledge, 1982.

The Onion presents Our Dumb Century: 100 Years of Headlines from America's Finest News Source. New York: Three Rivers Press, 1999.

People Weekly. "Sorry, man." v. 47. May 26, 1997. p. 127.

Porush, David. *The Soft Machine: Cybernetic Fiction.* London: Methuen, 1985.

Provos, Niels and Peter Honeyman. *Detecting Steganographic Content on the Internet.* 31 August 2001. http://www.citi.umich.edu/techreports/reports/citi-tr-01-11.pdf 06 Feb 2004.

Rapoport, Anitol. "The Vitalists' Last Stand." *Android Epistemology*. Cambridge: MIT Press, 1995.

Ray, Robert B. *The Avant-Garde Finds Andy Hardy*. Cambridge: Harvard University Press, 1995.

- - -. *How a Film Theory Got Lost and Other Mysteries in Cultural Studies.* Bloomington: Indiana University Press, 2001.

Raymond, Eric. *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary.* Sebastopol, CA: O'Reilly and Associates, 2001.

Reynolds, Craig. "Boids (Flocks, Herds, and Schools: a Distributed Behavior Model)." 6 September 2001. http://www.red3d.com/cwr/boids/ 14 January 2004.

Rosenheim, Shawn James. *The Cryptographic Imagination: Secret Writing from Edgar Allen Poe to the Internet*. Baltimore: Johns Hopkins University Press, 1997.

Rubin, Martin. *Thrillers*. Cambridge: Cambridge University Press, 1999.

Rubinstein, Leonard. *The Great Spy Films*. Secaucus, N.J.: Citadel Press, 1979.

Schatz, Thomas. *Old Hollywood/ New Hollywood: Ritual, Art, and Industry*. Ann Arbor, MI: UMI Research Press, 1983.

Scholes, Robert, Nancy Comley, and Gregory Ulmer. *Text Book: An Introduction to Literary Language*. New York: St. Martin's Press, 1995.

Schrecker, Ellen. "Before the Rosenbergs: Espionage Scenarios in the Early Cold War." *Secret Agents: The Rosenberg Case, McCarthyism, and Fifties America*. Eds Marjorie Garber and Rebecca L. Walkowitz. New York: Routledge, 1995.

Searle, John R. "Minds, Brains, and Programs." *The Philosophy of Artificial Intelligence*. Ed. Margaret A. Boden. New York: Oxford University Press, 1990.

Singh, Simon. *The Code Book: The Science of Secrecy from Ancient Egypt to Quantum Cryptography*. New York: Anchor Books, 1999.

Sokal, Alan. "A Physicist Experiments with Cultural Studies." *Lingua Franca*. May/June 1996, pp. 62-64. http://www.physics.nyu.edu/faculty/sokal/lingua_franca_v4/lingua_franca_v4.html. 14 January 2004.

Spotlight on Location: Jaws. Extra on DVD. Universal, 1975.

Sobchack, Vivian. *Screening Space: The American Science Fiction Film*. New Brunswick, NJ: Rutgers University Press, 1987.

Stephenson, Neal. *Cryptonomicon*. New York: Perennial, 1999.

Terminator. Dir James Cameron. 20th Century Fox, 1984.

The Thing From Another World. Dir Howard Hawks, Christian Nyby. VHS. RKO, 1951.

Titanic. Dir Jean Negulesco. Perfs Clifton Webb, Thelma Ritter. Videocassette. 20th Century Fox: 1953.

Titanic. Dir James Cameron. Perfs Leonardo DiCaprio, Kate Winslett. Videocassette. 20th Century Fox: 1997.

"*Titanic*." *Internet Movie Database*. http://www.imdb.com/title/tt0051994/ 18 December 2003.

Tron. Dir. Steven Lisberger. DVD. Disney, 1982.

Truscello, Michael. "The Architecture of Information: Open Source Software and Tactical Poststructuralist Anarchism" *Postmodern Culture: An Electronic Journal of Interdisciplinary Criticism*. 13:3 (2003 May). 39 paragraphs. http://www.iath.virginia.edu/pmc/issue.503/13.3truscello.html 16 Feb 2004.

Turing, Alan M. "Computing Machinery and Intelligence." *The Philosophy of Artificial Intelligence*. Ed. Margaret A. Boden. New York: Oxford University Press, 1990.

2001: A Space Odyssey. Dir. Stanley Kubrick. DVD. MGM, 1968.

Ulmer, Gregory L. *Heuretics: The Logic of Invention*. Baltimore: Johns Hopkins University Press, 1994.

- - -. *Internet Invention: From Literacy to Electracy*. New York: Longman, 2003.

USAF. "Automated Detection of Steganographic Content." *Air Force STTR Program*. http://www.acq.osd.mil/sadbu/sbir/solicitations/sttr04/af04.htm 06 Feb 2004.

Virilio, Paul. *War and Cinema: The Logistics of Perception*. Trans. Patrick Camiller. New York: Verso, 1989.

Walkowitz, Rebecca. "Introduction." *Secret Agents: The Rosenberg Case, McCarthyism, and Fifties America*. Eds Marjorie Garber and Rebecca L. Walkowitz. New York: Routledge, 1995.

WarGames. Dir John Badham. DVD. MGM, 1983.

Weaver, Tom. "Harry J. Essex." *Interviews with B Science Fiction and Horror Movie Makers: Writers, Producers, Directors, Actors, Moguls, and Makeup*. Jefferson, NC: McFarland & Company, 1988.

Wiener, Norbert. *Cybernetics: Or Control and Communication in the Animal and the Machine*. Second edition. Cambridge: MIT Press, 1961.

- - -. *The Human Use of Human Beings*: *Cybernetics and Society*. Garden City, NY: Doubleday Anchor, 1954.

Willemen, Paul. "Reflections on Digital Imagery: Of Mice and Men." *New Screen Media:Cinema/Art/Narrative*. Eds Marting Reiser, Andrea Zapp. London: British Film Institute, 2002.

Wyatt, Justin. *High Concept: Movies and Marketing in Hollywood*. Austin, TX: University of Texas Press, 1994.

BIOGRAPHICAL SKETCH

Brendan Riley grew up in Chaska, Minnesota, a suburb of Minneapolis. From 1995-1999, he attended St. John's University near St. Cloud, Minnesota, where he earned a Bachelor of Arts in English, focusing heavily on film and media studies. Brendan then matriculated to the University of Florida, where he studied both media studies and composition. He earned a Master of Arts in English in the Spring of 2001 and stayed at the University of Florida to continue his doctoral work. In May of 2004, Brendan received his Doctorate of Philosophy in English. *Cinema, Computers, and War,* his dissertation under the guidance of Gregory Ulmer, combines his interest in media studies and the rhetoric of new media to explore how technology can guide experimental media criticism. In the fall of 2004, Brendan will join the English Department faculty at Columbia College, Chicago.