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PERFECT CONTAGION MACHINE:
DIGITAL MEDIA, SCIENTIFIC EVIDENCE, AND EMERGENT OUTBREAKS ON SCREEN

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ABSTRACT

This dissertation examines the recent archive of popular media documenting the spread of emergent outbreaks. As products of globalization, emergent infectious diseases (EID) arise from the shifting environmental conditions, transportation networks and social practices of an interconnected world. In an effort to represent these complex networked phenomena, popular films, television, and video games have turned to the rhetoric of science and medicine. Coupling medium-specific analysis with historical and anthropological work on science and medicine, I track the way digital medial communicate EID outbreaks. Rather than focusing on scientific or medical content, I analyze the intersection of media forms and scientific paradigms that produce epistemological impressions—the sense of science—that help us see, hear, and feel an emergent outbreak.

Each chapter interrogates a representational strategy to track the way popular media articulate the scale, presence, containment, and transmission of EIDs. The first chapter draws on scholarship on disease mapping to analyze how recent films and video games use maps to communicate the geographic distribution of an outbreak and produces the overwhelming sense of viral omnipresence. The second chapter analyzes the representational structures that surround microscopic images on screen to demonstrate how these images are used to guide the viewer across the disparate visual and geographic scales of an emergent outbreak. The third chapter turns to histories of sonar and ultrasound to interrogate how recent horror films use sound mixing and audiovisualization techniques to express the spatial confinement of quarantine and unstoppable viral dissemination. The final chapter contextualizes the reflexive style of found footage horror in the "mechanical objectivity" paradigm to demonstrate how the genre encourages viewers to engage with the film as visual evidence that in turn produces a sense of viral omnipresence. By attending to acute scientific structures, all chapter access the representational forms and scientific logic that allow us to sense the world, and indeed, *make sense* of the world in its contemporary networked condition.

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Ian Jones, Nicole Morse, Jordan Schonig, Tyler Schroeder, and Ling Zhang. In particular, I have been lucky enough to have two colleagues who have read every single page of this dissertation (if not twice). Jordan and Nicole, thank you both for your unbelievable patience and generosity. I promise you'll never have to read about microscopic images ever again.

The writing group was conceived as a way to extend the support structures of the Mass Culture Workshop. Over the course of the last four years, I have had the incredible opportunity to workshop three chapters of this dissertation through Mass Culture. Conversations held in these sessions have directly influenced the central terms, theoretical lines of thought, and organization of the dissertation. I am grateful for feedback from my fellow graduate students, Dave Burnham, Matt Hauske, Katerina Korola, Tien-Tien Zhang, Sabrina Negri, Clint Froehlich, Solveig Nelson, Steven Maye, Chaz Lee, James Rosenow, Pao-Chen Tang, Shannon Tarbell, Sean Batton, Pedro Doreste, Gary Kafer, Junko Yamazaki, and Artemis Willis. Additionally, I'm thankful to the faculty attendees of the workshop including, Salome Skvirsky, Takuyka Tsunoda, Richard Neer, and Phil Kaffen.

While this dissertation topic emerged at the end of my course work, the classes and conversations with faculty at the University of Chicago in my first three years were hugely influential in shaping the trajectory of the project. In particular, Lauren Berlant's seminar on Ordinariness provided the essential context to break from my French film roots. Stepping outside of Cinema and Media Studies, I was able to take *Contagion* seriously for the first time and wrestle with the possibility of radical change. At the same time, courses with Jennifer Wild, Tom Gunning, Yuri Tsivian, James Naremore, and Jim Lastra all helped reinforce my Film Studies roots. While this project draws across disciplines, it remains fundamentally grounded in the methods of Film Studies: skills I've cultivated through courses with the department's amazing faculty.

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Studies annual conference, "Transforming Contagion," "Monstrous Media," "& Media" and "The Costs of Abstraction." The discussions with graduate students and faculty across disciplines has been detrimental to my interdisciplinary approach. I'm thankful for the network of colleagues who I've met over the years: Misha Mihailova, Ben Aspray, Ashley Smith, Andrew Vielkind, Bill Albertini, Scott Richmond, Scott Curtis, Oliver Gaycken, and Priscilla Wald.

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I must thank my friends for their patience and support over the years. Writing a dissertation often causes unstable moods, bouts of cynicism, and crushing self-doubt. I'm so grateful for those

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Just weeks before completing the final draft of this dissertation, I lost a close friend and colleague, Hannah Frank. Hannah was so central to my graduate experience, a true friend, generous colleague, and mentor. Though this final work is unlikely up to her high standards, I dedicate the project to her memory. Over the years, Hannah sent countless references, read draft after draft, offered sage advice, and reassured me every step of the way. Moreover, her friendship was often what kept me afloat. In many ways I cannot fathom this project completion without Hannah, and it seems wrong that this final work exists without her here. I dedicate this work to her memory and hope to carry on the lessons and kindness she offered me over the years. Hannah, I miss you everyday.

INTRODUCTION

THE SENSE OF SCIENCE, OR SENSING AN OUTBREAK

> "The simplest means of transforming the juxtaposed set of allies into a whole that acts as one is to tie the assembled force to one another, that is, *to build a machine*."
> —Bruno Latour[1]

Amidst the rapid escalation of a global, emergent outbreak, *Contagion* (Soderbergh 2011) abruptly turns to a saturated image of the past. The cold and sickly tones of the diegesis give way to the flashback's over-exposed, warm image of the film's deceased "patient zero," Beth Emhoff (Gwyneth Paltrow) as she moves through the hazy Hong Kong casino floor. Jump cuts and shaky handheld cinematography contrast with the static long takes and green tones of the film's prevailing visual style. The camera follows Emhoff as she mingles with anonymous individuals, sips on her drink, examines her cell phone, and finally takes a seat at a casino game table. She shifts uncomfortably, surrounded by a crowd of smiling, sweaty onlookers gathered to watch the game. The man to Beth's right leans forward slightly and holds out his poker chip with both hands. Bowing his head, he mimics the gesture of blowing on the chip. A close up shows a flash of realization across her face and Beth laughs, leaning forward to blow on the chip. The image freezes and a disembodied voice states: "It's transmission." The film returns to diegetic present, showing the same moment captured by grainy surveillance footage, frozen on a laptop screen.

This scene dramatizes the investigatory methods of epidemiologists facing an emergent outbreak who use careful organizational protocol to track the past movements of infected individuals. In the context of the film, this scene helps us reconcile the discrete geographical locations of the infected

[1] Latour, Bruno. *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Mass.: Harvard University Press, 1987), 129-30.

individuals who parish in the film's opening moments, including the Japanese businessman offering the chip, and American, Emhoff. This interaction between the two is paused, and "transmission" helps assign meaning to this moment, joining them together through this contagious interaction. The moment draws a causal line of transmission from one character to another to create clear geographical links and an infectious timeline for the rapidly spreading global infection [Fig 0.1]. Finally, the cut to the laptop screen reinscribes the temporal and stylistic shift of the flashback with the film's epidemiological narrative, which seeks to locate and track the spread of an emergent infectious outbreak.

Fig 0.1: "Transmission." *Contagion* (Soderbergh 2011)

In 2007, the World Health Organization (WHO) warned that infectious diseases were emerging at an unprecedented rate.[2] In the ten years since this announcement, we have seen the alarming the rise and fall of H1N1, Swine Flu, SARS, Ebola, and Zika, among other, less-publicized emergent outbreaks.[3] The Centers for Disease Control (CDC) defines emergent infectious diseases (EIDs) a products of globalization; that is, diseases that arise from the shifting environmental conditions, transportation networks, and social practices of an increasingly interconnected world.[4] *Contagion*'*s* epilogue, for example, dramatizes the emergence of the disease as it moves from bat to pig to human, locating its root in the deforestation efforts by an international corporation.[5] The film's fictional emergent infection and real outbreaks, like Zika and Ebola, demonstrate how EIDs implicate a whole host of political, economic, and cultural conditions, and have become critical sites of contention and criticism across scholarly disciplines, not limited to political science, literature, and sociology. From discussions of the nationalist values they uphold to the narratives of connectivity, EIDs have become central launch site for the analysis of globalized culture at large.

At the same time, EIDs have found their way into the hands and homes of the masses through news media and popular video games, television, and film. From the sensationalist headlines circulating across the internet [Fig 0.2] to the string of disease-driven television shows (see: *The Walking Dead* (Darabont 2010-)*, The Strain* (del Toro & Hogan 2014-)*, Helix* (Porsandeh 2014-15)*,*

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[2] WHO. "International Spread of Threatens Public Health Security," *World Health Organization,* 23 August 2007, http://www.who.int/mediacentre/news/releases/2007/pr44/en/

[3] The CDC has a vast archive of emergent outbreaks in the United States including acute bacterial and infectious outbreaks due to environmental disasters. CDC. "Emergency Preparedness and Response: Recent Emergent Outbreaks," *The Centers for Disease Control,* 2017, https://emergency.cdc.gov/recentincidents/index.asp

[4] The CDC's sentiment is echoed by Antonio Negri and Michael Hardt's claim, "The dark side of the consciousness of globalization is the fear of contagion." CDC. "What are emerging infectious diseases?" *The Centers for Disease Control,* 30 May 2014, http://wwwnc.cdc.gov/eid/page/background-goals; Hardt, Michael and Antonio Negri. *Empire* (Cambridge, Mass.: Harvard University Press, 2000), 136.

[5] While this scene offers causal lines of connection between discrete species populations, importantly, this scene does not offer a sense of comfort or control over the emergent outbreak. Rather it functions as a somewhat impotent gesture: highlighting the impossibility of controlling the environmental factors that lead to its emergence.

The Last Ship (Kane & Steinberg 2014-)*, Fortitude* (Donald 2015-), and *Containment* (Plec 2016)), to the outpour outbreak films (*It Comes at Night* (Shults 2017), *World War Z* (Forster 2013)*, 28 Days Later* (Boyle 2002)*, 28 Weeks Later* (Fresnadillo 2007)*, The Crazies* (Eisner 2010)*, Cabin in the Woods* (Goddard 2012)*, Pontypool* (McDonald 2008)*, Pandemic* (Suits 2016)*, [REC]*(Balaguero & Plaza 2007)*, Quarantine* (Dowdle 2008)*, Rise of the Planet of the Apes* (Wyatt 2011)*, Dawn of the Planet of the Apes* (Reeves 2014) just to note a few), emergent outbreaks have become favorite subject in popular media. *Contagion* is but one example of a growing archive of contemporary media that use EIDs to paint a dark and destructive portrait of global society. Across all of these texts, disease serves as a powerful and palpable threat that is capable of destroying life as we know it. Moreover, all of these examples emphasize the connective conditions that have lead to imminent demise. Densely populated urban centers or locations, like the crowded Hong Kong casino, transnational transportation systems, and the progress of modern science and global industry are posed as emergent sites of vulnerability, where a disease is likely to erupt and wreak havoc on the unsuspecting human population. As Pricilla Wald eloquently claims, "The interactions that make us sick also constitute us as community. Disease emergence dramatizes the dilemma that inspires most basic of human narratives: the necessity and danger of human contact."[6] *Contagion's* frozen surveillant sequence crystallizes Wald's account, offering us an evidentiary image that speaks to the very dangers of human interaction.

[6] Wald, Priscilla. *Contagious: Cultures, Carriers, and the Outbreak Narrative* (Durham: Duke University Press, 2008), 2.

Fig 0.2: *National Geographic* website, "Why Zika is This Year's Scary Virus." (Qummen *National Geographic*).

While globalizing processes may shrink geographical and social distances, placing us at a greater risk of contact with a diverse array of individuals across the world, the scene simultaneously points to the progress of science and technology in an era saturated with digital image production and circulation. The all-seeing gaze of the casino's cameras are capable of documenting transmission, capturing it, and making it available for viewing and reviewing. The moving image, recorded and reproduced digitally, in this sense, offers us insight into the unfolding of an invisible event—that of microscopic viral transmission—to render it a tangible evidentiary object for analytical scrutiny. *Contagion* suggests that technology, to some degree, offers us coherent representation of events that lead to knowledge of the outbreak, and ideally a level of control over its spread. Importantly, this scene extends this proposition to film form: that momentary freeze frame at then end of the flashback, however brief, is absolutely critical. Steven Soderbergh could have cut directly to the frozen surveillance footage on the laptop screen—this would have provided the same *narrative* information. But he chooses to halt the diegesis through a short freeze frame of Emhoff in close up. This image, juxtaposed against the frozen surveillance image aligns these two static pictures of "transmission" to unite the evidentiary moving image and epidemiological method. This cut, united

by expository voice over, collapses the cinematic and surveillant. "Transmission" extends across the images to implicate the cinematic medium in the method of epidemiological surveillance, as if to say, cinema too might provide the same investigatory and epistemological value as the "official" image of evidence. Like surveillance footage, moving images can be rewound, manipulated, or frozen in the attempt to organize—to represent—an emergent infectious outbreak.

This dissertation explores the intersection of media forms and scientific rhetoric in the representation of emergent infectious disease. The pair of "transmission" images offers a useful simile for this dissertation, but the scene's value lies in how it allows us to think about the formal codes and assumptions we use to uncouple the pair, or how to draw the division between the evidentiary and fictional moving images. The freeze frame, voice over narration, and editing all tell us how to read these images: as located, visualizations of viral transmission. But what allows us to see these frozen moments as evidence of an invisible biological process? The "transmission" moment in *Contagion* is a classic example of how media visualize the spread of a microscopic pathogen. In an effort to overcome the limitations of human vision, film and television have developed codes to help represent the spread of an invisible pathogen. As Kristin Ostherr and Pricilla Wald has shown, human contact tends to stand in for transmission; however, Soderbergh's freeze frame reminds us that media forms—the use of editing and voice over, in particular— are also integral to this translation.[7] Not only that, but the ability to read the image as transmission is dependent upon existing codes of evidence and investigation that extend beyond the cinematic into the scientific.

Perfect Contagion Machine turns to the rhetorical forms—the protocols, paradigms, logical structures, and formal patterns—that prop up the representation of emergent infections on screen.

[7] Ostherr, Kirsten. *Cinematic Prophylaxis: Globalization and Contagion in the Discourse of World Health* (Durham [N.C.]: Duke University Press, 2005); Wald, *Contagious*

Combining medium specific analysis of film, television, and video games with historical, anthropological, and sociological accounts of science and medicine, this dissertation traces the rhetorical structures that help contemporary media represent the complexity and scale of a networked outbreak. Each of the chapters interrogates a representational strategy—epidemiological maps, microscopic images, soundscapes and sonic technologies, and found footage horror aesthetics—pairing it with historical and theoretical work on scientific evidence and technology to show how popular media make us see, hear, feel, and know an outbreak. By interrogating how media forms helps us sense outbreaks, we encounter the representational forms and scientific logic that allow us to sense the world, and indeed, make sense *of* the world in its contemporary networked condition.[8]

EIDs in/as/and Networks

> "We can't get the risk [of infection] to zero here in the interconnected world."
> —Tom Frieden, Director, The Centers for Disease Control[9]

The emergence of disease outbreaks in popular media could simply be read as a symptom of our globalized conditions and the real life EIDs threatening the increasingly interconnected world population.[10] Indeed, many scholars use this interpretative impulse to link the representation of disease on screen and off to nationalist projects, internet culture and virality, and terrorist

[8] Patrick Jagoda offers "sensibilities of distribution" to describe how aesthetic texts help us sense incomprehensible network structures. Jagoda, Patrick. *Network Aesthetics* (Chicago: University of Chicago Press, 2016), 19.

[9] Frieden, Tom. CDC Press Conference, 8 October 2014. http://www.cnn.com/2014/10/08/health/ebola-us-airport-screening/index.html.

[10] Dahlia Schweitzer has explictly claimed a causal connection between the rise of disease in film and the 9/11 terrorist attacks. Schweitzer, Dahlia. "When Terrorism Met the Plague: How 9/11 Affected the Outbreak Narrative," *Cinema Journal* 56, no. 1 (Fall 2016): 118-123.

networks.[11] In all of these accounts, diseases are used to talk about larger sociopolitical problems in contemporary society that articulate our "fascination not just with the novelty and danger of the microbes but also with the changing social formations of a shrinking world."[12] This fascination stems from the way diseases seem to mimic or reveal the sheer scale and complexity of these networked conditions. Microscopic viruses travel, often-invisibly, across vast geographic spaces through person-to-person contact, and animal, food, and plant vectors. At the same time, infection is contingent upon particular social interactions, environmental factors, and even political policies: the population density of an urban area, the air quality, public health regulation, food handling and waste management etc. An outbreak therefore hinges on particular, small-scale biological factors in tandem with large-scale configurations of social bodies and institutions. This is precisely why Alexander Galloway and Eugene Thacker have claimed "emergent infectious diseases are networks…and [as networks] that work too well…they are beyond one's capacity to control them, or even to comprehend them."[13] As such, diseases in scholarship have become a way to express the very incomprehensibility of contemporary network culture.

Indeed following Galloway and Thacker's claims, EIDs and networks are often used interchangeably to discuss the incomprehensibility of our contemporary conditions. EIDs are capable of exposing the global transportation systems, geopolitical relationships, and social behaviors—as such, they are a kind of ghost in the machine. They force us to think about the conditions of globalization: the way we move through the world and how that world shapes that

[11] Wald and Ostherr both discuss outbreaks in the context of nationalist discourse, Jussi Parikka aligns outbreaks with viral online culture and computer viruses, and Eugene Thacker and Alexander Galloway focus on how EIDs are related to terrorist networks. Galloway, Alexander R., and Eugene Thacker. *The Exploit: A Theory of Networks* (Minneapolis: University of Minnesota Press, 2007); Parikka, Jussi. *Digital Contagions: A Media Archaeology of Computer Viruses* (New York: Peter Lang, 2007).

[12] Wald, *Contagious,* 2.

[13] Galloway and Thacker, *The Exploit,* 6, 95.

movement. And more so than that, as *products* of contemporary networked society, EIDs force us to encounter the biological impacts of those conditions: to face the way our shifting social, political, and economic systems could potentially lead to our demise.[14] The 2014 Ebola outbreak, for example, revealed the precarity of Western hospitals that were tasked with the identification and treatment of an incredibly rare pathogen. The infection of two nurses in Dallas, Texas, treating a man who had recently returned from a trip to Nigeria, demonstrated that in spite of international public health regulation and domestic health care protocol, healthy American citizens were susceptible to the virus. Moreover, though the Nigerian government was employing quarantine measures in an effort to quell the spread of the virus, the Dallas cases dramatized the impossibility of a public health and national security in a world where individuals can move rapidly across the globe.[15]

Contrary to the rhetoric of incomprehensibility, moments like the 2014 Dallas cluster transform the seemingly intangible conditions of globalization into a clearly defined series of events grounded in a biological process. The transmission of Ebola on US soil offered a coherent picture of how individuals—and therefore diseases— can move through transportation networks, and the subsequent procedures and infrastructures in place to stop its movement through local and global

[14] Though I use CDC's official language of globalization to designate the historical specificity of EIDs, it is worth noting that this dissertation focuses largely on the contemporary moment, one fundamentally shaped by the globalization's processes, but less attached to the classical structures of the economic structures that have come to define the 1990s. Rather, my dissertation highlights what we might call the aftermath of globalization, one defined by the decentralized and global networked conditions that no longer appear to be economic and industrial shifts or processes but fundamentally part of everyday life. In other words, the networks discussed in this project offers a portrait of the world in line with what Michael Hardt and Antonio Negri call the suspension of history under the regime of Empire. Produced through the systems of globalization and neoliberalism, Empire is felt and experienced as though "this is the way things will always be an the very way things were always meant to be." In other words, the interconnected, decentralized structures, and economic processes that move peoples, capital, and indeed, viruses, across the globe appear to be the "eternal" and fixed state of being. EIDs and the rhetoric of inescapability that surrounds these events, highlight the conditions in which viral outbreaks are inevitable and unstoppable parts of the processes and structures that shape life in the contemporary moment. Importantly Alexander Galloway reminds us that in spite of the decentralization, power structures—protocols—persist. While Galloway locates his analysis in the power structures of computers and technology, this dissertation illuminates the way science becomes a powerful way to shape the perception and responses to networked conditions and emergent outbreaks. Hardt & Negri, *Empire,* xiv; Galloway, Alexander. *Protocol: How Control Exists After Decentralization* (Leonardo Books, 2004), 7-8.

[15] Christensen, Jen & Goldschmidt, Debra." Out of Control: How the World Reacted as Ebola Spread," *CNN,* November 2014, http://www.cnn.com/interactive/2014/11/health/ebola-outbreak-timeline/

sites of contact. Though networks may be "incomprehensible," or as Galloway claims elsewhere, "unrepresentable," outbreaks offer sensible moments when the complexity of the system acutely expresses itself.[16] Tracking—or as Wald would claim, narrating—a disease outbreak offers a look at the architecture of networked culture: " The routes traveled by communicable disease light up the social interactions—the spaces and encounters, the practices and beliefs—of a changing world."[17] Seeing the movement of the Dallas man from Nigeria, to his stop over in Belgium, to his arrival on American soil offered a glimpse into the way people move through networks and the types of social formations and interactions that result. Following epidemiological tracking protocol, CDC officials sought to identify and locate every possible point of person-to-person contact, constructing a web of social interactions—possible infectious nodes—that quickly branched into a vast array of individuals, locations, and movements. Mapping, tracking, narrating an outbreak immediately offers a look at part of the vast global network.

In spite of the fact that these acute articulations clearly show networked relationships and structures, the examination of networks and EIDs in humanities scholarship too often dwells in the language of abstraction. Wald reminds us that outbreak, contagion, and virus are "more than epidemiological fact[s]:" they have long historical traditions that are related to social behaviors and cultural practices: like network infrastructures, contagion implicates a vast array of sociocultural conditions.[18] The analysis of EIDs reveals vast networked structures, systems, and protocols, as well historical social and cultural conditions and practices; however as a result, "specific diseases [and terms, for that matter] blur together as emerging infections map the changing spaces, relationships,

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[16] Galloway, Alexander, "Are Some Things Unrepresentable?" *The Interface Effect,* (Cambridge: Polity Press, 2012), 92.

[17] Wald, *Contagious,* 9.

[18] Wald, *Contagious,* 2.

practices, and temporalities of a globalizing world."[19] Outbreaks, which seemingly offered concrete glimpses at a network, fall into the trap of incomprehensibility and unrepresentable complexity. Wald's work is unique in that she seeks out specific sites to examine the way outbreaks express shifting sociocultural behaviors and conditions; however in her focus on culture, she fails to articulate how these epidemiological processes are communicated—represented—through particular media forms. But the prevailing strand of contemporary disease scholarship's use of disease to express abstract complexity simply rearticulates claims to network unrepresentability instead of considering the medium specific ways film, television, or even print journalism communicate epidemiological processes, geographic relationships, and other networked conditions central to tracking and communicating EIDs to the public.

Outbreaks have become expressive of what Galloway calls, "network pessimism," or the impulse to call everything a network, and subsequently use other networks to understand that original network.[20] This rhizomatic analytical structure produces a logical problem: every network becomes expressive of another network, and we're left with an infinite chain of overlapping configurations—indeed, another network. In order to escape this web, Galloway and Thacker turn to configurations within networks—lines, nodes and protocol—to see if they can locate the power structures that make this totalizing structure appear heterogeneous and hierarchical: that is, how power structures emerge and how one thinks through networks in spite of the rhizomatic structure. Unfortunately in their book-long account of networks, EIDs merely become another example of a network that expresses a network. Slipping between viral outbreaks like SARS, computer viruses, and bioterrorism, they use abstracted concepts like transmission and invisibility to articulate the

[19] Wald's language is paralleled by Hardt and Negri's claim that, "the age of globalization is the age of universal contagion." They, along with Wald, are more concerned with an earlier historical moment in the 1990s, marked by rapidly globalizing processes and the rise of HIV/AIDS in the US. Hardt and Negri, *Empire,* 136; Wald, *Contagious* 6-7.

[20] Galloway, Alexander. "Network Pessimism," *Culture and Communication,* 11 November 2014, http://cultureandcommunication.org/galloway/network-pessimism

complexity of global network culture: for Galloway and Thacker "disease is always virtual:" complex disease networks express network complexity.[21]

Nowhere is this circular hermeneutic more pervasive than in Jussi Parikka's *Digital Contagions,* where he rhetorically collapses network and contagion to discuss contemporary digital culture. Like Galloway and Thacker, contagion for Parikka, serves as an "open-ended system" that expresses "[network culture's] very defining modes of operating."[22] Though Parikka claims that he is not using contagion or virality metaphorically, the principle of contagion and it's multiple iterations across worldwide events and in culture, are used to *express* or "expose" conditions of network culture.[23] For example, through what he calls "asignifying semiotics," he makes the claim that computer viruses operate *like* biological ones, as "propitiating automata that are coded by an individual but reproduce within their system of language" and thus expresses the contemporary condition in which "order emerges out of chaos" to produce assemblages of "flows of matter and energy that achieve stability:" outbreaks, be that biological or technological, are fleeting moments of stability.[24]

While outbreaks undeniably expose structural components of networked culture—the way that new travel patterns and infrastructures places us into contact with a wide variety of peoples and objects, or the density of urban environments that serve as incubators for the silent spread of illness— Parikka, Galloway and Thacker's readings overlook the highly codified forms of evidence, reason, and logic that prop up those structures and critically, make them appear stable and coherent

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[21] Galloway and Thacker, *The Exploit,* 122.

[22] Parikka, *Digital Contagions,* 215.

[23] Parikka, *Digital Contagions,* 2.

[24] Parikka, *Digitial Contagions,* 14 and 166.

to the general public.[25] When Galloway and Thacker claim the virtuality of disease keeps society in a "state of permanent emergency wherein infection is always out of reach," they figure EIDs as an ideology, not a biological fact.[26] While disease is undoubtedly bound up in ideology and all of these networked factors and conditions, this reading washes over how infection, transmission, vectors, and a whole host of principles are central to the production of this emergency state and indeed, the recognition of the disease itself.

This dissertation argues it's not simply a matter of how EIDs expose the connectivity of our networked conditions, but the way they rely on and are articulated through scientific epistemologies and evidentiary forms, which, in turn, make them an incredibly powerful subject for fiction and nonfiction media alike. Outbreaks are, most immediately, biological events, and as such we understand them using the instruments, evidentiary forms, and logical principles of scientific and medical analysis.[27] Epidemiological concepts like transmission, infection, or vectors, may express larger social and political infrastructures, but what about the concepts themselves? How does the disease become sensible to us in the first place? How does it transform from an infected site or

[25] It is worth noting that though Galloway does not discuss the formal structures of EIDs in his collaborative work with Thacker, he is not entirely divorced from the methods of formal analysis. In his work on video games, for example, he attends to the structural principles of game design in order to make claims medium specific claims. However, in his discussion of EID networks, it would seem that EIDs themselves are those very structure. In other words, the biological processes and scientific communication structures are taken as givens. Galloway, Alexander R. *Gaming: Essays On Algorithmic Culture* (Minneapolis: University of Minnesota Press, 2006).

[26] This logic parallels Joseph Masco's claim that the counter terrorist state creates a constant state of emergency in order to promote preventative measures. Galloway and Thacker, *The Exploit,* 122; Masco, Joseph. *The Theater of Operations: National Security Affect From the Cold War to the War On Terror* (Durham: Duke University Press, 2014).

[27] I use event throughout this dissertation to describe the way outbreaks are figured in popular media. In other words, I use event in its most basic intuitive form: to mark a significant spatiotemporal happening—a disruption. Event, as opposed to fact, helps describe the way outbreaks are not understood as individual viruses, but a multiplicity of infections, social conditions, etc. However, it is worth noting that the biological fact of transmission is persistent across all outbreak events. The trouble with this notion is that it risks conflating the fact of transmission with the outbreak event, as demonstrated in Chapter 2. A further examination of the public perception of event v. fact of outbreak is worth exploring. However, a systematic philosophical account of outbreak events v. facts would deter from this dissertation's interest in the perceptual instincts and epistemological intuitions that shape the sense of an outbreak. Bennett, Jonathan Francis. *Events and Their Names* (Indianapolis: Hackett Pub. Co., 1988).

person into a network to relationality, complexity to chaos? And how are these ideas and concepts communicated to the public? All of these movements, and concepts have *representational forms*.

Perfect Contagion Machine examines these representational forms to understand the way outbreak structures are articulated through contemporary media. While accounting for and organizing an outbreak into a single, total representation may seem to be an impossible task, science, medicine, and mass media have found ways to communicate and make legible the spread of emergent infectious diseases. Speaking more generally about network representation at large, Patrick Jagoda argues, "even if some things or totalities are 'unrepresentable,' they can still be encountered and experienced."[28] Nowhere is this more apparent than in the sciences, where research and education continually seeks to explain the complex world around us. Science offers organizational and logical strategies that seek to articulate coherent interpretations or representations of contemporary networked structures; and media as expressive forms have the power to shape the experience and encounter of these explanations.[29] Regardless of whether these accounts are "accurate" iterations of a network, they are the foundational tools and epistemologies that give shape to our perception of the networked world around us. Seeing, understanding, knowing networks is not a matter of mastery, but glimpsing at how they operate.[30] As Bruno Latour claims, "knowledge does not reflect a real external world [or in this case, The Network] that it resembles via mimesis, but rather a real

[28] Jagoda, *Network Aesthetics,* 21.

[29] The use of "expressive forms" is derived from Lisa Gitelman's definition of media as "socially realized structures of communications…[including] both technological forms and their associated protocols." Which is to say that I take media to include the medium and the underlying formal composition of the media text. Gitelman, Lisa. *Always Already New: Media, History and the Data of Culture* (Cambridge, Mass.: MIT Press, 2006), 6.

[30] I follow Alexander Galloway's work on power and protocol, where he claims networked and distributed systems of power still have internal systems that produce the forms of management. In other words, protocol functions as "a technique for achieving voluntary regulation within a contingent environment." While Galloway turns to computer systems to discuss distributed power structures, I offer scientific paradigms as another useful set of signifying systems to consider the relationship between structure and decentralization in networked society. Galloway, *Protocol,* 7.

interior world, the coherence and continuity of which it helps ensure."[31] Thus following Latour, this dissertation explores how popular media "make knowable"—or as I contend, sensible—emergent outbreak networks by examining the interior world—a world built and sensed through scientific and media forms—that produce sensible instances of coherence and continuity.

Mediating EIDs

> "Science and media become transparent when scientists and society at large forget how many norms and standards they are heeding, and then forget that they are heeding norms and standards at all."
>
> —Lisa Gitelman[32]

By turning to sociological and anthropological accounts of science and medicine, *Perfect Contagion Machine* offers a new way of approaching the representation of contagion in media at large. Historical accounts of outbreaks on screen have largely focused on the cultural and social implications of representation, or the way that representations of outbreak configure bodies, use particular imagery or language that may reflect or influence the perception of cultural practices or populations. Wald and Ostherr's respective accounts of contagion across the 20th century focus on the way epidemiological concepts have profound impacts on the public's understanding of risk, safety, and vulnerability to infection.[33] However, like the analysis of EIDs and networks, these readings frequently leap from disease to society with little account of the logic that underlies the representational form in the first place. Maps, sickly patients, quarantine measures are read as

[31] Latour, Bruno. *Pandora's Hope: Essays On the Reality of Science Studies* (Cambridge, Mass.: Harvard University Press, 1999), 58.

[32] Gitelman, *Always Already New,* 6.

[33] Also see Susan Sontag for a longer literary history of this mode of analysis. Sontag, Susan. *Illness As Metaphor ; And, AIDS and Its Metaphors* (New York: Doubleday, 1990).

symptomatic or expressive of cultural, social, and political ideologies.[34] That is to say, like EIDs reflect networks, cultural readings of outbreak frequently claim that outbreaks reflect culture. This leaves us with a chain of referents seeming propped up by the scientific authority of the biological understanding of "contagion."

Alternatively, media—films, computers, cell phones, internet memes— become metaphors for the spread of viruses.[35] Ostherr, for example, begins by straddling these two modes of analysis, claiming that audiovisual representations of disease operate, "not only as vehicles of educational and ideological dissemination, but also as *metaphors* for the spread of disease within the processes of globalization."[36] The transmission of representational content across media platforms becomes a way to describe the transmission of viruses across the world. Indeed, the emergence of the rhetoric of virality to describe the circulation and popularity of internet-based material is the product of this mode of analysis. Both the symptomatic cultural readings of viruses and the metaphorical application of media platforms figure media as inert carriers of information or symbolic

[34] For example in her analysis of an animated epidemiological map in the 1950 public health film "The Fight Against Communicable Diseases," Ostherr rightfully claims that the map's animated spread of the virus from a small Midwestern town outward suggests "that any disease outbreak…could easily result in universal contagion." In order to articulate how maps successfully communicate this universality, she claims, "the ambiguous indexicality of cartography, undermines the potency of the image [of a map]." Rather than qualifying what it means that a map has "ambiguous indexicality"—what rhetorical structures and epistemologies of power and vision may be play— she immediately amasses a collection of examples of maps in film to finally claim that "epidemiological maps thus perform the crucial function of linking disease with radically marked bodies…Through this displacement, bodily invading becomes national invasion." I offer this example not to claim that Ostherr's reading is wrong; indeed her readings of post war mapping strategies articulate the powerful implications of global visualization. Indeed, signaling the map's problematic relationship to indexicality indicates that authoritative forms of evidence deserve critical pause. However by immediately making the interpretive leap from visualization to culture, the map's communicative structures and the role of cinematic form is lost in favor of the analysis of power. Ostherr, *Cinematic Prophylaxis,* 74-76.

[35] Parikka and Galloway and Thacker frequently slip into the viral metaphor to discuss modern technologies of communication. Jenkins et al. dedicates an entire book to proposing a new term to describe media circulation due to the harmful ubiquity of the viral media metaphor. Jenkins, Henry, Sam Ford, and Joshua (Joshua Benjamin) Green. *Spreadable Media: Creating Value and Meaning in a Networked Culture* (New York: New York University Press, 2013).

[36] It is also important to note that while this particular quote is tied to Ostherr's discussion of SARS, she defines "globalization" as a post war phenomenon. This is contrary to my own use of the term to describe the historical period that has been marked by the rise of neoliberalism, or "Late Capitalism" to denote a socio-economic shift emerging in the late 1970s and early 1980s. Ostherr, *Cinetmatic Prophylaxis,* 2.

representations of epidemiological concepts—"media circulate like viruses."[37] However, this dissertation shows how media are neither passive vehicles for representation nor metaphors for globalization. They, like the surrounding signifying structures in science, participate in meaning making and reception.

Symptomatic readings are largely facilitated by the representational tropes used to overcome the problem of viral invisibility. Since microscopic pathogens are not accessible to the naked human eye, media often use people, behaviors, and places to stand in for the outbreak; consequently, analysis almost exclusively focuses on these representational proxies, effectively obfuscating the underlying biological processes and presences.[38] In her historical account of contagion, Ostherr claims that all viral representations operate through a "dialectic of visibility and invisibility," or by coding visual objects or persons with the "presence" of the virus.[39] Within a filmic text, visual, cultural, and geographical signifiers frequently become endowed with viral meaning. By this I mean the surface of the skin—its pigment—or certain social greetings, burial practices, or regions located on a map come to stand in for a disease. For example, *Contagion's* flashback uses Emhoff to stand in for the virus. Her movements, points of contact, and the subsequent moment of "transmission" are all coded with the viral "presence" established in the film's opening moments. Ostherr's dialectic ultimately assumes that "seeing" the virus thus always involves the imagination of the viewer, who

[37] Parikka's work is by and large concerned with the metaphor of virality. He is not alone in this mode of analysis. See: Mitchell, Peta. *Contagious Metaphor* (London ; New York: Bloomsbury Academic, 2012); Jenkins et al, *Spreadable Media*; Sampson, Tony D. *Virality: Contagion Theory in the Age of Networks* (Minneapolis: University of Minnesota Press, 2012).

[38] Nowhere is this more true than accounts of the intersection between disease and the zombie horror genre. Indebted to historical discussions of zombieism, many scholars argue the modern films on infectious zombie outbreaks reflect sociopolitical anxieties related to terrorism, neoliberalism, and emergent pandemics. Carroll, Jordan S. "The Aesthetics of Risk in 'Dawn of the Dead' and '28 Days Later'," *Journal of the Fantastic in the Arts*, vol. 23(1) (2012); Hall, Derek. "Varieties of Zombieism: Approaching Comparative Political Economy through 28 Days Later and Wild Zero." *International Studies Perspectives* 12, no. 1 (February 2011): 1-17; Schweitzer, "When Terrorism met the Plague."

[39] Ostherr, *Cinematic Prophylaxis,* 15.

maps the disease onto the onto the diegetic proxy.[40] As a result, scholarly interpretations tend to focus on the objects or persons that are designed to stand in for invisible pathogen; and like Ostherr's dialectic, the virus is always absent.

That being said, Wald and Ostherr's work warrants this focus based on the prevailing representational trends over the course of the 20th century. Historically, outbreaks have been represented through configurations of individual and collective bodies that are coded as "different," that unavoidably contain social and cultural connotations capable of reflecting or influencing the public imaginary. For example, Wald's analysis of the HIV/AIDS epidemic demonstrates how the displacement of the disease onto bodies, populations, and corresponding stereotypes about behaviors created rampant social stigma and false assumptions about risk. Her analysis follows Paula Treichler's claim that the HIV/AIDS outbreak was an "epidemic of signification," a frightening cultural phenomenon because it was capable of traveling covertly across healthy, adult populations.[41] News media used unprotected sex in gay communities to emblematize the epidemic—to stand in for HIV/AIDS itself— and helped define the homophobic fallacies that surrounded the public perception of the epidemic in the early 1990s.[42] By emphasizing a specific population, mass media helped shape the public's interpretation of gay identity and social behaviors.

While symptomatic, cultural readings are essential ways to understand the impacts of an outbreak and the deeply problematic social and political implications of epidemiological methods,

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[40] Ostherr, *Cinematic Prophylaxis,* 7.

[41] Treichler, Paula. *How to Have Theory in an Epidemic: Cultural Chronicles of AIDS* (Durham: Duke University Press, 1999), 3.

[42] Wald also goes onto discuss the vilification of "Africa" once scientific research begins to track the origins of the disease's emergence. 222-230. Additional cultural discussions of AIDS representation in film, in particular, can be found in: Sontag, *Illness as Metaphor*; Hart, Kylo-Patrick R. *The AIDS Movie: Representing a Pandemic in Film and Television* (New York: Haworth Press, 2000); Tran, Danielle. "Visible and invisible trauma: locating AIDS within a gendered framework in Darrell James Roodt's Yesterday," *Safundi* 17, no. 4 (October 2016): 434-446.; Jih-Fei, Cheng. "How to Survive: AIDS and Its Afterlives in Popular Media," *Women's Studies Quarterly* 44, no. 1/2 (Spring/Summer 2016): 73-92.; Juhasz, Alexandra, and Ming-Yuen S Ma. "Moving Pictures: Moving Pictures: AIDS on Film and Video: Paul Sendziuk," *GLQ: A Journal Of Lesbian And Gay Studies* no. 3 (2010): 429.

immediately turning to cultural reflection causes us to lose sight of the outbreak itself. When outbreak becomes a placeholder to discuss other issues—gender, race, networks, politics etc—we overlook the complex structures that underlie the movement from biological pathogen to network culture. Missing from Wald and Ostherr's rich accounts is the role of science and media forms. While both scholars acknowledge the incredible power of scientific and medical imagery and language, they tend to figure media as *vehicle* for content, and science and medicine has transparent representational aids. *Perfect Contagion Machine* seeks to understand the steps in between the codified representational forms and the holistic interpretation of an outbreak: the formal and rhetorical structures and forms that help the viewer understand the relationship between evidentiary materials like disease map, surveillance footage, or microscopic image, and the omnipresent, global viral outbreak.

This dissertation contends that these representational codes used by popular media to represent EIDs today are deeply intertwined with scientific and medical imagery, protocol, and logical paradigms. Therefore my shift in analysis is, in part, a historical one. Ostherr and Wald's accounts of outbreaks are guided by representational strategies that they track across the 20th century. But in the last twenty years, likely due to the rise of real world EIDs, fiction films, television, and games have increasingly turned away from bodies and populations in favor of drawing upon the imagery and language of science and medicine. *Perfect Contagion Machine* highlights the growing collection of films and television series that have turned away from infected, individual bodies. *Word War Z, 28 Days,* and *The Last Ship,* for example, all begin in the midst of deadly outbreaks and consequently turn to the population scale to represent the presence of a deadly viral threat.[43] And *28 Weeks Later,*

[43] Structurally this can be seen in the rise of "network narrative" films like *Contagion.* David Bordwell uses network to describe films where in lieu of a central storyline and protagonist, films will have "several protagonists [that] are given more or less the same weight as they participate in intertwining plotlines. Usually these lines affect one another to some degree. The characters might be strangers, slight acquaintances, friends, or kinfolk. The film aims to show a larger pattern underlying their individual trajectories." Bordwell, David. "Lessons from Babel," *Observations on Film Art,* 27 November 2006, http://www.davidbordwell.net/blog/2006/11/27/lessons-from-babel/

Contagion, and *Containment* all emphasize the epidemiological containment strategies and complex scientific and political structures of outbreak management. EIDs, like SARS, Zika, or Swine Flu express very few physical symptoms, and those that do manifest physically tend to resemble a respiratory infection or seasonal flu. Moreover, these outbreaks are increasingly emerging in wide variety of populations and geographical locations. Facilitated by the networks of globalized society, no age, gender, race, or sexuality seems to be immune. Though culturally coded representational strategies persist— targeted regions of the world, for example, continue to permeate contemporary figurations of outbreaks along with corresponding cultural stereotypes—*Contagion's* flashback, and the collection of texts explored throughout this dissertation, attest to the rise of technological, scientific, and medical support.[44] Emhoff's body may signify the presence of the virus, but it is only through the figure of diegetic expert and the intervention of evidentiary media that "transmission" is successfully articulated.[45] Recent fiction films, television, and video games exhibit a greater concern for precise epidemiological methods, instruments of analysis, and imagery to communicate the spread of emergent pathogens. From the horror films such as *28 Days Later, [REC],* and *Pontypool,* to Hollywood action films like *World War Z* or *Rise of the Planet of the Apes,* the mise-en-scene of modern disease film is increasingly saturated with scientific and medical imagery; and hugely popular mobile games, like *Plague Inc* (Ndemic Creations 2012) and *Pandemic* (Asmodee Digital 2016), feature epidemiological map interfaces, and locate game play in the mutation of viral pathogens.

[44] Contagion has been criticized for creating a dichotomy between Asia and "The West," which has been further reinforced by visually emphasizing Asia as "unclean" or "unhygienic." Benson-Allott, Caetlin. "Out of Sight," *Film Quarterly* 65, no. 2 (Winter 2011): 14-15.

[45] This movement away from individuals is paralleled by a recent study that has "exonerated" HIV's patient zero in the US. A team of researchers at University of Arizona has found indications that HIV/AIDS was present in the United States prior to the string of cases that were traced by to the flight attendant Gaeten Dugas. Prior to this discovery, Dugas served as a "Typhoid Mary" villain for the epidemic's emergence. McNeil, Donald. "HIV Arrived in the US Long Before 'Patient Zero,'" *The New York Times,* 26 October 2016, https://www.nytimes.com/2016/10/27/health/hiv-patient-zero-genetic-analysis.html?mcubz=0.

While it's safe to say that HIV has even fewer physical indications of infection, the clusters within gay populations helped create a narrative associated with particular social and geographical boundaries.[46] EIDs, on the other hand, spread rapidly across the world, often undetected and unstoppable. Indeed, in the first sentence of *Cinematic Prophylaxis,* published just two years after the SARS outbreak, Ostherr claims that public health policy and protocol was "undermined by the invisibility of contagion."[47] By failing to offer a visual correlate of the virus, SARS moved quietly and quickly through global transportation networks. This bold statement demonstrates the problem of representation facing contemporary media today: EIDs lack easily identifiable visual codes or populations. Consequently, there has been a rise of alternative representational strategies that emphasize the networks of transmission, epidemiological tracking methods, and scientific analysis of invisible pathogens. Indeed, underlying Ostherr's statement about SARS and her work at large, is the central scientific paradigm that aligns vision and control. This logic pervades her dialectical analysis and is also detrimental to Wald's account of the contagion narrative.[48] Bodies, narrative, nations, and populations are all ways to visualize the virus and therefore make it controllable. But this dissertation contends it's not merely *what* is made visible but *how*. The representational forms that prop up our sense of an outbreak are reliant on communicative structures and rhetoric. Thus, I ask: how do texts ask us to read an individual or population as a viral proxy? How does a particular diagram or map communicate the distribution and spread of a virus?

In order to answer these questions, *Perfect Contagion Machine* turns to science and media as communicative forms. This perspective is indebted to structuralist accounts of science, which claim

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[46] Wald, *Contagious.*

[47] Ostherr, *Cinematic Prophylaxis,* 1.

[48] Both Ostherr and Wald's account begin by foregrounding the relationship between vision and viral control. Following their attention to the cultural implications of these power structures, control is most often located in policing national boundaries, marked populations, or social gestures.

that facts, truth, objectivity and other seemingly empirical categories of knowledge are products carefully codified rational and experimental structures that shift over time.[49] Though science claims to offer an objective interpretation of apriori reality, sociological and anthropological accounts of science and medicine have argued that these interpretations and their subsequent representations of the world rely on internal systems of meaning production: "the sciences do not speak of the world, but rather, construct representations that seems always to push it away but also bring it closer.[50]" I turn to these self-satisfying systems not to dismiss science, but to use science's representational tool kit to understand how it helps us make sense of an emergent outbreak. *Perfect Contagion Machine* uses the signifying structures—the evidentiary forms, logic, and scientific paradigms—of science to convey invisible process like the biological spread of pathogens, and social restructuring of epidemiological management strategies.

Emerging in the postwar in the United States and Europe, Science and Technology Studies (STS) has sought to analyze the experimental and proof-making structures of scientific research and experimentation. Lead by social scientists, anthropologists, historians, and philosophers, like Latour, Steve Woolgar, Stephen Shapin, Simon Schaffer, and Thomas Kuhn, STS brings humanist and social scientific analysis to bear on the methods and logic of science and medicine. The anti-essentialist field begins "from an assumption that science and technology are thoroughly social activities," demonstrating the way culture and society influence or are inflected within scientific research.[51] In particular, I draw from the work of Bruno Latour and Steve Woolgar, who use anthropological

[49] Many historians of science have demonstrated the shift of evidentiary and analytical paradigms within the sciences. Some of the most famous accounts include: Daston, Lorraine, and Peter Galison. *Objectivity* (New York : Cambridge, Mass.: Zone Books, 2007); Distributed by the MIT Press, 2007; Lynch, Michael. *Truth Machine: The Contentious History of DNA Fingerprinting* (Chicago: University of Chicago Press, 2008); Shapin, Steven, Simon Schaffer, Thomas Hobbes, and American Council of Learned Societies. *Leviathan and the Air-pump: Hobbes, Boyle, and the Experimental Life* (Princeton, N.J.: Princeton University Press, 19890.

[50] Latour, *Pandora's Hope,* 30.

[51] Sismondo, Sergio. *What is Science and Technology Studies?* (Oxford: Blackwell 2010), 10-11.

methods to carefully track the movement from scientific experiment to publically disseminated fact. Latour and Woolgar's *Laboratory of Life,* and Latour's later work, *Science in Action,* combine structuralism and ethnography to show how systems, like protocol, documentation, and publication, are all carefully designed to efface traces of society and culture.[52] Latour's work in these early accounts through the development of "Actor-Network Theory" in *Pandora's Hope,* seeks to demonstrate the complex weave of humans and technology in claims to knowledge production—the way simple exchange between scientists in a lab, or the marking down of experimental findings, or the translation of data into a graph is caught up in a collection of human and non-human agents. I turn specifically to Latour's early body of work for his careful analysis of scientific forms: that is, the ridged protocols and methods science uses to produce and communicate knowledge.[53] These early accounts show how technology, images, and language all influence the communication and perception of scientific authority. In other words, he traces the "actors" that collectively *signify* science and the paradigmatic processes that reinforce their social dominance.[54]

While science may construct—or allow us to sense—representations of the world, this dissertation shows that media are active participants. As Latour argues, in order to understand scientific knowledge and evidence, we must attend to the broader communicative structures: "Taken in isolation, an electron microscopic image of a virus, a photograph of a galaxy, and the drawing of a skeleton in a natural history museum have no specific value…If you want to understand what an

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[52] Latour and Woolgar, *Laboratory of Life;* Latour, *Science in Action.*

[53] I use "scientific form" here to communicate what I see as an affinity between how formal analysis and Latour's account of socially conditioned scientific structures. Latour is invested in how science has carefully codified systems of meaning production that are used to signify objectivity, authority, and truth, not unlike Film Studies' investment in the relationship between film form and narrative or experience. For example, one might see trace the similarities between David Bordwell's investment in the formal communication of narrative in "Classical Hollywood Narration" and it's paradigmatic transformations over the last forty years in *The Way Hollywood Tells It,* to Latour's account of scientific communication in *Science in Action* and "Visualization and Cognition." Latour, Bruno. "Visualization and Cognition," *Knowledge & Society* 6 (January 1986): 1-40.

[54] Latour, *Pandora's Hope.*

isolated inscription means in science, you have to reinsert it inside the cascade of other inscriptions out of which it has been extracted."[55] Thus I explore the "cascade" of structures that support and surround science on screen that are bound together and perpetuated through media forms. Marrying theories of knowledge and evidence from STS, Sound Studies, and Geography with formal analysis, *Perfect Contagion Machine* shows how scientific principles and concepts are not merely content—facts, figures, or truths—carried by media, but communicated and understood through combination of media's formal representational patterns and the underlying paradigms and logic that shape scientific knowledge itself. *Contagion's* freeze-frame juxtaposed against the surveillance footage offers a particularly apt example of how film form facilitates the communication of an epidemiological concept—transmission. The translation of the two frozen images is not merely a product of their representational content, but the combination of the frozen moment in time, recognizable aesthetics of surveillance footage, and the voice of the diegetic expert, bound together through editing and sound design. The sequence expresses the film's internal logic that implicates the medium into the project of tracking the spread of a deadly virus. The film reminds us that media forms—surveillance imagery, for example—are integral to epidemiological methods and the collection and presentation of evidence; or we might say, the film reminds us of the instrumental value of media in making sense of outbreaks and indeed, making them sensible to the general public.

Perfect Contagion Machine therefore suspends symptomatic cultural and metaphorical analysis in favor of attending to the intersection of scientific and media forms on screen. By looking at how formal patterns like editing, sound design, and cinematography work *with* epistemologies of vision, scientific logic, and evidentiary images, this dissertation shows the integral role media plays in the

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[55] Latour, Bruno. "Entering a risky territory: space in the age of digital navigation," *Environment And Planning D-Society & Space*, 28, no. 4 (2010): 588.

perception and understanding of EIDs and indeed, globalized, network society.[56] This method distinguishes itself from cultural analysis of contagion, which often falls on far ends of the spectrum by either treating media as containers for content, or using media as a metaphor for contagion itself. Turning to the epistemological and representational foundations of EIDs on screen, *Perfect Contagion Machine* examines how contagion itself—as a scientific principle—is communicated by signifying systems of science and media forms.

Sensing Outbreak

> "Our idea of anything *is* our idea of its sensible effects…our conception of these effects is the whole of our conception of the object"
> —Charles Sanders Peirce[57]

Given the gravity and timeliness of this topic, one might ask why this dissertation focuses on the fictional, popular figurations of EIDs. Undoubtedly, there is much work to be done on the short documentaries on outbreaks aired on cable news, the articles published across scientific and popular magazines and newspapers during the "Summer of Ebola," and the "Year of Zika," as well as the corresponding public health protocols and containment strategies that emerged from the ubiquitous press coverage.[58] However, I turn to popular, fictional media to explore the representational strategies taken for granted—the conventions we overlook or passively accept as evidence or truths. Hollywood films, network and cable television series, and free mobile app games offer a wealth of

[56] My method is indebted to rigorous historical work offered by Scott Curtis, Lisa Cartwright, and Jonathan Sterne who carefully examine the way the invention of technologies like cinema, the microscope, or the stethoscope, offered new ways of mediating the world around us, and subsequently helped shape scientific protocol, and diagnostic processes. Cartwright, Lisa. *Screening the Body: Tracing Medicine's Visual Culture* (Minneapolis: University of Minnesota Press, 1995); Curtis, Scott. "Still/Moving: Digital Imaging and Medical Hermenutics," *Memory Bytes* (Durham, NC: Duke University Press, 2004), 218-254; Sterne, Jonathan. "Mediate Auscultation, the Stethoscope, and the "Autopsy of the Living": Medicine's Acoustic Culture." *Journal Of Medical Humanities* 22, no. 2 (Summer 2001): 115-136.

[57] Pierce, C. S. "How to Make Our Ideas Clear," *Popular Science Monthly* 12 (January.1878): 286-302.

[58] Quammen, David. "Why Zika is this Years' Scariest Virus," *National Geographic,* 28 January 2016, http://news.nationalgeographic.com/2016/01/160128-zika-virus-birth-defects-brian-damage-history-science/

clichéd characters and settings, recycled plots, and hackneyed moral lessons: indeed, there is no better sight to explore convention. Propping up these spectacular stories of global pandemics, heroic accounts of brave epidemiologists, and the terrifying lessons learned about public health security and safety, is "science."

My use of scare quotes is meant to designate how science is dramatized to the masses through fictional media: the instruments, images, character archetypes, and settings that compose the visual rhetoric of science on screen. Like *Contagion's* "transmission" images, these evidentiary forms and language create the *impression* or *sense of science,* and are consequently often overlooked in spite of their critical narrative or epistemological role. This is by and large related to very representational conventions that structure the body of a media text: they have been so well integrated into the vernacular of media forms that we fail to recognize their argumentative structures and powerful effects. From the petri dish samples containing a sample that can prove a scientific hypothesis, to the x-ray images or CT scans that reveal the gravity of an internal injury, films, television, and games continually use scientific and medical instruments and evidentiary forms to give shape to a moment or broader narrative structure. The interpretation of a x-ray or the point of view shot of a doctor or scientist gazing into a microscope often feels natural or intuitive: these encounters hardly ever interrupt our sense of diegetic coherence or rupture our sense of reality. By turning to these seemingly transparent or intuitive encounters with "science" this dissertation offers an account of the sense of scientific expertise, logic and evidence, or the *sense of an outbreak*.

The intersection of science and media technologies, like cinema and photography has received considerable attention in the field Film Studies. Extensive historical work has shown how visualization technologies, capable of capturing, documenting, and reproducing seen and unseen

phenomena, became part of the apparatus of scientific discovery.[59] Today, however, in an age where technology, science, and medicine seem to continually outpace the human, the instruments, logic, and images of science and medicine have increasingly become part of our ordinary visual landscape. Therefore in order to understand the lineage of many of the epistemological formations traced in these early technological histories, I turn to the popular as a site to explore the way science has woven itself into the contemporary media vernacular.

Importantly, this is not the first foray into popular representations of science on screen; this dissertation is indebted to the historical foundation laid by scholars like Oliver Gaycken and Ostherr who have sought to draw across entertainment, education, and public health, to show how scientific imagery and language has been represented, consumed, and interpreted by audiences in the 20th century. Indeed this dissertation seeks to continue Gaycken's methodological work, which attends to the intersection of scientific and cinematic patterns of signification in early popular science films. Gaycken's however, is primarily invested in the historical analysis of texts that foreground scientific content. Borrowing Neil Harris' term, he claims that early popular science films utilize the "operational aesthetic," by showcasing "how things work."[60] While encounters with spectacular images of scientific processes or compelling reproductions of evidence, graphs, and charts may have enticed audiences' curiosity or helped validate its authority, today science and medicine in popular media have become background noise. From the forensic and medical dramas continually recycled in network television, to the latest Blockbuster scifi flicks, to the sensationalist click bait headlines

[59] Extensive historical work on these issues can be found in the work of Scott Curtis, Lisa Cartwright, and Georges Didi-Hubermann. Cartwright, *Screenign the Body*; Curtis, Scott. "Science Lessons," *Film History,* v. 25, (2013): 45-54; Curtis, Scott. *The Shape of Spectatorship: Art, Science, and Early Cinema in Germany* (New York: Columbia University Press, 2015); Didi-Huberman, Georges. *Invention of Hysteria : Charcot and the Photographic Iconography of the Salpêtrière* (Cambridge, Mass.: MIT Press, 2003).

[60] Gaycken, Oliver. *Devices of Curiosity: Early Cinema and Popular Science* (New York, NY: Oxford University Press, 2015), 11.

circulating across the web, "science" is a ubiquitous part of everyday life. Thus today, that "how" is increasingly embedded in an intertwined with the conventions of fiction film, television, and games.

As such, this dissertation focuses heavily on the *effect* of media and scientific forms. That is, I am less concerned with the "accuracy," "authenticity," or "facticity" of the epidemiological map or microscopic image, and more concerned with why we might not question these "scientific" moments in the first place. By situating these moments in structural accounts of science and medicine, I show how these seemingly intuitive iterations of evidence and logic are conveyed through the combination of epistemological paradigms, codified experimental protocol, and media forms that come together to produce an impression of an emergent outbreak.[61]

An outbreak's impact at the individual or global scale cannot be expressed simply through numbers and diagrams. Indeed, what drives much of the preventative protocol, quarantine strategies, international containment measures, and vaccine research is related to the public's reception of an outbreak. Zika and Ebola made headlines once the virus began to threaten the seemingly safe Western world. News media were central to producing the persistent sense of vulnerability to the virus. For instance, CNN begins its timeline of the Ebola outbreak in 2014 with the following:

> *Imagine* – the largest Ebola epidemic in history began with the simple act of caring for a child (emphasis mine). Soon, it spread from the child's remote village in Guinea. And now, the infection has wiped out entire families, created thousands of orphans in its wake, and left people terrified from Dubreka, Guinea, to Dallas, Texas. Scientists predict as many as 1.4 million people could be infected if nothing is done to help.[62]

Though this statement includes precise locations, statistical data supported by "scientists," I want to draw attention to the quotation's beginning. The statement immediately addresses the reader, asking

[61] Bruno Latour claims the division between science and phenomenology has helped produce the perception that science exists as an autonomous category of knowledge. Phenomenology, he argues participates in this division, by aligning it with the body and experience. Latour seeks to traverse these categories by offering the term "actor" to describe both human and nonhuman participants in meaning-making systems. While I do not dismiss phenomenology, indeed I take it up as a method at moments in this dissertation, I seek to traverse this division by considering the relationship between media experiences and science. Latour, *Pandora's Hope,* 9.

them to "imagine" an incredibly familiar and emotionally wrought scenario. The outbreak is articulated and contextualized by drawing upon a collection of supporting scientific and emotional materials. Vulnerability and the sense of the outbreak's relationship to the reader is the result the assemblage of data and imagery that collectively articulate the scale, distribution, infection rate, and gravity of the emergent outbreak.

Indeed, as I show, no singular representational strategy is capable of "standing in" for the outbreak. From the microscopic invisibility of the virus, to its geographical distribution, and the social structural reorganizations of quarantine, an outbreak's effects are felt and understood at a variety of visual and experiential scales. Through an attention to the rhetoric of representational forms, this dissertation reveals how media help us *sense* an outbreak at a variety of visual, affective, and epistemological levels. Maps, images, diagrams, and reports might help us make sense of the scale, geographical distribution, and infection rates of a deadly virus, but they can hardly account for the totality of an outbreak in all its networked complexity. All four chapters are therefore dedicated to a single rhetorical form—the epidemiological map, microscopic image, sound mixing and audio visualization, and the found footage horror genre—in order to attend to the way these common representational strategies help communicate a networked outbreak. Each chapter moves between the paradigmatic and exemplary to show how media navigate the relationship between the particular and general, the microscopic and the global, the individual patient and population. I begin by first outlining the representational strategy's paradigmatic use, situating it within a broader discourse of science and medicine, and then move to an exemplary, often reflexive, case study to demonstrate the scope of its rhetorical power.

Chapter One starts with the most familiar representational convention: the disease map. Through the analysis of *Dawn of the Planet of the Apes'* animated map illustrating the spread of the

[62] Christensen, Jen & Goldschmidt, Debora. "Out of Control:' How the World Reacted as Ebola Spread," *CNN,*

Simian virus across the globe, I parse the aesthetic and rhetorical structures of the maps. Drawing upon scholarship on disease mapping from Geography, I situate these graphic translations of the outbreak in the rhetorical and representational strategies used by epidemiologists to control emergent infectious threats. While for epidemiologists, disease mapping offers a way to compare infection rates and geographic locations and therefore acquire some degree of control over its spread, I argue the disease map on screen serves to undermine the viewer's comprehension, and by extension forestalls a feeling of control, over the emergent outbreak. *Dawns'* map demonstrateswhat I call, "relational ontology," which asks us to continually draw comparisons between the symbolic renderings of infection to guess where and when the virus may strike next. Extending these paradigmatic rhetorical structures, I turn to the use of the map in mobile app and browser based games. Through close readings of the epidemiological map interface, I argue that games exploit the aesthetic and rhetorical functions of the map to create a feeling of viral omnipresence. By asking players to continually move between game modules, where they juggle supplemental content like news articles and disease facts, these games place the player into an anxious state of emergency. I contextualize this affective relationship between the rhetoric of the interface and the gaming experience within discussions of biosecurity and counterterrorism to argue that the instrumental function of map—to visualize and therefore control an outbreak—ostensibly reproduces the logic of biosecurity underlying contemporary geopolitics.

In Chapter Two, I trace the rhetorical structures that often surround what we consider to be a neutral representation, the microscopic image, which has become one a favorite substitute for a virus on screen. As an instantaneously recognizable image and symbol of scientific evidence, the microscopic image often serves as a crucial tipping point in the outbreak narrative. Drawing upon historical and anthropological accounts of scientific protocol and objectivity, I use the programmatic

December 2016, http://www.cnn.com/interactive/2014/11/health/ebola-outbreak-timeline/

television series *House* (Shore 2004-2012) to argue that despite the illusion of transparency, the apparition of the microscopic image on screen relies on heavily codified representational systems capable of translating the tissue sample located in a petri dish into an evidentiary image of the virus.

Attending to the ordinariness of the microscopic image and other seemingly inert representational forms reveals the critical structural role they play in articulating an outbreak. In the case of the microscopic image, I show how the epistemological instability of the image and its surrounding representational tropes help navigate the networked and scalar complexities of an emergent outbreak. Turning to *Contagion,* I demonstrate how the film uses the uncertainty—illegibility—of the microscopic image to assemble a networked outbreak. Rather than offering up a concrete and stable representation, I emphasize the effect of media forms to argue that outbreaks are grasped through encounters with representational forms that help anchor the event to particular scientific paradigms, technologies, and logics continuous with our own sense of being in the world. *Contagion,* withholds a fully formed translation of the microscopic image, and instead uses editing to gradually unpack its significance by moving from the space of the lab to global pharmaceutical marketplace, offering new bits of information with each step along the way. The sense of the outbreak only emerges through the collection of images of scientific evidence, exposition delivered by diegetic experts, supplemental information provided through mass media, and contextualizing it within a global economic marketplace.

The perception of outbreaks is not confined to the official spaces and representational forms of science and medicine. Thus in line with Jogoda's claim that omnipresent networks "are most distinctly felt, materialized and conceived through the experience of everyday media and ordinary social practices," the second half of the dissertation moves beyond explicitly scientific forms evidence to consider the affective and experiential possibilities of knowledge on screen.[63] Chapter

[63] Jagoda, *Network Aesthetics,* 5.

Three develops the discussion of space raised in Chapter One through the analysis of sonic codes in film and television to argue for a representation of the affective conditions of an outbreak. Contextualizing sound mixing techniques, including echo and ambient sound, in histories of scientific and medical appropriations of sound, I argue for an "acoutemology" of EIDs on screen.[64] Close readings of *28 Days Later's* opening sequence, featuring quarantined London, and the television series, *The Last Ship,* demonstrate how sound can help us sense the social spaces of outbreak management: to produce the impression of a contained and controlled biohazard lab or unsettling quiet of a quarantine zone. Turning to *Pontypool* and the horror genre, I test the epistemological limits of sound through the analysis of the film's use of audio visualization. Using phenomenological methods from Sound Studies, I argue for what I term, the *duplicity of sound* to describe how the acoustemology of sound in film and television produces the impression of knowledge—the sense of distance, proximity or spatial relationships—but ultimately escapes the paradigmatic standards of scientific evidence. Hearing, as a deeply subjective and unvisualizable event, will always escape the privileged, empirical position of visual evidence. Through the analysis of *Pontypool's* audio visualizations, I argue, shows how this duplicity can be used to create the impression of an unseen threat: a feeling of viral omnipresence.

The move toward affect in this chapter helps account for a localized representation of outbreak. While maps may offer an abstract geography of an epidemic or pandemic, sound offers the possibility of sensing the event on the level of the body. Outbreaks often result in the massive restructuring of social interactions and spaces through containment strategies including quarantine, public health monitoring, and syndromic surveillance. As a result, they effect the daily movements and behaviors of individuals and the experience of public space. Chapter Three turns to affect and

[64] I borrow "acoustemology" from anthropologist Steven Feld who argues sound is capable of producing "experiential truths." Feld, S. "Waterfalls of song: an acoustemology of place resounding in Bosavi, Papua New Guinea," *Senses of place* (Santa Fe NM: School of American Research Press, 1996), 97.

phenomenology to help move between the structural components of outbreaks—the upending of spatial and social relationships through disease management strategies—and the way they are felt and experienced by individuals on the ground. While sound functionally scares the viewer in horror films like *Pontypool*, it simultaneously produces a sense of what it feels like to be vulnerable to a viral threat or walk the streets of a quarantine zone. At the same time, I argue this affect of the filmic or televisual texts remains grounded in the perceptual and epistemological structures of science and medicine. Affect may escape the boundaries of scientific inscription or evidence, but *Perfect Contagion Machine* argues that particular representational forms are capable of structuring corresponding affective responses that are tied to scientific epistemologies and paradigms.

The final chapter locates the intersection of form, epistemology, and affect in the found footage horror genre, which has become a favorite site for EID narratives. Contextualizing the genre's visual style in the "mechanical objectivity" paradigm, which argues that our historically conditioned perception of objectivity favors mechanically produced evidence, I argue that the reflexive aesthetics of the found footage horror ask us to engage with the films as visual evidence.[65] While sound locates the representation of outbreak in the experience of a diegesis, found footage horror films use the camera itself to produce the sense of a viral threat. The shaky handheld camera, direct address, and unorthodox framing produces what I term, the *evidentiary effect,* or the immediate encounter with the aesthetics of evidence, prompting us to seek out information in the image, scan the frame, and ideally, produce some sort of knowledge about it's contents. The *evidentiary effect* prompts viewers to try and *locate* and *discern* the images. The relationship between the aesthetics of evidence and the investigatory gaze is used in service of the horror genre's affective project, where the *evidentiary effect* creates the sense that the film is capable of revealing, and therefore controlling, the viral threats, but is ultimately withheld to create the impression of viral contamination.

[65] Daston, Loraine and Peter Galison. "The Image of Objectivity," *Representations* 40 (1992): 81-127.

All four chapters demonstrate how media and science work hand-in-hand to create the *sense* of causality or logic that is central to the analysis and communication of emergent outbreaks. While complex networked structures may actively push back on the organizational structures of science and medicine, EIDs continue to be approached using the evidentiary materials, causal logic, and experimental protocol of science and medicine. By examining the way these systems of knowledge are embedded in media forms, we can better understand the way networked phenomena are communicated and experienced everyday.

As such this dissertation speaks to the logic, experiences, and affects of contemporary networked culture at large. From the epidemiological map to the horror genre, this dissertation argues that the representational structures of EIDs participate in the central sociocultural discourses of surveillance, evidence, and biosecurity. While found footage horror may lie safely within the bounds of fiction, the archive of evidentiary materials reflects shifting evidentiary paradigms and distribution practices associated with online streaming culture. The maps and sound mixing techniques of Chapters One and Three offer accounts of contemporary affective landscapes saturated by a feeling of inescapable danger and emergency that support the preventative measures of biosecurity policy. And the microscopic image attests to the epistemological value of codified forms of scientific evidence, capable of simultaneously anchoring and scaling logical representations of networked structures. Importantly, these discussions are not embedded in the narrative content of these texts, but woven into the conventional structures and experiences of games, film, and television. While the television shows and films might get the science wrong, and audiences might not believe in the truth and objectivity of the events on screen, these texts reflect the intuitions and implicit ways in which we understand and perceive science and medicine. They offer a look into the communicative building blocks that help us understand networked culture. Indeed, Latour qualifies the terms network as "tool," not a stable object; it's a term to describe a particular configuration of

actors and relationships.[66] Similarly, I argue that by exploring the configuration of science and media, we see how media forms become critical tools that allow to see, hear, feel, and know a networked, emergent outbreak.

[66] Latour, Bruno. *Reassembling the Social: An Introduction to Actor-network-theory* (Oxford; New York: Oxford University Press, 2005), 130.

CHAPTER 1

THE RELATIONAL ONTOLOGY OF THE DISEASE MAP, OR HOW TO FEEL AN OUTBREAK

The end of 2011's *Rise of the Planet of the Apes* (Wyatt) closes with three CGI animated apes perched atop the California redwoods, overlooking the San Francisco Bay. As they gaze upon their new territory, the film fades to black and the credits commence. Just seconds later they're interrupted by the film's ominous epilogue. The final scene opens with an airline pilot exiting his house and taking a seat in the waiting taxicab. With a subtle clearing of the throat, the scene transitions to the airport through a low angle, dolly shot of the lobby; suitcases and feet cross in and out of the frame as the camera glides to a close up of the spotted marble floor. A large drop of blood strikes the center of the frame and cuts back to the pilot who wipes his nose and exits the shot. Dramatic music swells and the camera pans to the arrivals and departures board and begins to slowly approach the list of international flights. Finally, the board overtakes the frame and the camera rapidly dollies in to black where a bright yellow dot appears, dead center. A line emerges and climbs toward the right hand side of the frame and the credits recommence. As the line slowly bends, a dull gray outline of Europe begins to appear on the outer edges of the frame and the line finally collides with France. The impact generates a burst of smaller lines radiating outward, and faint clusters of dots begin to appear across Western Europe. The line's momentum is matched by the camera movement and ominous music, following its steady pace as touches down in Africa and Asia. The camera rotates virtually around the globe, moving back slightly to reveal a sprawling landscape of starburst patterns surrounded by flecks of yellow. As the globe spins, the yellow bleeds across the continents to reveal distinct boarders between land and sea, and finally lands on North America and Western Europe. The landmasses are thrown into relief by yellow splotches, connected

through a series of curving lines [Fig. 1.1]. With this pause, the digital image flickers and we return to black.

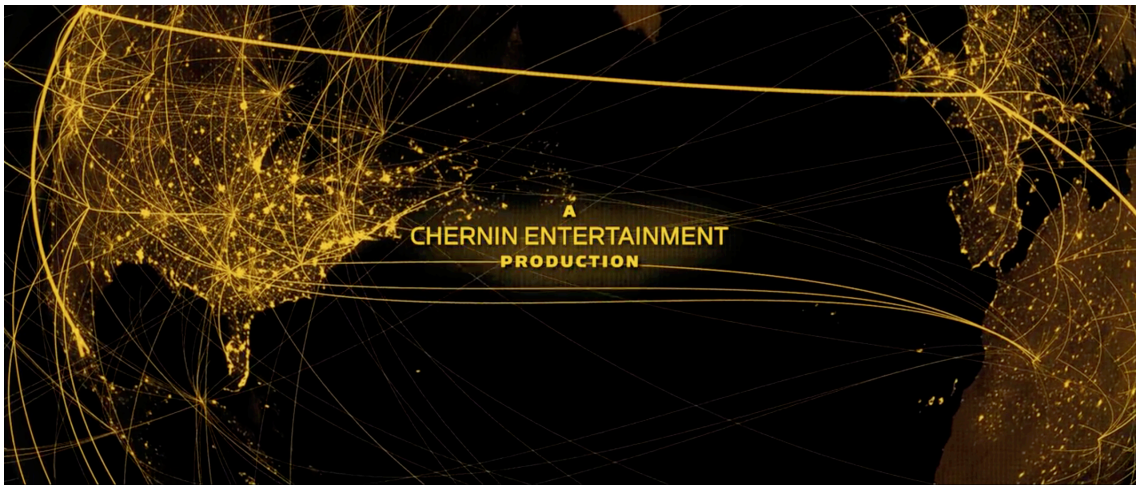

Fig. 1.1: End credit map from *Rise of the Planet of the Apes* (Wyatt 2011)

Why is this image so terrifying and what does it imply? *Rise of the Planet of the Apes* uses the outbreak of a deadly virus—the product of unethical drug testing on chimps—to set up the sequel's post-apocalyptic narrative. While the emergence of the virus is only mentioned in passing, the final credit sequence manages to articulate its devastating aftermath through splotches, dots, and lines. The map condenses a decade's worth of narrative into a collection of geometric patterns scattered across the globe to set up an entire world for the film's sequel. This can largely be attributed to the familiarity of disease maps. We immediately recognize the dots, lines, and splotches as a map: the anxiety-inducing image of a world vulnerable to the spread of a deadly biological agent.

The disease map often serves as the definitive image of a viral outbreak in both fictional news media alike.[1] The picture of the map, dotted and stained typically in red, is meant to give us a sense

[1] The CDC provides disease maps for recent emergent infections like Zika to help individuals assess risk. CDC "World Map of Areas at Risk of Zika." *The Centers for Disease Control,* 2017, https://wwwnc.cdc.gov/travel/page/world-map-areas-with-zika; Moreover, most major news outlets feature disease maps in reporting on emergent outbreaks. For a

of location, scale, and distribution of the virus, or what we have come to understand as a total visualization of the outbreak. By locating the infected individuals or fatalities, the map visualizes the effects of a microscopic virus circulating through space and time, invisible to the naked eye. In this sense the map endows us with a sense of control in that we can clearly *see* and *predict* where the virus has struck and whom it might strike next. Indeed, disease mapping has historically served as a critical epidemiological tool in the management and treatment of deadly infectious agents that has lead to the eradication and prevention of major global outbreaks.[2]

In spite of providing viewers with a god-like perspective of the virus, *Rise's* disease map does not function as an instrument for disease management or an image of control; it instead illuminates the anxiety-inducing effect of the disease map in fictional visual media. The sense of visual mastery offered by the disease map would appear to make it the ideal form to represent an emergent infectious disease (EID). In the last twenty years, popular media have increasingly turned to the disease map to represent pandemics. Films like *World War Z* (Forster 2013)*, Contagion* (Soderbergh 2011)*,* and *Fatal Contact: Bird Flu in America* (Pearse 2006) have all used maps to show the distribution and threat of the virus on the global population. Maps help collect and organize individual cases into a coherent symbolic system that is meant to transform the complex network of spaces, populations, and transmissions into single document to be read, understood, and ideally mobilized to master the spread of disease. But maps in fictional visual media, like *Rise* are not used to place the viewer in a powerful viewing position; more often than not, they are meant to inspire fear, paranoia and anxiety. The globe, spotted in yellow and crossed with transnational flight patterns disrupts the any sense of closure afforded by *Rise's* traditional Hollywood narrative structure, to confront the audience with a

recent example of a time-lapse map, see the New York Times feature "Understanding Zika." Byrd, Alexander & Pecanha, Sergio. "Understanding Zika," *The New York Times,* 29 July 2016, https://www.nytimes.com/video/world/americas/100000004185544/understanding-zika-virus.html

[2] Koch, Tom. *Cartographies of Disease* (New York, NY: ESRI Press, 2005).

portrait of the world in peril.[3] Looking closely at recent films and video games, this chapter asks: how does the map, a source of epistemological and epidemiological power, transform into an instrument of anxiety in popular media? And how does that anxiety relate to the project of EID representation?

Returning to *Rise,* we might begin by considering what is lost in this representation of the outbreak. The map visualizes of the viral pathways at the global level through international flight patterns; at the local level, dot clusters show the density of infection. Yet while the beginning of the epilogue pointed to the social spaces of an interconnected world as the site of viral spread, it says little of the localized transmission of the illness. It's unclear how exactly the virus spreads from person-to-person. Is it airborne? Spread through contact or by fluids? These types of questions impact the social and economic conditions of the outbreak. Airline travel suggests that certain international travel hubs and socioeconomic populations are at risk of infection. While the map's line can make it's way through the most wealthy and populated countries on the planet, it cannot account for localized urban conditions that might inhibit or prevent the spread of illness. Are those who ride buses as at risk as those sharing recycled air on a flight? *Rise's* map attempts to visualize the emergent infectious disease, one deeply tied to these questions and fundamentally inseparable from localized environments and global systems. This global perspective helps link geographic locations through transportation networks, but it will never manage to account for all of the relationships and networks at stake in the emergent outbreak.

Since the "spatial turn" in the humanities and social sciences, the objectivity of the map and mapping practices has faced criticism.[4] Scholars now take into account the work of abstraction and

[3] Similar disruptive disease messages can be found in earlier films like *Invasion of the Body Snatchers* (Kauffman 1978). However *Invasion* locates this ominous threat on the level of the body, whereas the disease map scales the threat to the global level.

[4] Canonical discussions of mapping skepticism can be found in the work of Denis Wood, Gunnar Olsen, and J.B. Harley. Harley, J. B. *The New Nature of Maps: Essays in the History of Cartography* (Baltimore: Johns Hopkins University

social and the political effects of the underlying representational processes. While we're increasingly attuned to the cultural, political, and racial biases of mapping, the map still stands as the prevailing mode of global representation in popular culture. Maps are not objective, but they do allow us to see and think about processes and relationships at a global scale. Space provides the context in which discrete objects and processes can be compared and analyzed. In this sense, the map helps organize interrelated processes into a unified event: that is, it transforms discrete social interactions, environmental conditions, and biological phenomena into a singular representation.

The project of this chapter is not to dismiss the global map, but to examine how the map communicates the totality of an emergent outbreak. Maps are powerful resources to "transmit knowledge" and create the perception of visual control. This chapter seeks to understand how the epistemological charge and representational structures of the map can be mobilized to create an anxious image of the emergent outbreak in fictional visual media. I begin by turning toward recent scholarship in Geography to explore how maps communicate the spread of a deadly virus across the globe by forcing us to think about the outbreak relationally. Placing *Rise* along side Tom Koch's work on disease mapping, I trace how maps in media construct a relational way of seeing, or what we might call the map's "relational ontology." Maps encourage viewers to see everything relative to one another: meaning and representation only emerge as one draws comparisons and contrasts between graphic and informational elements. From here I turn toward the use disease maps in two recent video games, *The Great Flu* (Ranj Serious Games 2009) and *Plague, Inc* (Ndemic Creations 2012). While *The Great Flu* and *Plague Inc* have opposite gaming goals—one asks you to fight the disease, the other encourages its spread—both use the disease map as the central interface and tool for or against global outbreak. I argue these games use the relational ontology of the map to

Press, 2001); Olsson, Gunnar. *Abysmal: A Critique of Cartographic Reason* (Chicago: University of Chicago Press, 2007); Wood, Denis, and John Fels. *The Natures of Maps: Cartographic Constructions of the Natural World* (Chicago: University of Chicago Press, 2008).

encourage a mode of gameplay that results in affective encounter with outbreak, or the sensation of viral omnipresence. The multi-module interfaces of *The Great Flu* and *Plague Inc* ask players to confront the complexity of an outbreak as they juggle an excess of supplementary materials. The barrage of textual and visual information forces players to encounter the limitations the disease map as a source of control, leaving them overwhelmed and anxious. More often than not, prevention and treatment procedures are dwarfed by the sheer scale and speed of the viral outbreak. While these games can be said to offer a pedagogical lesson on the difficulties of disease prevention and treatment, attending to the experience of playing through these disease map interfaces reveals an affective representation of an emergent infectious disease, wherein the virus feels both ineffable and omnipresent.[5] The player's sense of fear and anxiety relates to the entangled and overwhelming structure of an emergent infection and the impotence of the game's mechanical features to produce a sense of mastery over its spread. Rather than simply learning about localized epidemiological methods, the games allow the player to experience the complexity of a networked outbreak.[6]

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[5] I use affect, as opposed to emotion here to describe the gaming experience. While maps and representations of disease are often discussed through the language of fear, I use affect and anxiety in an effort to articulate the "unlocated" experience of these games. By this I mean, affect helps designate a sensational experience that cannot be pinned down to cause-effect relationships, but rather "emerging from gameplay—the intermingling of game subject and game objects." While the language of affect theory tends to remain fairly abstract to describe pure "relationality" and "possibility," I am perhaps more closely aligned with Sarah Ahmed's discussion of affect's "stickiness" or the way its capable of creating relationships and preserves values. Ahmed's language, and indeed Joseph Masco's work on affect and the counterterror state suggest that affects are capable of forming structure—or networks—through these powerful embodied relationships between bodies and forms. Ahmed, Sara. *The Promise of Happiness* (Durham [N.C.]: Duke University Press, 2010), 30. Norgard, Rikke Toft. "Expressive and Affective Gameplay with Technologies." *Video Games and the Mind : Essays on Cognition, Affect and Emotion.* (McFarland, 2016), pp. 96.

[6] Scholarship on educational games tends to focus on the content of games or scientific and sociological accounts of game pedagogy. Borrowing from Richard Ferdig's distinction between gaming's explicit and implicit lessons, I aim to think about education or pedagogy to consider what we might call the "implicit" affective lessons of gaming. This logic is also present in the work of Bogost and Paul James Gee, who both advocate for the pedagogical possibilities of gaming beyond mere content. For Bogost, lessons can be learned through processes, or as he claims "procedural representation explains processes with other processes." Bogost turns to games in particular because of their process-driven nature; however, his analysis remains largely concerned with how games guide players through a narrative process. Gee, on the other hand, is more invested in how games produce learning *experiences* through the constraints and affordances of the game's architecture. I closely align myself with these two figures, equally concerned with the medium-specific architecture of the game and the experiences they afford. Bogost, Ian. *Persuasive Games: The Expressive Power of Videogames*. (Cambridge, Mass.: MIT Press, 2007); Gee, Paul James. "Video Games: What They Can Teach Us About Audience Engagement." *Nieman Reports* 64, no. 2 (Summer 2010): 52-54; Ferdig, Richard E. "Education (General)." *Encyclopedia of Video Games*: *The Culture, Technology, and Art of Gaming*, edited by Mark J.P. Wolf, vol. 1, (Greenwood, 2012): 178-180.

These affective accounts of *The Great Flu* and *Plague Inc* demonstrate how these maps reinforce the logic of biosecurity. Disease maps allow us to see the geographic distribution of the disease and remain a privileged epistemological tool, but they also encourage us to *anticipate* where it will strike next. Fighting against an outbreak therefore requires perpetual vigilance against an unknowable but inevitable viral threat. This present, defined by the certainty of an apocalyptic future parallels the rhetoric of anti-terror following the 9/11 attacks and the Iraq War. Indeed, the discussion of disease outbreak often slips into the language of bioterror.[7] Their conflation is related to the way both are figured as unknowable, emergent, and yet inevitable, giving shape to a affective landscape built on the vulnerable state of the present. This sense of anxiety, I argue, can be felt in playing out *The Great Flu* and *Plague Inc,* which results in a representation of outbreak that highlights the relationship between the epistemological value of the map and the affective logic of biosecurity. Examining the disease map in fictional visual media therefore offers a look into the representational forms and affects that shape our perception of the world in the age of global networks.

Epidemiological Maps, Instruments of Control

While the disease map has historical origins that have been traced back to the 15th century, the most influential and commonly cited example of the modern disease map is associated with John Snow and the 1854 cholera outbreak.[8] Snow famously used a map of London to identify a contaminated water pump as the source of the deadly, seemingly unstoppable outbreak. Locating victims using a dot map, he was able to see the geographic distribution of the illness and draw a

[7] Eugene Thacker and Alexander Galloway often use emergent outbreaks and bioterror interchangeably. And a recent article on disease in cinema symptomatically reads the rise of EIDs on screen as a consequence of the 9/11 and anthrax attacks. Galloway, Alexander R., and Eugene Thacker. *The Exploit: A Theory of Networks* (Minneapolis: University of Minnesota Press, 2007); Schweitzer, Dahlia. "When Terrorism Met the Plague: How 9/11 Affected the Outbreak Narrative," *Cinema Journal* 56, no. 1 (Fall 2016): 118-123.

[8] Koch, *Cartographies of Disease.*

correlation between the prevalence of the illness and the surrounding environmental conditions. The map's spatial relationships helped Snow determine the cause of the infection by tracking its movement across the city to the Soho water pump. The map provided a concise geographic history of the outbreak and stop its spread. Indeed Snow's map was so influential it has been marked as the founding of epidemiology and consequently has had immense influence upon modern standards of public health and hygiene.[9]

Since 1854, the disease map has become a standard tool in the tracking and control of infectious agents. Epidemiologists use the map to spatialize the disease, to establish relationships between infected individuals and the environment to visualize the scale and distribution of the outbreak. Maps allow scientists to assemble multiple factors—infection rates, environmental conditions, time-scales—into a single unified plane of representation.[10] It provides a graphic plane on which events, locations, persons, and populations can be placed, offering a seemingly rational portrait of the outbreak with clearly defined relationships between these discrete elements. Ideally, these spatial, and often temporal, relationships are used to locate an illness' source. Given the instrumental value of the map, controlling and managing the virus occurs by controlling those mapped element: controlling populations and environmental boundaries. Quarantine, for instance, one the most familiar forms of disease prevention and control, attempts to quell the spread of a virus by restricting the spatial movement of at-risk individuals. Authorities draw out a *cordon sanataire,* or a boundary around a selected area to prevent an isolated disease population from contaminating the immediately surrounding areas. The cordon and quarantine are direct products of the logic underlying the disease map, which transforms the virus from an invisible pathogen or infected patient into a "spatial phenomenon." Tom Koch goes as far to claim, "epidemics and pandemics are

[9] Koch, *Cartographies of Disease*, 75-101.

[10] Koch, Tom. *Disease Maps* (Chicago, IL: University of Chicago Press, 2011), 5.

spatial phenomena," insofar as we understand the epidemic as distinct form the virus or disease by nature of its geographic prevalence.[11] Pandemics and epidemics are fundamentally dependent upon categories of community and distribution, and can only be defined through comparison to standardized categories, including population and geography. The disease map is the perfect example of how the epidemic and space are inextricably united; so much so that the map has come to stand in for the assemblage of events and influences at work in an epidemic.[12]

Outbreaks include a range of biological, environmental, social, and temporal factors. Disease maps help transform those processes, encounters, and individuals into simplified, legible visualizations. Infected individuals, transportation and industrial networks are abstracted into graphic symbols and located on the static two-dimensional mapping interface.[13] Individuals are coded as shaded regions or colored dots, frequently lumped into larger subpopulations to be decoded through a corresponding key, while prevalence is discerned through the density of the color coding, which often uses darker shades or more heavily dotted regions to indicate more densely afflicted areas. Stepping back, the map appears to provide a coherent representation that can account for the spatial and temporal distribution of an outbreak.

The map functions much like a chart, graph, or diagram by treating individuals—or even the assemblage of symptoms—as data points in a coded representational system. What distinguishes the

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[11] Koch, *Disease Maps,* 2.

[12] Scientific diagrams and representations, "[make] the object scientifically *knowable* implicate an independent object, they simultaneously achieve a graphic rendering of the object's materiality." The logic here is reinforced by the paradigmatic alignment of sight and knowledge and the collapse between representation and materiality through the act of looking. Lynch, Michael. "Discipline and the Material Form of Images: An Analysis of Scientific Visibility," *Social Studies Of Science* no. 1 (1985): 43.

[13] Michael Lynch on mapping practice: "The ultimately reconciliation of the grid and the source it marks off occurs on the surface of the map. The two-dimensional paper brings together the identified landscape and the mathematical grid. Graphic formats come to embody properties analogous to the Kantian categories of time, space, and causality. The map transfers the categories from an ideal transcendental context to a concrete manipulatory region." Lynch, "Discipline and the Material Form of Images," 42.

map from the abstract visual landscape of the scientific chart is our perception of its referent. Unlike the chart, diagram, or graph, the map appears to resemble the tangible, physical space to which it refers. While the dots, or shading might be understood as symbols, they are located on what we understand as a rational representation of physical space. Those symbols are therefore grounded in a representational form we have come to understand as objective and absolute.[14] The iconic world map is integral to our cultural imaginary, shaping our perception of space, nation, and identity. We instantaneously recognize the map's continental and national boarders, and boundaries between land and sea. And for the most part, the map remains true to its real world referent; hypothetically we can verify the correspondence between reality and representation by merely traveling to a geographic location included on the map.[15]

The iconicity and authority of the map are reinforced through modern mapping practices, which rely on satellite imagery and processed digital data. With the rise of geographic information systems (GIS) technology, which employs computer based-statistical mapping practices, the disease map stands among the leading forms of scientific authority. GIS technologies promise objectivity, "not only in the clarity of their presentation, but also in the manner in which the mapping process encourages our thinking about the relations between microscopic agents, human host populations, and the facts that encourage or inhibit their mutual relations."[16] Computers are capable of processing massive amounts of data and therefore offer the possibility processing the diversity of

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[14] In his discussion of scientific diagramming, Michael Lynch claims, "Diagramming provides the intermediary between an original field and a final analysis. The 'original' is enflamed as the 'authentic' or 'real' phenomenon discussed and analyzed in the text, and it represents the 'raw data' that are subsequently processed to expose phenomena hidden within the surplus details of those data." In the case of maps, the "original" and representation (map) are often understood as one in the same due to the inaccessibility of the referent (global geographic space.) Lynch, Michael. "Science in the Age of Mechanical Reproduction: Moral and Epistemic Relations Between Diagrams and Photographs," *Biology And Philosophy,*1 (April 1991): 221

[15] Wood, *Natures of Maps,* xvii.

[16] Koch, *Cartographies of Disease,* 2.

relationships and factors at stake in a global outbreak.[17] But in order to produce a clear representation, the data must undergo multiple stages of coding. A collection of symptoms becomes a patient, who becomes a data point in a larger population pool, which is coded into a graphic representation of a sample size, finally transposed onto the surface of the map. Locating the corresponding symbol involves the calculated approximation of spatialization that must take into account the scale of the map in order to make it a legible representation of the outbreak.[18] In this process, the biological agent moves from the imperceptible microbe, to the infected individual, to a sub-population, that can be rendered into a spatialized symbolic representation. Supported by the objectivity of GIS mapping techniques and measurement, it is easy to lose sight of the red dot or shaded region's referent. Moreover, mapping the virus involves the abstraction of social and cultural conditions, political and economic infrastructure, and biological processes. As shipping routes transform into dotted lines, migration patterns are lost in favor of national boarders, and transportation pathways, local encounters, cultural practices, and economic policy fade away and push the map further from its physical referent.

This is especially true in the use of disease maps in fictional visual media. While *Rise* may traffic in the visual authority of the global map and digital mapping technologies, the curving lines and dot clusters lack the standard key. The disease map is so familiar that the film can simply extract the most recognizable visual components in order to represent a global outbreak. *Rise* uses the legibility of the map to *imply,* to give the *impression* of the outbreak. This effect is reinforced using time-lapse

[17] Anne Beaulieu suggest the term "digital objectivity" to describe the authority of digitally rendered imagery in the science: along with the mechanical objectivity of scanning and imaging technologies' we see the mobilizaition of computer-supported statistical and quantitative apparatus, which provide a further mechanism for validation and guaranteeing objectivity." Beaulieu, Anne. "Voxels in the Brain: Neuroscience, Informatics and Changing Notions of Objectivity," *Social Studies of Science* 31, no. 5 (2001):664-65.

[18] Mapping operates through Euclidean model of space, where in calculations for distance and objects located on the graphic plane are measurable by comparison to planar space. Miller, Harvey J. and Wentz, Elizabeth A. "Representation and Spatial Analysis in Geographic Information Systems," *Annals Of The Association Of American Geographers* no. 3(2003): 574.

animation. Today in both popular and news media alike, the density of infection is expressed using time-lapse visualization technologies to show the spread of the disease over time. Like *Rise's* map, the dots or shaded regions will bleed outward, crossing national and continental boarders. Animated maps are meant to illustrate the pathogen's movement and helps create a sense of a clearly defined viral pathway, offering timelines that may aid in the prediction, interception, and control of the spread. *Rise's* map, for instance, uses the leaping lines to trace the spread of the virus across with globe with links between international cities, creating a causal relationship between the viral pathways and transnational flight patterns. The mechanism of delivery and the actual movement of the disease are fused into the movement of the lines across a black screen. *Rise's* animated lines and dot clusters transform the discrete elements—the individuals and environments, or here, the dots and lines—into the phenomenon of an outbreak or a unified event.[19]

Rise's map uses dot clusters and curving lines to combine time, space, and transmission and express the relations between them. As the curving line touches down, it prompts the eruption of dots and lines at the point of contact to produce the impression of a cause effect relationship between flight patterns and infection. In both fictional and epidemiological forms, disease maps are used to connect the dots, to draw correlations between space, population, and time: "The idea is not simply to use mapping descriptively to represent statistics to describe so many cases here or so many deaths there. That is important, but in itself insufficient. The real objective is to understand the *relation* between viral or bacterial communities, their human hosts, and the environment that inhibits or encourages their relationship."[20] *Rise* uses the spatiotemporal unfolding of the event to visualize

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[19] Lynch argues scientific representations " c*onstitute* the material form of scientific phenomena." . Koch claims the evidentiary nature of the disease map is upheld by the "manner in which maps present the discrete element son an epidemic or pandemic occurrence…as a unified event." Both of these accounts articulate how visualizing discrete elements within a single representation helps produce a unified sense of the outbreak. Lynch, "Discipline and the Material Form of Images," 43; Koch, *Disease Maps,* 5.

[20] Koch, *Cartographies of Disease,* 1.

the causal relationships between environmental and social conditions and viral prevalence. In other words, the international lines of flight become implicated in the spatial and temporal unfolding of the outbreak, connecting the outbreak to broader social and industrial conditions.[21]

Maps encourage us to think through an outbreak as a series of relationships. The abstraction of the outbreak into symbols located on a single graphic plane invites us to *compare* elements on the global grid. *Rise's* map proposes comparison between the prevalence of the illness and international flight patterns. It is an instrument precisely because it invites this comparative mode of seeing that draws direct correlations between these discrete elements. Maps invite what Koch calls an "ecological" way of thinking by establishing relations between discrete abstract elements: "it assigns relations between elements of one or more abstract sets in a manner that permits all to be considered together…the cognitive process of map thinking encourages a perspective that is relation and spatial at once."[22] I suggest we extend this idea of "map thinking" to "map seeing" to describe how maps encourage us to compare any and all elements located on the global grid. Koch describes what we might call the "relational ontology" of the map, or the inherently relational mode of thinking and seeing embedded in the map as a visual representation of the world.[23] One can only understand the map and all its components through this act of comparison. Severing an element from its spatial and visual context would result in a loss of meaning. To read a map involves comparing each of the graphic elements to one another, much like a language.

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[21] For Wood, these relationships are naturalized by located them on what we understand to be a representation of the Earth's surface. They are simultaneously reinforced by placing one symbolic system on top of one another. On the one hand you have the representation of the globe—already a symbolic rendering of the Earth's surface—juxtaposed with the lines and dots standing in for the movement and prevalence of the disease. For Wood, this "2 tiered semiological system" helps reinforce the facticity of the map. Wood, *The Natures of Maps,* 19, 73.

[22] Koch, *Cartographies of Disease,* 2.

[23] Koch, *Cartographies of Disease,* 6. Also see Wood's *The Nature of Maps* for an extensive discussion of how maps communicate through graphic comparisons.

It is precisely this relational ontology that makes a map an effective epidemiological tool. By forcing us to see the discrete elements of a map relationally—and more persuasively, unfolding in space and time—the map suggests clear causal relationships that can perhaps be predicted and ideally intercepted. For Koch and other epidemiologists and geographers, the map can reveal the *reason*—the source—of viral emergence.[24] Indeed, *Rise's* epilogue locates the source of the outbreak, and one could potentially follow the final map's lines backwards to point of origin. For epidemiologists, tracing viral pathways this not only allows them to understand the initial conditions for the emergence of the disease, but also to predict where and how fast the disease will spread. Mapping helps reduce the disease to clearly established relationships that may be severed in service of containment and control. In other words, if we can see the cause-effect relationship between the infected, then we can potentially interrupt those pathways and prevent transmission. If one could stop *Rise's* line, then we might be able to stop the devastation of the human race.

Rise's lines of transmission in time create an "if-then" structure of organization that helps establish causality that can be used to logically project into the future: "the power of mapping resides in its relational perspective and invites associations based on…bidirectionality."[25] Koch uses this logic to claim that mapping is a process of storytelling insofar as it gives a linear and coherent structure to the complex intersection of ecological, social, and biological factors at stake in an outbreak. This idea is echoed in the work of Pricilla Wald who aligns the contagion narrative with the disease map: "The outbreak narrative is itself like the epidemiological map…The points on the epidemiologist's map…make little sense without a story that is told about transmission."[26] Like the disease map, the contagion narrative helps give chronological and spatial order discerned through

[24] Koch, *Cartographies of Disease,* 2.

[25] Koch, *Cartographies of Disease,* 6.

[26] Wald, Priscilla. *Contagious: Cultures, Carriers, and the Outbreak Narrative* (Durham: Duke University Press, 2008), 39

the broader story of the outbreak. For Wald, narrative functions like a key to the map that decodes the relationships between symbols, that in turn help sort out the convergence of social, political, and cultural relationships between places and populations. For Wald and Koch, both maps and stories are methods we can employ to organize the social, industrial, and political networks at stake in an outbreak.[27] Both can give us a sense of linear causality and rational logic; watching the disease spread in time, over the surface of the map, essentially narrates the outbreak.

At the same time, we understand the map as an evidentiary object. Our sense of control is reinforced by the *visualization* of these relationships. While viewing or reading it might help tell the story of a pandemic or epidemic, the map's relational ontology suppress the "propositional" or "argumentative" reality of the map.[28] Instead, in a glance, we see and understand clearly defined spatial, temporal, and environmental relationships of an outbreak. The map therefore must serve a dual function: as both the "subject, an evidentiary statement in its own right, *and* an object on which ideas are played out in the two-dimensional plane of the map."[29] Importantly, organizing the discrete elements of an outbreak is an *idea* in itself. While we watch the lines move and the dots emerge, we see the accumulation of the discrete parts and "in the process of 'seeing' part and whole…the map becomes a thing in its own, at once a statement of occurrence, a theory of what cased it, and as a testing field for that theory."[30] Though we don't read *Rise's* map as a "theory," Koch's claim does get us closer to the experience of looking at the disease map. As we look at the static or animated expression of the world, the map *proposes* an organized expression of the outbreak that, at the same time *creates* the very outbreak itself. Production and apprehension collapse in the experience of

[27] Wald, *Contagious,* 37; Koch *Cartographies of Disease,* 2.

[28] Geographers have argued that maps make arguments, propositions, theorize, and lie. See: Wood, *Natures of Maps*; Olsson, *Abysmal*; Koch, *Disease Maps*.

[29] Koch, *Disease Maps,* 13.

looking at the disease map, translating a series of relationship in space and time into a visualized phenomenon that appears to have bearing on our reality.[31] The map's spatialization has incredible epistemological power because, "insisting that something is *there* is uniquely powerful way of insisting that something *is*."[32]

The collapse between the map's relational ontology and materiality is upheld by the primacy of vision. While a map may be composed of an underlying symbolic logic, the apprehension of a map asserts an epistemological charge that immediately forces spatial and temporal relationships into the realm of fact.[33] This is echoed across discussions of vision and power, perhaps most persuasively in Michel Foucault's discussion of the medical gaze. For Foucault, the powerful primacy of the human gaze causes the collapse between seeing the physical manifestations of a patient's symptoms and the underlying biological processes that underlie the disease: "The patient is the rediscovered portrait of the disease; he is the disease itself."[34] The map works in a similar way; in collecting the discrete elements and organizing them spatially, the map allows for the visual apprehension of what appears to be the outbreak event. Assembling individuals into an aggregate, and placing that aggregate onto an environment the map reveals the epidemic or pandemic. While the assemblage itself is theoretical, or propositional in nature, we understand the disease map as evidence of the event. The map, like the medical gaze, conflates the underlying analytical process with the evidentiary object or diagnosis.

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[30] Koch, *Disease Maps,* 26

[31] The map's power is also upheld by the fact that it visualizes a scale beyond human sense capacity: "This is what maps give us: reality, a reality that exceeds our reach, our vision, the span of days, a reality we achieve in no other way. We are always mapping the invisible, or the unattainable, the future or the past, the whatever-is-not-here-present-to-our-senses-now and, through the gift of maps, transmuting it into everything its not…into the real, into the everyday." Wood, *Disease Maps,* 15.

[32] Koch, *Disease Maps,* 7.

[33] Maps are considered "facts" insofar as we understand them to be "mutually agreed upon…mirrors of nature." Shapin, Steven, Simon Schaffer. *Leviathan and the Air-pump: Hobbes, Boyle, and the Experimental Life* (Princeton, N.J.: Princeton University Press, 1985), 22-23.

[34] Foucault, Michel. *The Birth of the Clinic* (New York: Pantheon Books, 1973), 14.

In seeing—or in Foucault's case speaking—the object itself erases the labor of interpretation or production.

By rendering the disease geographically, the map transforms the invisible pathogen into visible representation. Indeed, the disease map has been compared to the microscope as an instrument of visualization that can be used to collect and organize infected individuals in single, unified form of evidence.[35] *Seeing* the outbreak at the global scale allows epidemiologists to understand and ideally prevent the spread of disease, through spatial tools like quarantine. This approach parallels the clinical treatment of disease that relies on the authority of human vision: "The naming and then treatment of disease is about *seeing* and then thinking about what we see."[36] Maps do some of that thinking for us. Maps not only allow us to *see* and therefore verify the outbreak event, they create links and relationships between cases that directly impact treatment and prevention protocol. By setting up a relationship between infected individuals and environments, the map proposes a coherent logic of transmission the that can be instrumentalized to fight against the virus—in other words, they are epistemologically charged tools.

The organization of the outbreak gives the epidemiologist the power to fight against the outbreak. Much like the microscopic image, x-ray, MRI, or blood test, the disease map functions as a form of visual evidence that is used to understand the virus. By visualizing the virus, the map produces knowledge about the outbreak, therefore endowing the scientist with power to fight against it. This methodology is upheld through the paradigmatic relationship between sight, knowledge, and power that underscores modern scientific practice returns us to Foucault's "medical gaze." In *Birth of the Clinic,* Foucault describes how medical knowledge often operates through a

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[35] See Wald, *Contagious,* 39; Koch, *Cartographies of Disease,* 328.

[36] Koch, *Disease Maps,* 2.

trained mode of seeing. Medical expertise and authority are associated with individuals who have trained themselves to recognize certain patterns or symptoms, diagnose individuals and consequently make the virus visible. For Foucault, this medical gaze illustrates the collapse of sight and knowledge that over time has been internalized in modern medical practice.[37] While the gaze functionally makes disease visible, the invisible is just as important to the authority of knowledge production. Expertise is figured as a trained gaze capable of reading the surface symptoms to diagnosis the interior—invisible—biological processes that are inaccessible to the naked eye.[38] The authority of the expert gaze therefore relies on the inaccessibility of that visual knowledge by the average onlooker. In medicine, the disparity between the expert and patient is integral to the perception of power and control. The scope of this disparity and Foucault's interest in expertise evolves into a broader discussion of power in his later work, *Discipline and Punish,* where sight and power move away from the embodied, authoritative gaze and toward the invisible, all-seeing panopticon. In the era of the disciplinary panopticon, the fantasy of all-seeing and therefore all-knowing position can be fulfilled using surveillance. Power is maintained not through individual observation or the policing of individuals, but through the assumption of constant and total surveillance that leads to self-regulation.[39] While Foucault's discussion of surveillance extends to individual, technological, and institutional forms, the map's illusion of spatial mastery places it along side the panoptic power structure. They reinforce in the fantasy of the all-seeing, rational perspective that can know and control society at large.

[37] Foucault, *Birth of the Clinic,* 114.

[38] Foucault, *Birth of the Clinic,* 166-7.

[39] Foucault, Michel. *Discipline and Punish: The Birth of the Prison* (New York: Vintage Books, 1995).

Indeed the panopticon is derived from historical practices of quarantine during the plague.[40] Within the confines of a strictly sectioned off portion of the city, highly regulated and persistent inspections reinforced the illusion of the omnipresent gaze and the panoptic structure of power. Foucault narrates life inside of the cordon as an endless cycle of home inspections, carefully monitored movements, and rigorous documentation in an effort to exercise complete control over the spread of the disease. Quarantine helps Foucault describe how panoptic power uses distributed authority and treats individuals as regulated data in order to fulfill the fantasy of total surveillance: "Plague is met by order; its function is to sort out ever confusion…It lays down for each individual his place…by means of a omnipresent and omniscient power."[41] Like the disease map, there is a sense that the gaze can be everywhere and be used to control the outbreak spatially. At the same time, this monitoring is reinforced by the nature of the virus itself. Foucault turns to quarantine and the plague because the invisibility of the virus allows for extreme spatial and social regulation: the threat of the invisible and seemingly omnipresent virus appears to necessitate the surveillant measures. The disease map would seem to fulfill the fantasy of visual power and control. However, like the panoptic control of quarantine, the disease map's power resides in what remains invisible and unmarked. The yellow dots and lines of the map might visualize the distribution of the virus and its spread, but the representation is constantly burdened by the invisible threat. The disease map does not simply narrate or reveal an outbreak. The panoptic perspective afforded by the map produces the sense that blank spaces remain at risk.

While Foucault's panopticon may help explain the epistemological value and epidemiological instrumentality of the disease map, it cannot account for their apparition in popular fiction films and games. If the map indeed places the viewer in a position of power wherein they can see, understand

[40] Foucault, *Discipline and Punish,* 95.

[41] Foucault, *Discipline and Punish,* 197.

the environmental relationships of the outbreak, and ideally prevent its spread, then why does *Rise's* map produce anxiety? In "Postscript on Control Society," Giles Deleuze famously responds to Foucault to claim that in the wake of neoliberalism and globalization we have moved from a panoptic society of discipline to a society of control. This socio-historical shift has caused us to move away from the hierarchical model of power—one that suggests that map may provide mastery or "confinement" of space and time—toward an increasingly dispersed and decentralized system of control. Deleuze's networked model of control is "continuous and unbounded," defined by a series of "postponements" wherein nothing is ever produced or achieved, rather society is defined by this ceaseless pursuit of an ending that will never come.[42]

Though Deleuze's analysis remains relatively abstract, this "future-thinking" model of power speaks to the experience of *Rise's* disease map. The dots and lines are not merely static expressions of infected populations or documented movements and interactions, but also active threats that exist relative to the surrounding geography. Looking at this powerful, epistemologically charged visualization of the outbreak does not instill mastery; rather the relational ontology of the map forces us to think into the future, that is, to immediately anticipate where and when it might strike next. As viewers, we thus feel a sense of vulnerability to the outbreak as it reminds us of the interconnected complexities of a globalized world. The epistemological and instrumental value of map merely reinforces our vulnerability: the inescapability of our networked conditions. What the map, and indeed the Control Society, suggest is a predictive logic of power defined by using the present to look forward: to always ask where and when the virus may strike. Thus the map's power in *Rise* lies not in the ability to offer a complete image of an outbreak, but to force the viewer into this relational, future-oriented mode of thinking. It locates power in the virus, not the viewer, leaving them to confront the impotence of the epistemologically charged instrumental map.

[42] Deleuze, Giles. "Postscript on Control Soceity." *October,* v. 59 (Winter 1992): 6.

In mapping the transmission of the virus over time, the map projects itself in the future.[43] While the presence of a disease dot or shaded region may effectively locate the presence of the virus, using that information to anticipate the future of the outbreak requires continually comparing the dot to the surrounding space. Consequently, the "blank' spaces within the frame [of the map]…generate and reflect aesthetic and epistemological anxiety."[44] We cannot definitively *know* when the disease will strike: we can only predict. This predictive position establishes a temporal relationship to the outbreak that contributes to the anxious affect. Anxiety, as Kierkegaard famously claims, is a "future-oriented feeling…aimed less at a specific object as the fetish of their desire than at the configuration of the world in general."[45] Unlike fear, which is focalized, specific and located in an object, anxiety lacks a concrete site. The invisible omnipresent virus is the perfect example of the threat that is simultaneously "no*thing*" and "no*where,"* that creates and anxiety about the general state of the world population and global health.[46] The relational ontology of the map encourages us to imagine the existential threat of the virus, to dwell in the unknown blank spaces from our vulnerable position in the present. The map in *Rise* produces this sensation, forcing us to face the overwhelming scale of an epidemic or pandemic, to leave us anxiously aware of the fact that the outbreak might be incomprehensible, unknowable, and uncontrollable.

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[43] Indeed, as Denis Cosgrove argues, vision is often future-thinking: "Vision's meaning incorporates imagination: the ability to create images in the mind's eye, which exceed in various ways those registered on the retina of the physical eye by light from the external world. *Vision has a creative capacity that can transcend space and time: it can denote foreseeing as well as seeing.*" Cosgrove, Denis. *Geography and Vision* (New York, NY: Palgrave Macmillan, 2008), 8. (Emphasis mine.)

[44] Cosgrove, *Geography and Vison,* 10.

[45] Ngai, S. *Ugly feelings* (Cambridge, Mass.: Harvard University Press 2005), 209

[46] Both Martin Heidegger and Sigmund Freud make similar distinctions between anxiety and fear. For Freud, anxiety is associated with the condition of neurosis, not a particular object or fixed location, whereas fear is located, in for example, the threat of castration. Heidegger's language resembles Kierkegaard, claiming anxiety is "completely indefinite," opposing it against fear which can always be "encountered, it can *cause* harm. Heidegger's language suggests that fear can be ascribed to the logic of cause-effect, whereas anxiety remains both everywhere and nowhere. Martin Heidegger, *Being and Time*, trans. Joan Stambaugh. (Albany: State University of New York Press, 2010), 173; Sigmund Freud. *Inhibitions, Symptoms and Anxiety*, ed. James Strachey (New York: W.W. Norton & Company, 1989), 57.

In order to dwell on and expand the relationship between the map's relational ontology and the affect of the disease map, I will turn to the games *The Great Flu* and *Plague, Inc.* While *Rise* allowed us a glimpse into the apocalyptic future, the global interfaces of *Flu* and *Plague Inc.* offer sustained encounters with the disease map. So far I have discussed the disease map as a clear and immediate visualization: one that seemingly summarizes complex processes into an easily digestible and legible image. Indeed, their utility is linked to the brevity of the act of looking: "The whole [map] is itself out-of-time, a distillation of movement to be read as whole in one glance. We take both the temporal and motile synchronicity for granted only at our peril. It is integral to the maps power as an element that contributes much to the map's utility in medical sciences"[47] *Rise's* use of time-lapse animation provides a slight revision of this formula insofar as it illustrates the unfolding of the virus in space and time. However, there is a still a sense that the map creates an enclosed narration of the outbreak that can be easily taken in an understood in a matter of minutes; there is no room to inspect the image or locate errors. Instead it leaves the viewer with a contaminated image of the world as they exit the cinema. But what happens when the map becomes the foundation for playing out an outbreak?

Interfacing Outbreak

A coproduction of RANJ Serious Games and the Rotterdam Museum of Natural History, *The Great Flu* asks players to fight the spread of a deadly emergent infection. Created under the advisement of the virologists from Erasmus Medical Center, the web browser-based game forces players to manage the political, social, and scientific implications of an emergent global outbreak. The game begins with a video that provides the narrative context; a deep voice compares the outbreak to the 1918 Spanish Influenza, which wiped out an estimated 20-40 million individuals,

[47] Koch, *Cartographies of Disease,* 7.

warning of the real life consequences of an untamed viral outbreak. Unlike a standard tutorial video, *The Great Flu's* introduction does not give instructions on how to play the game; rather, players select from a collection of fictional viral villains and are thrust into the central global map interface.

Fig. 1.2: *The Great Flu* Interface, (Ranj Serious Games 2009)

Upon first glance, it's hard to find the map or discern the game's interface. The modular dashboard [Fig. 1.2] contains a number of interconnected panels including a message board, news ticker, and list of action items. The eye is immediately drawn to the pillar at the center of the screen, which serves as the hub of statistical information, including infection rate, death rate, and budget. To the right, the news ticker and message center offer supplementary materials including fictional news clippings, videos, and email messages from other countries. To the left, a line of action item icons display a range of graphic symbols that correspond to the limited set of prevention and treatment options. The eye finally spirals to the black, negative space in the middle of the screen, where faint, dotted lines form abstract shapes and cast luminescent shadows. A tiny label at the bottom of the screen clarifies: "world map, drag to scroll." This map can only be viewed in fragments. The module shows a scaled-in portion of the globe, and players must use their cursor to

drag and drop in order to see different sections of the map. The geographical boundaries of the regions are loosely sketched in dotted outlines without a clear distinction between land and sea, or key to discern geographic scale. As the player moves their cursor over the dots transform into solid white lines, encouraging them to click. Selecting the region reveals a name and statistical data in the small module located at the base of the pillar to the right of the map. A small, incomplete world map illuminates the chosen section and basic population information appears. Below, a list of progress bars correspond to the action items and allows them to track their efforts to control the outbreak.

But it's not immediately clear how to play this game. The tutorial video gave narrative context, but fails to provide any practical instructions or sense of where to begin. While players explore the game's interface, a blunt sound effect signals the appearance of a bulletin in the news ticker. The headline warns of a possible viral outbreak and prompts the player to navigate to a region of the globe. Dragging and dropping across the map reveals a tiny dot. Clicking on the section grants them access more precise statistical data and shows the infection of several hundred individuals. And so the game begins.

Like *Rise's* disease map, *The Great Flu* uses a minimalist aesthetic to maximize the anxious affect. The outbreak is reduced to a collection of dotted lines, glowing shadows and foreboding red dots, which likewise, fail to evoke a sense of representational precession or visual mastery. Without a key, it's hard to know how many infected individuals a dot symbolizes, or where exactly the outbreak has emerged. The loosely sketched boarders and limited visual field reinforce this sense of spatial uncertainty. For epidemiologists, the visual and quantitative information might prove to be a useful resource, but for the average player there is nothing reassuring about this data. Moreover, the game's soundscape lends to the mounting anxiety and emphasize the player's diminished position. The blunt sound effects arrive in quick succession and immediately prompt players to attend to off screen space. Where are the sounds coming from and how far has the virus spread? As the game

unfolds, the sound effects increase in frequency prompting the player to toggle across the map in search of their origin. However the sounds do not correspond to locations in space and players are left to laboriously drag and drop the map, searching for new tiny dots in the sea of black while racing against the ticking clock.

Players will never see the entirely of the global outbreak, resulting in a heightened sense of the map's relational ontology. Sounds may suggest the location of the virus, but they also indicate a world vulnerable to infection. The visualization of infected individuals through dots on screen will always be understood relative to those off screen, unseen, unmonitored locations. Focusing attention on one section of the world is always at the expense of another, as virus spreads and dots erupt in a continuous string of sound. While the global map might promise the fantasy of total vision—a perspective without an off screen—the interface restricts the view and intensifies the impulse to compare and contrast the visual elements on screen and off. As the dotted borders of the world fade into the edges of the frame, the player is constantly forced to consider what lies outside of their narrow scope of vision, to compare contrast, and track relationships on screen and off. The feeling of vulnerability emerges from the use of the dot as well as the player's limited gaze: they are left to *imagine* the visual scale of the outbreak.

This ill-fated imaginary is central to playing out the game, which is entirely motivated by the logic of prevention. The only way to stop this deadly outbreak is to anticipate where it might strike next and implement preventative action items. Locating the dot on the map allows players to observe the surrounding regions and begin to "distribute face masks," or "improve health care." All of the game's action items require careful forethought. There are no quarantine or vaccination measures; rather the game allows players to "develop research facilities" and "stockpile vaccinations." Throughout the game there is little sense of whether actions items have had any direct effect. Dragging and dropping the icon does not reduce the dots on screen or even stop the ever-

growing patches of infection. Instead, players are left to gauge their progress by comparing the interface modules. Each action must be dragged to a specific region and comes at a cost to be subtracted from the 100 billion dollar budget at the central pillar. Players must manage the funds, infection rates, and fatalities to predict which regions can reasonably quell the spread of the virus. The various modules emphasize the player's impotent position as they maneuver between fragmentary glances of the pandemic, which often results in costly missteps. For example, an action item might not result in a direct effect upon the map, but a message or news bulletin might appear in the modules to the right. A player might "create early warning system" in a designated region, costing $100,000,000, and immediately a message appears: such-and-such country— often of the Global South—regrets to inform the player that they lack the infrastructure to take such measures, leaving them vulnerable to the spread of the illness [Fig.1.3]. The player repeatedly encounters these messages as they are forced to battle against the unseen roadblocks of the geopolitical landscape. Like the limited map interface, these responses highlight a disconnect between localized action and global health. ndividual actions and viral emergence must always be gauged against the unseen, but relative conditions and spaces that enable the spread of disease. *The Great Flu* extends this comparative logic to the multi-module platform, where players encounter the influence of politics and mass media. Faced with a fragmented map, these supplementary materials are in a sense meant to "fill-in" the unseen; but in doing so simultaneously open up the outbreak to a messy web of geopolitical influences. Rather, these modules help situate the outbreak in a broader political an informatic systems that capable of inhibiting or encouraging the spread of a deadly virus.

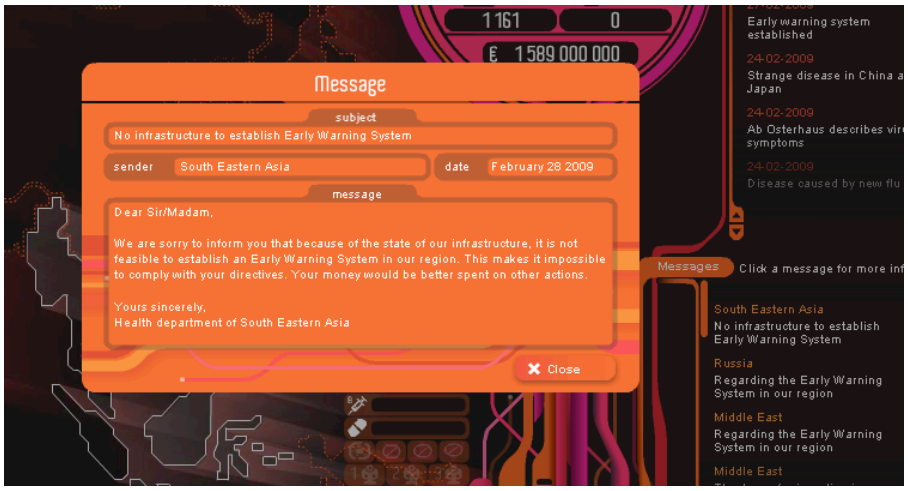

Fig. 1.3: The geopolitical conditions for outbreak management. *The Great Flu* (Ranj Serious Games 2009)

In *The Great Flu* the relational ontology of the map bleeds into the gameplay afforded by the multi-module interface. Players must constantly compare supplemental elements: news headlines might reveal viral mutations prompting a shift in preventative strategies, or a player might see the early signs of an outbreak in a new geographic region and "inform civilians" only to find their government publicly denying the allegations of infection. These encounters encourage the player to try and predict the global ramifications and examine the surrounding regions. Moreover, all of this occurs simultaneously and with mounting speed. The game's aesthetics and architecture make it difficult to manage all of the modules simultaneously. The drag and drop map and action items feel like time-consuming endeavor against the game's ticking clock and death toll. The minimalist aesthetics of the map often make it difficult to locate oneself on the interface. Toggling across the globe, players may find themselves lost in a collection of jagged dotted lines, and must reorient themselves by selecting a region and consulting the global map key to their right. The regional key is meant to track the progress of specific global region as the player deploys preventative action items, but the progress bars remain largely incoherent and seem to only function as reminders of where icons have been dropped. While the majority of gameplay unfolds on the left, the modules to the

right constantly distract players. Too much attention to the dotted map will often result in an insurmountable mountain of news clippings and videos. Clicking on a video will pause the clock, however they hardly provide a break from the stress of gameplay. The videos include historical accounts of the 1918 Spanish Influenza, which provide grim statistics of the deadly outbreak, and fake news reports of mass of panic in the face of localized attempts to quarantine the infected. Stock news footage shows riots, abandoned city streets, and ransacked hospitals to visualize the local effects of the outbreak upon social systems, institutions, and the public at large. These videos are meant to tap into the player's emotions and remind them of the horrific effects of the outbreak on the human population. Messages from across the globe highlight how economic disparity and political conflict are at odds with the project of pandemic prevention at the global scale. While the player might exhibit preventative control over the globe through the map interface, individual nations stand in the way of this fantasy of global health. The result is a sense that one is trapped in a contaminated global landscape without any hope of survival. The combination of the modules creates a gaming experience driven by anxiety. By the end of the game, players are almost blindly toggling across the map as the speakers are filled with blunt beeps and their inbox fills with angry messages from nations across the globe. News videos show riots and social devastation as boarders are shut down and governments crumble. It's all too much to manage.

And then the game just ends: "Congratulations! It's over. You've finally conquered this vicious flu virus." The final message from "The United People of Earth" provides statistical data for the outbreak, including the total number of infected, dead, and end budget. Players cannot lose *The Great Flu*; rather finishing provides a pedagogical win: "Hopefully you've learned a lot about to tackle a pandemic flu virus like this. Until now we know little about these viral outbreaks. *The only thing we know is that it will happen again* (emphasis mine)" [Fig. 1.4]. This final statement participates in the game's broader fragmented and comparative aesthetic. It suggests an exterior to the game that

cannot be controlled, known, or ever really seen: a threat that lurks outside of the boundaries of the seen, but still known through the map.

Fig. 1.4: End of the game. *The Great Flu* (Ranj Serious Games 2009)

In the end, *The Great Flu's* virus *feels* omnipresent. This sense of the omnipresent, or the known but not seen, distinguishes *The Great Flu* from *Rise's* map. As they walk out the theater, *Rise's* audience might imagine the possibility of such an event, or reflect on the speed and scale at which the virus moves across the globe. The sheer scale of the film's final image—the world stained in diseased dots—may overwhelm the viewer. But *The Great Flu's* interface offers fragments of that vision, allowing outbreak to emerge in playing across the modules, drawing comparisons between them, and finding a way to sift through the excess of statistical data, political interests, and mass media headlines. Players will never *see* the totality pandemic, but they will *feel* its presence. The diffusion of representation across multiple modules creates the sense that the virus is everywhere, affecting geopolitical relationships, communication systems, and economic development, without providing the authority of total visualization. Even with access to multiple organizational strategies,

communication networks, and preventative actions, the player is left overwhelmed and out of control.

In this sense, we might compare this gaming experience to watching a horror film. *The Great Flu's* omnipresent villain traffics in the logic of off-screen space in a scary movie.[48] In horror films, audiences are frequently shown or hinted at the presence of a threat. Tight or selective framing creates a tension between what is shown on screen and the known threat lurking just beyond the edges.[49] While the audience *knows* the threat is looming and present, that knowledge does not diminish the feeling of anxiety or suspense; it in fact enhances it. Anticipation in a horror film is created through the relationship between the knowledgeable viewer, and on and off screen space, which together create suspense and anxiety. In other words, we *know* a threat is there, but we're powerless to stop its apparition. Like the disease map, knowledge does not ease the viewer (or player); it actually creates the feeling of anxiety and insecurity. Players of *The Great Flu* have access to a wealth of knowledge and information about the virus, but all that does is exacerbate the feeling of vulnerability. The virus, like the monster outside of the film frame, feels both present and inevitable, and players are left in an impotent state of anxious anticipation.

While *The Great Flu* poses players *against* the monstrous virus, the recent surge of mobile contagion games including *Plague Inc, Infection* (Games for Free 2011)*,* and *Bio, Inc* (DryGin)*,* allow

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[48] In *The Philosophy of Horror,* Noel Carroll contrasts horror to the scientific fantasies of Enlightenment, which propose a rational, all-seeing subject: " Enlightenment supplied the horror novel with the norm of nature needed to produce the right kind of monster." Thus the source of anxiety and horror, in part, seems to lie in the violation of this subject position. Carroll, Noel. *The Philosophy of Horror* (New York: Routledge, 1990), 57.

[49] Adam Hart explicitly uses this type of language to describe the effects of the "Killer POV," which uses the roving point of view shot to produce a "unique absence continually reminds audiences that there are large, narratively significant areas in the diegesis that are being withheld from them…[that] constantly forces its audience to realize that they do not know what lies around the corner, or outside the frame, and Killer POV, maybe more than any other technique, exposes, even flaunts, just how little the viewer knows about that world." Hart's analysis offers a formally driven account of framing in horror that is most often discussed through the language of suture and identification in horror scholarship. I use Hart in order to emphasize the relationship between medium and affect as opposed to identification, the more commonly cited effect of off screen space through Laura Mulvey and Vivian Sobchack. Hart, Adam Charles. "A Cinema of Wounded Bodies: Sensational Abjection and the Spaces of Modern Horror." (Dissertation, The University of Chicago, 2014), 14.

them to step into the position of a deadly biological agent. The most popular of these games, *Plague Inc,* aligns the player with the omnipresent virus, using the disease map interface to place the vulnerable global population at their fingertips. From the central disease map, players are tasked with spreading the virus across the world by tracking infection rates through statistical data, exploiting global transportation networks, and evolving the biological make up of the pathogen itself. Like *Rise* and *The Great Flu, Plague Inc.* Begins with an outbreak in select a geographic location and uses dot mapping to visualize the spread of the disease. Players start by selecting a region of the world map to start their outbreak; experienced players will find that their virus is more likely to spread if they target regions without adequate public health infrastructure or are central global transportation hubs. For example, immediate success is often achieved if they select a densely populated Asian region, opposed to a wealthy European country. They can track their progress at the base of the screen, which contains both regionally specific and global statistical data. As the virus spreads, players earn "DNA points" that can be used to mutate and evolve their pathogen and encourage the spread of the illness. Points will buy you new symptoms, modes of transmission and "abilities;" all three of the categories offer advantages that range from animal vectors for transmission to antibiotic resistance. In order to make the most out of these evolutionary options, players must compare the interface modules and think through the ways in which bodies, goods, and boarders might interact to leave them vulnerable to the spread of disease [Fig 1.5].

Fig. 1.5: *Plague Inc's* disease map interface stained in red. (Ndemic Creations 2012)

Plague Inc.'s global map also features tiny animated boats and airplanes that zip across the interface; like *Rise,* the transportation routes become vectors for the virus as they become stained in red and their pathways transform into dotted lines that link the regions of the globe. Players can exploit these routes if they realize the close connections between viral transmission and global transportation networks. At the top of the frame, a news ticker streams global headlines and the game is frequently interrupted with important global news headlines, tips, and historical facts. *Plague Inc.* encourages the player to understand their progress by comparing their statistical data to historical events; the game might be interrupted by a pop up window congratulating them on "[killing] more than The Black Death." These windows are meant to give the player a sense of satisfaction, but they also in turn help give these historical events sense of scale. While the goal of the game might be to encourage the spread of red across the globe, coupling the historical fact with an image of the world colored in red also allows the player to see the scale of plagues past.

Unlike *The Great Flu, Plague Inc* is not marketed as an educational game, but that doesn't mean it lacks a lesson. For Lorenzo Servitje, *Plague Inc* allows players to see the susceptibility of humans to pathogens through statistical information, historical facts, and the evolutionary features of the

game.[50] Indeed, early in the game players receive a "tip," asking them to "think—what would happen in real life? [Fig. 1.6]" Moreover the game advertises itself as a "hype-realistic model of the world," that simulates the catastrophic possibilities "to end human civilization."[51] The most obvious source of information comes from the disease evolution and abilities center, where each new symptom or mode of transmission comes with a corresponding caption describing elements like, "cough" or "heat resistance" and how they aid the spread of a deadly virus. These features include fact-based information on how biological agents mutate and the dangerous impact on the human body. Using Ian Bogost's theory of "procedural rhetoric," which argues that "game processes make arguments about how systems work in the material world," Servitje claims that *Plague Inc* teaches players about the biopolitics of public health by using statistical data to reduce human population to numbers and graphs, which in turn determine the player's success or failure.[52]

[50] *The Great Flu,* in particular markets itself as an educational game. The supplementary materials provide historical information about past diseases as well as general facts on vaccine research and the spread of virus. Lorenzo Servitje argues that *Plague Inc.* allows players to reflection on the logic of preemption that undergirds outbreak management (Kulle et al). Writing on educational games primarily focuses on how games are able to convey educational content— in line with *The Great Flu's* written, supplementary materials. Medium specificity in these accounts is often considered through a game's ability to "motivate" players through reward based systems and the repetitive patterns of game play that encourage learning. Servitje's reading of *Plague Inc.* offers a slight revision, perhaps more closely aligned with Ian Bogost's procedural rhetoric, which claims that a game is capable of making an argument through the medium specific architecture of video games. Bogost, *Persuasive Games,* 3; Kulle, Halsten, and Frej Edvardsen. *Educational Games : Design, Learning, and Applications* (New York: Nova Science Publishers, Inc, 2010); Servitje, Lorenzo. "H5N1 for Angry Birds: Plague Inc., Mobile Games, and the Biopolitics of Outbreak Narratives," *Science Fiction Studies,* 43(1) (March 2016): pp.99.

[51] NDemic Creations. "Plague Inc." http://www.ndemiccreations.com/en/22-plague-inc

[52] Servitje, "H5N1 for Angry Birds," 90.

Fig. 1.6: *Plague Inc* asks players to draw upon preexisting knowledge of viral outbreaks. (Ndemic Creations 2012)

Servitje's reading focuses primarily on the informatic data used to gauge player progress, but it does not account for how game play also illuminates the complex networked structure of the contemporary pandemic. By focusing on the game map and the experience of playing *Plague Inc,* we encounter a different lesson that resembles *The Great Flu's* final message. Early on in the game, players might use the global transportation networks to facilitate the spread of their disease, but nations are quick to fight back. Countries will shut down airports, cancel world events and develop effective anti-vitals to try and stop the spread of the illness. Moreover, environmental events, like heat waves, tsunamis, and snowstorms will crop up in the midst of a game. While an isolated snowstorm in Europe might seem disconnected to a global outbreak, players can use mutations and modes of transmission to exploit unrelated environmental factors to encourage the spread of disease. Quickly evolving your disease using "resistance to cold" suddenly links the virus to localized weather conditions. The relational ontology of the map interface encourages the player to see all of these conditions—visual or not—as interrelated networks that can be exploited to devastating effects.

The effects of global environmental, social, and political conditions all become filtered through the disease map. The political, social, and public welfare of the world is gauged with respect to the interface, which helps produce the sense that all of these conditions are intimately interrelated and therefore susceptible to a deadly virus that can exploit the networked structure of our globalized world. Speaking of the game's moralizing message, Servitje goes as far to claim that, "the very goal of the game suggests that humans are not the necessarily the dominant species on the planet."[53] In fact, the game fulfills this message through the *Planet of the Apes* expansion pack. As a promotional tie-in for *Dawn of the Planet of the Apes* (Reeves 2014), the "Simian Flu" expansion pack couples the outbreak with primate domination to emphasize the biological relationship between viruses, humans, and apes. Players have the ability to evolve the ape's mental capacities and encourage migration efforts that, like the virus, exploit the globalized transportation networks.[54]

"Simian Flu" pushes *Plague Inc's* narrative a step further to offer a "post" to the original apocalyptic narrative, warning humans of our precarious position on this planet. But I'd extend the games warning to suggest that this dominance and the technologies that encourage us to perceive such power, like mapping, in fact leaves us *feeling* vulnerable to mutable viral agents. Using the very technologies that are meant to facilitate the control and containment of viruses, the game emphasizes how the contemporary globalized conditions encourage the demise of the human race. In the case of *Plague Inc.* and the "Simian" expansion, the anxiety is not necessarily the product of playing through the game, but a reflective lesson. Like *The Great Flu,* the game creates anxiety about our networked conditions and the strategies we have to fight against them. The game asks us to understand the scale, transmission, and effects of a pathogen requires the assembly of discrete

[53] Servitje, "H5N1 for Angry Birds," 99

[54] The "Simian Flu" expansion pack uses green, instead of red, to animate the spread of the virus. Unlike the original, which ends with a picture of the world stained red, "simian flu" ends with an image of the world in bright green and a message of primate dominance. Like the map from *Rise,* stained yellow, this image, while iconographic, lacks the doom of The Great Flu or the original Plague Inc.

interface elements and information in order to grasp at the mechanics and devastating repercussions of the outbreak. But the affect of *Plague Inc* highlights the privileged perspective offered by the map. Indeed, the experience of this map perhaps more closely resembles *Rise,* where the full weight of the global representation is felt in the aftermath. Nonetheless, this reflective message of the game aligns all three maps, which promote a future mode of thinking and seeing with respect to outbreak management and prevention. Servitje argues *Plague Inc*'s map resembles real life disease maps, where "in both cases, the goal is still to foreclose the future."[55] Player's goal is to see the map stained in red, but that deadly image simultaneously leaves them with a precautionary message about the state of biosecurity and global health. *The Great Flu, Plague Inc,* and *Rise* position the viewer or player *toward* the infected future: to create anxieties about the very tools, like the map, that we use to prevent deadly outbreaks.[56]

This precautionary message, and indeed *The Great Flu's* final lesson, articulate the disease map's relationship to the geopolitical logic of biosecurity. Biosecurity aims to secure life against the spread of biological agents. The term, relatively new to public discourse, has theoretical ties to Foucaultian biopolitics, were politics takes governance over "life itself." We see the convergence of these two terms in the earlier example of the plague quarantine, where in service of protecting or securing human life, the state invokes regulatory power over individual bodies and spaces. While biopolitics remains confined the academy, biosecurity has entered popular public rhetoric in the fight against biological agents. The rise of emergent infectious diseases, like Zika, H1N1 or Swine Flu, has drawn

[55] Servitje, "H5N1 for Angry Birds," 99.

[56] In this sense, the game's interface speaks to Edward Branigan's discussion of point of view shots in cinema. In an attempt to rethink the relationship between spectatorship and privilege, Branigan argues the point of view shot emphasizes: "not so much that a character sees something, but that he experiences difficulty in seeing. What is revealed is not the external object of a glance nor an internal state of the character, but a condition of sight itself." The frustrations felt while playing *The Great Flu* and *Plague Inc* offer similar encounters with the way a medium constructs the illusion of privilege or power, only to reveal the highly restricted position of the payer or viewer. Branighan, Edward. *Point of View in the Cinema* (New York: Mouton, 1984), 80.

global health and biosecurity into the public's eye. Biosecurity is now intimately linked with the globalized conditions highlighted in all three maps: our only strategy against an unpredictable and essentially unstoppable agent seems to be calculated preventative methods. However, the only way to predict the threat of the virus is to assume it's inevitable apparition: "*the only thing we know is that it will happen again."* Indeed, endings are critical to all three examples: *Plague Inc,* animates how viruses can exploit our contemporary conditions and leaves the player with an image of the world stained red, decimated by the outbreak. Similarly, *Dawn* ends the film with a message of anticipation: an anticipation of the next film, but also the anticipation of a similar outbreak event when faced with a familiar image of the contaminated world in close proximity to their own. They use the map's relational ontology to push beyond the boundaries of the text to shape our perception of the future: we are meant to leave all three *anticipating, predicting, envisioning.* This anticipation of an inevitable crisis is what allows the state to exercise power in the present through the logic of biosecurity. However that power, which appears to work in service of global health, can only be maintained through the persistence of the future threat. Biosecurity can never conquer its enemy: it is only sustainable as long as its enemy exists, always approaching but just out of view.

For anthropologist Joseph Masco, the logic of biosecurity underwrites the contemporary geopolitical landscape. Since the 9/11 and the anthrax attacks on the U.S. Postal Service, biosecurity measures have increasingly merged with the language of bioterror, fueling highly regulated and invasive political measures that violate individual rights to privacy. Contemporary discussions of emergent pathogens are often linked to the language of bioterror due to critical structuring principles shared by the two phenomena: terrorism and EIDs appear to lack centralized agency and visibility.[57] They often operate invisibly, representing an omniscient and inescapable threat to the

[57] Galloway and Thacker, *The Exploit*; Masco, Joseph. *The Theater of Operations: national security affect from the Cold War to the War on Terror* (Durham, NC: Duke University Press, 2014).

basic structures of everyday, networked life. Both prey on the structures of an increasingly globalized world, revealing the insecurity of connectivity.[58] In order to control these threats, there is the sense they must first be visualized and located—only then can we anticipate and stop their next move. Like the panopticon, biosecurity regulates human action in service of an invisible, yet vigilant power. While I want to move away from the slippage between terrorism and biosecurity, Masco's discussion does lead to a critical affective structure upholding disease prevention and containment. The fusion of terror and disease has lead to what Masco calls "a constant state of affective emergency," or a picture of the current globalized world as dangerously emergent, vulnerable to biological or political attacks.[59] The threat of a predetermined threat, like a viral outbreak, unearths fears about the vulnerability of our present networked state, contaminating the present with a persistent fear of the hypothetical future.

This logic is best articulated through *The Great Flu,* which makes this inevitability palpable through gameplay. The anxiety and helplessness that prop up the logic of biosecurity are products of the game's limited interface and multi-module platform, which places players in a restricted position while they face the convergence of global networks at stake in an emergent infection. In the storm of information and images, the only way to navigate from within this landscape is to try and anticipate the deadly future. The game upholds this state of emergency by denying a direct cause-effect relationship between the action items and the map, while simultaneously encouraging players to draw comparisons across the discrete interface modules. The world *feels* interconnected, or networked, yet without a clear cause-effect relationship between the action items of the map, the game creates the sense that combat requires persistent and disciplined defensive strategies. *The Great Flu* claims these strategies and gaming experience are an attempt to teach players about the troubled

[58] Masco, *The Theater of Operations,* 156.

[59] Masco, *The Theater of Operations,* 165.

position of the epidemiologists and scientists who are charged with organizing and fighting against the apocalyptic destruction of the human race. But without a sense of how these actions are directly effecting the virus, the strategies largely remain symbolic icons, susceptible to the slippery mutations and movements of a cunning virus like those seen in *Plague Inc.*

The Great Flu's real "lesson" lies in the overwhelming experience of the map interface. Forcing players to confront the complexity of a networked, global outbreak places them into a state of emergency as they struggle against the limited interface and excess of information. Players do not learn about the strategies or skills needed to fight against a virus, only how hard that struggle can be i*n spite of* the tools and efforts of experts. Thus the anxiety and foreboding message of the game participate in painting a world shaped and conditioned by the existential threat of disease. The anxiety-inducing experience and pedagogical lesson of *The Great Flu* is closely aligned with contemporary biosecurity simulation efforts, including the "Atlantic Storm" exercise organized by the Center for Biosecurity at the University of Pittsburgh Medical Center. "Atlantic Storm" tasked volunteers with the management of a smallpox outbreak and was meant to examine the national and global responses to a biosecurity crisis. While the simulation aimed to test the effective governance of global health institutions, the participants lacked the necessary resources and information to achieve these goals. Instead, they were left "in state of helplessness in the midst of an escalating crisis…participants in this exercise do not learn how to manage smallpox but rather are asked to experience existential force that cannot be stopped."[60] Masco calls the simulation "the perfect affective exercise in the production of terror," which has since been used as evidence for the insecurity of the world against the spread of a deadly infectious agent. Rather than providing the necessary skills and tools to manage the biological crisis, the simulation was meant to show the

[60] Masco, *The Theater of Operations,* 173-4.

vulnerability of the current state of global health and encourage the development of new preventative strategies.[61]

Like "Atlantic Storm," *The Great Flu* places the player into an affective state of emergency. But the anxieties produced in gaming are not simply aimed at the future; rather they seep into more immediate concerns about present public heath in a globalized network society. Biosecurity constitutes the world as "dangerously emergent—with multiplying vectors of vulnerability and attack," which has become the standard affective landscape of the post 9/11 security state.[62] Geoffrey Whitehall makes a similar case for the representation of the H1N1 outbreak, claiming that the aesthetics (language, news media coverage, and fictional accounts) transformed the outbreak in to a "transcendental 'unknown by rooting an aesthetic emergency in a sustained affect of fear."[63] However, as I have argued, these fictional representations of the EIDs traffic in the affect of anxiety as opposed to fear through the very tools and strategies that we associate with epidemiological management and control. Nonetheless, the map participates in the production of this affect through the relational ontology of the map, figuring the disease as omnipresent and unattainable, the targeted affect of fear is replaced with a more insidious sense of anxiety: one where society is perhaps less actively fearful of tangible threats, and rather burdened by a persistent risk of emergence. These conditions can be compared to Martin Heigegger's understanding of anxiety and Being, wherein he claims anxiety positions the individual toward the world and creates the necessary conditions in which they strive toward Being itself. Anxiety is therefore the "generic template" for all kinds of

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[61] Masco, *The Theater of Operations,* 174. Masco's discussion of the dangerously implications of "Atlantic Storm" can be further supported by Nick Dyer-Witheford and Greig de Peuter describe the power of games of Empire: "Games blur the lines between work and play, production and consumption, voluntary activity and precarious exploitation, in a way that typifies the boundless excursive of biopower" *Games of Empire: global capitalism and video games,* (Minneapolis, MN: University of Minnesota Press, 2009), xxix.

[62] Masco, *The Theater of Operations,* 165.

[63] Whitehall, Geoffrey. "The Aesthetic Emergency of the Avian Flu Affect." *The geopolitics of American insecurity: Terror, power and foreign policy* (London ; New York: Routledge, 2009), 79.

mood, or the foundation on which one orients themselves to the world."[64] For both Masco and Heidegger, anxiety provides the affective foundation for everyday life: the basic conditions for potential action. In the aftermath of 9/11 this anxious state has been dangerously exploited to promote disciplinary control by institutional and state powers. Biosecurity creates a feeling of insecurity—anxiety— about our current state, that has lead to dangerous violations to individual and public rights, like The Patriot Act. It encourages control and surveillance, continually contaminated by the inevitable and unknowable, or a present fundamentally shaped and conditioned by the anxious anticipation of the emergent danger. The procedural rhetoric of *The Great Flu* and *Plague Inc.* therefore does not merely educate players by asking them to move through the evolutionary stages of a virus, or employ particular preventative measures. They are educational insofar as they help us understand the affect of an emergent infection that fuels the logic of contemporary biosecurity. That is, it is not just about the informative *content* of these games, but how the disease map helps create a gaming experience that places the player into an affective state of emergency. *The Great Flu* produces this affective state by exploiting the relational ontology of the disease map and its ties to epidemiological management and control. The interface's aesthetic at first gives the sense of a centralized control center that allows you to see the networked structure of the globe. However, in playing the game, the player realizes the visuals, communication systems, and preventative actions can never be navigated simultaneously. Instead, the map itself is revealed as an instrument of anxiety, incapable of offering mastery or power over the emergent viral threat. There is a sense that despite all of the resources available today, there is no present strategy capable of protecting against

[64] Ngai, *Ugly Feelings,* 231.

the spread of a deadly virus.[65] *The Great Flu* rather offers an account of a contaminated future that can never quite be grasped on known: *"All we know for sure is that it will happen again."*

Conclusions

Dawn of the Planet of the Apes begins where *Rise* ends: a red dot flashes on screen and thin line erupts from the surface, curving to the right of the screen, while a series of smaller lines and dots spread surrounding the initial point of emergence. As the dots continue to spread and the line bends across the hazy global background, slightly transparent region boundaries are illuminated with hazy news footage [Fig. 1.7]. The line continues to move across the North America while a series of clips, including political speeches, masked citizens and laboratory equipment play underneath. Touching down in Chicago, then New York and along the East Coast of the United States, dramatic fireworks of red splotches emerge and obscure the image underneath. In contrast to *Rise's* dramatic score, *Dawn* features a subtle, melancholic melody, a series of quiet piano notes that ring out as line continues to make contact with the surface of the globe. As the globe turns, the camera moves toward South America. Red lines bend across the continent, criss-crossing as they touch down and radiate outwards. Rotating across the Atlantic, toward Africa, and finally Europe, the map shows fragments of violent news footage framed by increasingly stained landmasses. Europe is almost entirely red with curving flight lines radiating out beyond the edges of the frame. With a flicker, the news content shifts from the scientific discussion of the virus toward the social and political implications of the outbreak. A voice sounds, speaking of refugees fleeing infected regions, families torn apart, and violent riots in the city streets. As the camera virtually rotates toward Asia, the flight

[65] The affective pedagogy of the game follows Kierkegaard's analysis of anxiety and education, where he claims, "whoever is educated by annuity is educated by possibility." Anxiety resembled an informed position toward education, where education is infinite possibility that is never quite grasped. Education and anxiety are intimately linked by how they position and move subjects toward a goal. Biosecurity positions subjects against a biological threat, that can never been fully conquered. Instead subjects are always moving toward that future, with prevention as the only anticipatory

lines disappear, leaving land masses speckled in glowing red dots, and grainy images of mass chaos, ending with a biohazard sign and illegible computer script appear. The voice of a reporter mentions the breakdown of communication systems and political infrastructure, and as we move over the dark Pacific Ocean, a panicked voice makes a finally call out to the survivors: "Maybe this is how it is. Maybe this is the end. Pretty soon there won't be anyone left." The camera circles back to North America, now an opaque gray landmass with a few dim red dots sprinkled across its surface. A final string of slow piano notes ring out and the dots fade away as the film cuts to black.

Fig. 1.7: *Dawn of the Planet of the Apes* opening map. (Reeves 2014)

Dawn's opening sequence parallels *Rise's* credit sequence, using the disease map to show the viral unsettling devastation of the world and give context for the sequel. However *Dawn* revises the aesthetics of the first map to produce a very different message. Whereas *Rise* aimed to affect audiences with a threatening portrait of the globe ravaged by disease, *Dawn* aims to show the *effects* of that threat. In other words, while *Rise* used the relational ontology of the map encourage the viewers to imagine the possibility of a global pandemic, *Dawn* exploits that ontology to showcase the

measure to be taken. This produces self-reproducing anxiety that structures the present with respect to the unknown

sociopolitical impacts of the viral outbreak. The yellow lines and dots of the first film and surging soundtrack are stained red, and the rotation of the camera slows down in pace with the wistful score. While *Rise* encouraged the viewers to see the sheer scale and speed at which a virus can traverse the globe through the network of transnational transportation systems—in a sense asking viewers to marvel at the power of a biological pathogen— *Dawn* emphasizes the future of the management strategies, political responses, and social devastation.

By grounding these impacts in familiar images of news footage, *Dawn's* map offers an image of a contaminated global system that cannot be controlled or contained. This map narrates the future of *humanity*. Juxtaposing the visual codes of the epidemiological map against the news footage produces a sense of cause-effect: as the line touches down or a region becomes increasingly saturated with red, the grainy footage below suggests the localized effects of viral presence. This glimpse, unlike *Rise,* is not an animated image of possibility, but world that closely resembles our own. Indeed, the news clips briefly feature a speech given by President Obama, warning of mass panic. Drawing upon the familiarity of news images, and the disease map itself, *Rise* situates the plague in proximity to the present. While *Rise's* apocalyptic future, governed by apes, can only be understood as fiction, the film does try to give plausible context to the narrative using the authority of the disease map and mass media. This vision of an outbreak, composed of familiar aesthetic codes of disease mapping and news footage, feels feasible. Talking primates may never populate the world, but in globalized world that has seen the spread of emergent infections, the film actualizes an active threat that hits very close to home.

All of the maps discussed in this chapter highlight the anxieties of globalized network culture. Given EID's relationship to globalization, it is no surprise that film and games have turned to the iconic map to visualize the spread of an emergent pathogen. However, as I have shown throughout

future. Kierkegaard, Soren. *The Concept of Anxiety* (Macon, GA: Mercer University Press, 2008), 159.

this chapter, the value of the map lies beyond the capacity to *represent* an event at the global scale. Rather, focusing on the rhetoric—the relational ontology—of the map reveals the communicative and affective possibilities of the iconic, animated global image. Across *Rise, Dawn, The Great Flu,* and *Plague Inc,* the map provides an epistemological foundation that can be used to build a seemingly coherent picture of an outbreak. Placing dots, lines, modules, and supplementary information encourages the viewer or user to see a broader web—network—of interconnected relationships that function to overwhelm the viewers and players with the sheer scale and complexity of a viral outbreak. As a result, seeing or playing these animated maps helps cultivate an anxiety located in the structures of globalization and epidemiological management strategies. This picture of contagion is not one of visual mastery but anxiety; or as I argue, viral omnipresence.

Given the language of complexity and anxiety, it is tempting to align the disease map across these games and films with Alexander Galloway's denouncement of network visualization. Through the analysis of a terrorist network map, he claims that networks are fundamentally "unrepresentable," in that no visualization is capable of accounting for all of the connections, actors, and factors that make up a network.[66] Indeed, *Rise* and *Dawn's* web of transnational flight patterns and dots resemble the tangle of lines and nodes discussed by Galloway, and prompts one to question the representational possibilities of a such an image. How can one possibly read such an image, let alone extract information? Does the disease map, which strives to offer the entirety of an outbreak, reveal the impossibility of EID visualization?

Rather than dismissing the representational possibilities of the disease map, I'd like to claim the maps traced throughout this chapter demonstrate how the map can be used to produce a sense of viral omnipresence, which in turn allows reflection on the instruments of disease management and control. Playing through *The Great Flu* or watching *Dawn,* audiences encounter the incredible

[66] Galloway, Alexander, "Are Some Things Unrepresentable?" *The Interface Effect,* (Cambridge: Polity Press, 2012), 92.

complexity and scale of an emergent outbreak, leaving them with sense of impotence in face of an emergent biological threat. However, that confrontation is produced *through* the rhetorical structures and epistemological assumptions that we carry with respect to disease maps. In other words, the feeling of viral omnipresence emerges from the paradigmatic ways in which we read and understand maps. In her discussion of the 1994 film *Outbreak* (Petersen), Wald describes the disease map as an expression of "the ambiguous geography of an interconnected world," it provides a representation of a disease "that insists on the limits of…power and efficacy…and [the] dependence on U.S. technological know-how, which…caused the problem in the first place."[67] Wald's description animates how the tools of knowledge—mapping, scientific technology—simultaneously facilitate the spread of disease, and remain our only hope of fighting against it. The map is the means by which we understand the world, but all it can do is show us how little we know.

Indeed, the maps featured in this chapter all demonstrate the epistemological limitations of disease mapping. None of the maps featured in this chapter can be read, interpreted and used in service of epidemiological management strategies. Nonetheless, these maps do reveal the ways in which we understand and interpret emergent global outbreaks. In an effort to clarify his discussion of representation, Galloway borrows from Jacques Rancière to claim network visualization fails to produce an emotional shock or affective encounters in line with the systematicity of networked society. The experience of looking at the terrorist networks visualization undermines the information contained within the document, and thereby leaves viewers blind to the "mode of production, sublimating a political worry."[68] While disease maps are in danger of universalizing the an emergent outbreak's complexity, and indeed the biological processes and local effects of the pathogen, I argue that looking closely at the disease maps of films and games offer a look at the

[67] Wald, *Contagious,* 37.

[68] Galloway, "Are Some Things Unrepresentable?" 89.

underlying interpretive experience of reading a map that participates sensing the outbreak's scale and magnitude. The feeling of viral omnipresence is one created entirely through the viewer or player's attempts to decode and instrumentalize the map. As a result, these maps do not obscure the political value, but reveal way instruments of knowledge and control are used to cultivate anxiety.

In a sense, Galloway is right, in that totalizing images like maps and network visualizations "do violence" to the phenomena that they seek to represent.[69] The discussion of disease maps in this chapter shows how the illusion of geographical mastery ultimately reinforces the preventative logic of biosecurity, effectively engendering a present determined by an unknown future. But to condemn them for such violence is to overlook the epistemological and rhetorical structures that underlie this affect. Throughout this chapter, I have instead sought to examine the ways maps communicate emergent outbreaks, and how viewing and gaming experiences throw the architecture and rhetoric of map into relief. In confronting the complexity of the outbreak, we can begin to parse the representational structures that allow us to sense of the outbreak *and* the *affects* of those organizational forms. Indeed, situating this rhetoric along side the logic biosecurity reveals the ties between counter terrorist ideology and epistemological management and prevention strategies. Thus examining the disease map in films and games offers an account of how outbreaks are not only understood, but felt in the contemporary geopolitical climate.

[69] "One of the key consequences of the control society is that *we have moved from a condition in which singular machines produce proliferations of image, into a condition in which multitudes of machines produce singular images."* Galloway, "Are Some Things Unrepresentable?" 91.

CHAPTER 2

THE MICROSCOPIC IMAGE AND INTERPRETATION, OR HOW TO SEE AN OUTBREAK

Season one of the television series *Helix* (Porsandeh 2014-15) follows a group of CDC epidemiologists exploring a mysterious outbreak at a remote corporate research facility in the Arctic Circle. About midway through the season's viral mystery, lead scientist, Dr. Alan Ferragut (Billy Campbell) and his young assistant, Dr. Sarah Jordan (Jordan Hayes), take a second look at a set of viral samples. Peering into the scope, he looks up in astonishment: "Come have a look at this." Ushering Dr. Jordan to the instrument, he asks her to describe what she sees. Dr. Jordan narrates: "The virus is attacking the cell, multiplying rapidly." Unsatisfied, he asks her to look again, "more closely." A cut to a close up, masked to resemble the experience of gazing into a microscope shows a digitally rendered, blue spiky, pulsating orb. "Oh my god." The two shocked scientists direct their attention to a computer screen that shows a section of the orb next to a digitally animated protein helix. Circles and lines blink on screen, connecting portions of the two images, "He's using the virus as a delivery mechanism," explains Dr. Jordan. Dr. Ferragut responds, "The question is: what's the virus bringing to the party? And *why*…?"

As melodramatic as *Helix's* hanging question may be, this chapter starts from where the show leaves off by asking: what *does* the virus "bring to the party?" How do contemporary visualizations of microbial pathogens, often digitally rendered for popular audiences, function in the representation of emerging infectious disease?

Helix's scene demonstrates the common tropes of microscopic imaging found across genres and throughout film and television history; examples range from fiction films, like *The Fantastic Voyage* (Fleisher 1966) or *Jurassic Park* (Spielberg 1993); to early educational films, including *The Microscopic World* (Encyclopedia Britannica 1958) or Charles Urban's famous series *The Unseen World* (1903-

1905); to the more avant garde appropriations like those seen in *Upstream Color* (Carruth 2013).[1] The show draws upon familiar visual and verbal codes of laboratory sequences on screen, including white-coated characters peering into instruments and point of view shots of the microscopic view. Like the example from *Helix,* seeing the microscopic image often prompts both interpretative exposition and narrative revelation: dialogue will provide a reading of the microscopic sample that prompts a major scientific discovery that can resolve a narrative conflict or propel the narrative forward through further investigation. Importantly, it is the evidentiary microscopic image that stands at this critical juncture. By rendering the formerly invisible microscopic pathogen visible, it transforms the unseen viral threat into a stable evidentiary object.[2] And as a piece of scientific evidence, it suggests that we might gain access to knowledge or insight on the unknown and unseen biological processes that make up a disease outbreak.

This transformation, from invisible virus to stable evidentiary object, has made the microscopic image a useful tool in the representation of emergent infectious diseases on screen. Viruses are terrifying because they are invisible. Fiction films and television turn to the microscopic image as a way to render the unseen and unknowable threat visible, and thereby knowable and controllable. While the microscopic image is perhaps one of the most familiar forms of scientific evidence encountered in contemporary popular medical and scientific dramas on screen, its apparition relies heavily on aesthetic and epistemological codes to connote its authoritative objectivity. *Helix,* for example, exhibits the most basic structure: moving from the biological sample, to the instrument, to the image, and finally interpretation. The scene uses editing to weave together signifiers of scientific authority, like the petri dish and computer screen, as well as shots that have conventionally helped

[1] While *Upstream Color* does not feature the act of looking into a microscope, it still foregrounds the preparation of the sample in order to navigate the radical transitions between human-scale protocol and the flashing microscopic images.

[2] Bruno Latour claims laboratory science renders experiment and action an "object." These "new objects become things" that erase the conditions that allow us to see it as an object. Latour, Bruno. *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge: Harvard University Press, 1987), 91-92.

produce the perception of point of view, or "direct access," to the microscopic view afforded by the instrument. In *Helix,* "looking closer," in the sense of both seeing and understanding the image, requires following the show as it moves us through this translation process—in other words, it requires protocol. Navigating the challenge of transforming a microscopic virus into an evidentiary object creates links between human and technological forms of authority, erecting a narrative structure dependent upon and guided by the microscopic image.

This chapter examines the use of microscopic images in the representation of emergent infectious disease in contemporary fiction film and television. The apparition of the microscopic image and its epistemological and narrative value are dependent upon the assemblage of representational reinforcements across science and cinema. As in *Helix,* the microscopic image can never stand on its own, but instead operates through particular visual and verbal codes, including editing, instruments, and exposition that lead the viewer through the technical and interpretive process, transforming the biological pathogen from the inaccessible to the knowable and ideally, containable.[3] The image itself however, presents an epistemological anxiety for the text: faced with the microscopic image, the narrative must implement multiple structural and diegetic strategies to interpret and connect the microbial sample to global outbreak. I begin by tracking the paradigmatic apparition of the microscopic image through close analysis of the formulaic television series *House M.D.*, situating these structures in scholarship from Science and Technology Studies, which has begun to explain the paradigmatic structures of experiment and vision that shape the perception of objectivity. I then turn to *Contagion* (Soderbergh 2011) to argue the microscopic image and its

[3] This idea has been historically associated with public health strategies. Kristen Ostherr's work demonstrates how public health cinema foregrounded the relationship between visualization and containment/prevention. Visualization was a means of locating, and therefore controlling the spread of illness. However this paradigmatic relationship simultaneously prompts problems for the ways in which the imperceptible becomes displaced onto bodies, spaces, and social activities that reinforce certain racial, class, and gender stereotypes. Ostherr, Kirsten. *Cinematic Prophylaxis: Globalization and Contagion in the Discourse of World Health* (Durham [N.C.]: Duke University Press, 2005).

surrounding representational reinforcements prove to be a useful tool to represent a complex, networked outbreak.

Attending to the microscopic image in fiction film and television reveals the structures and assumptions that guide our perception of scientific evidence on screen and off. In spite of rigorous historical and anthropological work on scientific objectivity and protocol, the microscopic image remains a powerful, autonomous signifier of scientific expertise and authority. By turning to television and film, this chapter demonstrates how the paradigms and structures that prop up this perception are reinforced and communicated through film form. Thus, I contend popular films and television offer a highly concentrated and concise site to explore how scientific evidence is communicated to mass audiences. The structures traced throughout this chapter, albeit simple, formalize the paradigmatic structures of microscopic imaging. Thus attending to these representational conventions offers us a look not only at the scientific paradigms that help popular media communicate scientific evidence or complex global outbreaks, but also the paradigms that structure cinematic convention. Representing an outbreak—communicating epidemiological concepts like transmission and viral analysis— reveals itself as much indebted to scientific narrative content as cinematic form.

Invisible to Visible

House M.D. (2004-2012) follows the unstable, drug-addict, savant Dr. Gregory House (Hugh Laurie) and his team of diagnosticians as they solve the medical mystery of the week. The series tagline, "everybody lies" foregrounds the pitfalls of human subjectivity, and celebrates the purity of medical data and rational thought. While many of the diagnostic tactics within the show invite criticisms of medical practice, pathology remains the foundation for the show's narrative progression. Lab results, MRIs, and X-rays are never questioned and remain the base of medical

knowledge; indeed much of our time is spent along side the team as they methodically collect data. These sequences dwell in the labor of diagnosis: the spaces, processes, and instruments necessary to solve the biological mystery. *House's* mise-en-scene is saturated with medical instruments and technologies, and layered with jargon-heavy dialogue to reinforce the aura of analytic expertise. False positives or blurry x-rays are attributed to human error; the ethical conundrums are always the product of emotionally contaminated ethics that have strayed from pure, rational analysis. While *House's* faith in the medical instrument or test is by no means unique, the show's celebration of scientific objectivity and rationality offers a useful toolkit of examples. Each episode relies on the formulaic mystery structure that delays the diagnostic reveal through suspenseful testing sequences and character melodrama.

The most extensive use of microscopic imaging comes in the final moments of the season two episode "All In" (Gerber 2006), where Dr. House and his team attempt to diagnose a young boy who is unable perceive three-dimensional objects. After a series of risky medical stunts, they are banned from testing or treating the patient. However, thanks do a hospital charity event, Dean of Medicine, Dr. Lisa Cuddy (Lisa Edelstein) is conveniently occupied and unable to keep a close eye on the team's covert diagnostic actions. Facing a limited supply of tissue and time, the scene's suspense hinges on the execution of lab protocol; the methodical, step-by-step movement through the testing process builds tense expectation and focuses all the attention on the execution of precise actions.

The first test begins with a close up of the tissue, moving to reaction shots from the surrounding doctors anxiously discussing the ideal sample size. A close up returns us to the petri dish where the tissue is finally dissected and carefully moved onto a glass slide. Strict adherence to protocol is evoked through the action and dialogue. Close ups of the piping of a solution onto the slide, and its placement beneath the scope are intercut with heated dialogue about proper testing protocol.

Finally, the scene cuts to a close up of Dr. Cameron (Jennifer Morrison) leaning forward and looking into the microscope. The corresponding point of view shot shows the familiar oval image, masked to resemble the experience of gazing into a scope. Black masking frames a slightly out of focus collection of shadowed, wet, pink, white and black splotches, and the voice of Dr. Cameron narrates, "it's definitely not red."

This final image is a common example of how we understand microscopic "evidence." Without the ability to see the minute details of a sample with our own eyes, microscopy, microphotography, and microcinematography give us access to a formerly invisible world and produce images—understood as synonymous with the physical sample—evidence ripe for analysis.[4] Visualization renders the biological phenomenon a stable, rational data point; however the lack of an accessible referent prevents the unmediated judgment or confirmation of the microscopic image. If authenticity or realism cannot be verified by the standards of correspondence between biological sample and visualization, why do we still understand the abstract image in *House* as biological presence?

Presence is the product the complex relationship between protocol, designed to sustain the perception of correspondence as we move from sample to image, and the paradigmatic coupling of sight and knowledge. Science has established certain standards of practice to uphold this relationship and reinforce the authority and value of visual evidence. Take for instance, this historical account of objective visual observation from the seventeenth century recounted in Svetlana Alper's *The Art of Describing*:

> We will now speak of the mode in which objects must be presented to the senses, if the impression is to be distinct…If the object is to be clear seen it is necessary: (1) that it be placed before the eyes; (2) not far off, but at a reasonable distance; (3) not on one side, but straight before the eyes; and (4) so that the front of the objects be not turned away from, but directed toward the observer; (5) that the eyes first take in the object as a whole; (6) then

[4] Cartwright, Lisa. *Screening the Body: Tracing Medicine's Visual Culture* (Minneapolis: University of Minnesota Press, 1995), 8.

> proceed to distinguish the parts; (7) inspecting these in order form the beginning to end; (8) that attention be paid to every part; (9) until they are all grasped by means of their essential attributes.[5]

If we dwell on these standards for a moment we can begin to see how they are implicitly articulated through the scene's construction and presentation of the microscopic image. *House's* close up offers a highly contained and clear perspective of the microscopic view. Upon its apparition, we feel as though we've gained direct access to this instrumentally mediated perspective "directed toward" us for careful inspection. The scene's broader construction helps place us in an idealized viewing position along side the diegetic expert, offering an image that seems to "contain meaning"—a close up of an object that seems to mimic the conditions of scientific observation.[6] But the sense of the image's evidentiary value is entirely dependent upon aesthetic and formal codes that helps produce the perception of an object perfectly presented to viewer. That is to say, in order to create the sense of an evidentiary object that can invite the act of reading, interpretation, or diagnosis, film and television must first "prepare" an objective image using the conventions of continuity editing.

House uses tightly framed close ups and rhythmic editing to evoke the sense of carefully executed scientific protocol. The framing focuses our attention on the actions, while the editing moves step-by-step through the imaging process. The progressive and meticulous logic of this scene satisfies the mechanical aspirations of scientific protocol, which seeks to minimize the influences of human subjectivity.[7] *House's* use of framing and editing helps create the perception that we've gained access to a stable microscopic image that is the product of a carefully constructed management

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[5] Alpers, Svetlana. *The Art of Describing: Dutch Art in the Seventeenth Century* Chicago (University of Chicago Press, 1983), 95.

[6] The ties between cinema, photography and scientific observation can be traced back to the 19th century. Scott Curtis details how the principles of instrumentality and observation in science and medicine aligned with the affordances of early photography. Curtis, Scott. "Photography and Medical Observation," *The Educated Eye: Visual Culture and Pedagogy in the Life Sciences*, edited by Nancy Anderson and Michael R. Dietrich (Hanover, N.H.: Dartmouth College Press, 2012), 68-93

[7] Daston, Lorraine, and Peter Galison. *Objectivity* (New York: Zone Books, 2007), 99-100.

system free of human subjectivity. Breaking down the imaging process into sequential steps using close ups establishes a sense of careful control as we navigate the movement from human to microscopic scale, producing the perception of a corresponding objective image.

The scene from *House* articulates a representational structure that dates back to early cinema and can be traced in films over the last century. Similar patterns are articulated in Kristen Ostherr's work on early popular hygiene cinema, Oliver Gaycken's analysis of silent microscopic parody films, and Scott Curtis' history of Hermann Braus' microcinematography.[8] *House* demonstrates a historically established structure that uses protocol to unite the sense of objective visualization with "access" to unseen phenomena. In order to navigate the radical change in visual scale and preserve the link between sample and image, scientific visualizations depend on a shared set of rules to support the perception of reality or referentiality. As Laura Perini argues in her work on images in scientific research: "visual representations are perceptible objects that only convey content in light of interpretive 'rules' (which [are] often not explicit) that are at least partly conventional."[9] *House* testifies to the persistence of scientific and medical protocol in appeals to objectivity on screen. The demonstration of experimental labor announces the accuracy and authority of the image. At the same time, this attention to action showcases the stages of mediation in the movement between visual scales.

This constructivist reading of *House* risks undermining the epistemological and representational value of the image.[10] Thus far, I have tracked the way the show uses editing and

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[8] Ostherr, Kristin. *Medical Visions: Producing the Patient through Film, Television, and Imaging Technologies* (New York: Oxford University Press, 2013); Curtis, Scott. "Science Lessons," *Film History,* ID: Indiana University, 25:1-2 (January 2013): 45-54; Gaycken, Oliver. *Devices of Curiosity: Early Cinema and Popular Science* (New York, NY: Oxford University Press, 2015).

[9] Perini, Laura. "Image Interpretation: Bridging the Gap from Mechanically Produced Image to Representation," *International Studies in the Philosophy of Science* 26, no. 2 (June 2012), 153–70.

[10] Scientific "constructivism" is a common method in early STS work. Most arguments circle around the artificiality of the scientific method. See: Latour, Bruno, and Steve Woolgar. *Laboratory Life: The Social Construction of Scientific Facts*

framing to produce the *sense* of scientific precision. It suggests that the image's value is entirely dependent upon the surrounding protocol and thus the microscopic image may merely be a placeholder capable of being swapped out for any other evidentiary image. However, the microscopic image's relationship to scale and presence positions it as a unique narrative device. In moving between the micro and human scales of perception, the image transforms from the inaccessible biological referent into a stable, concrete object-entity. Without a human scale equivalent, the microscopic image is not held to mimetic or referential standards of judgment, unlike the x-ray or CT scan, which refer back to a specific patient or part of the living body.[11] Rather, by rendering the microscopic visible to the human eye, it often comes to designate or generalize the biological phenomenon.

The conflation of the microscopic view and the biological sample is upheld by the perception of "direct access" afforded by the mediating instrument. By this, I mean the perception that when one looks into the microscope, they are looking directly at that biological sample. The image appears as natural extension of the human gaze, not the product of carefully designed signifying structures. Indeed, this assumption underscores discussions of photographic and cinematic realism in the work of Kendall Walton and Noel Carroll.[12] Carroll outrightly claims the microscope "enable[s] us to see the things themselves, not merely the representations of these things," to ask, "if we are willing to speak this way about microscopes…why not regard

(Beverly Hills: Sage Publications, 1979); Lynch, Michael, and Steve. Woolgar. *Representation in Scientific Practice* (1st MIT Press ed. Cambridge, Mass.: MIT Press, 1990); Kuhn, Thomas S. *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962); Peirce, Charles S. *Essays in the Philosophy of Science* (New York: Liberal Arts Press, 1957).

[11] It's tempting to proclaim similar readings of visual experiments, like Etienne Julien Marey's movement photographs or x-ray photography. However, those both still hold human-scale referents, and therefore remained wedded to the specific conditions of their production.

[12] See Walton, Kendall, "Transparent Pictures: on the nature of photographic realism," *Critical Inquiry,* vol. 11, no. 2, (December 1984): 246-277; Carroll, Noel, *Theorizing the Moving Image* (Cambridge: Cambridge University Press, 1996).

photography in the same light?"[13] Carroll's question relies on the paradigmatic understanding of the instrument as a prosthetic tool to extend human sense capacity. The microscope, or camera, can serve as a passive, technological device that allows the humans to see visual scales, movements, or events that otherwise go unnoticed or remain inaccessible to the naked eye.[14] In *House,* "direct access" is upheld by the conventions of film form. The scene first primes the viewer through the careful presentation of protocol, and turns to the classical construction of point of view. Dr. Cameron's gaze into the microscope followed by the close up produces the sense that we've stepped into the position of the expert who directly accesses the microscopic view. This shift into the position of the expert obscures the labor and influence of protocol and encourages us to see the image as an extension of our gaze. At the same time, the primacy of human vision renders protocol and the microscope as passive tools in service of the expert gaze: the mechanical means of access to the microscopic view.

Indeed, the microscope was developed not according to the accuracy of an image, but in pursuit of visual clarity. Lisa Cartwright's work on the history of the microscope demonstrates how the instrument was developed according to the standards of human vision. Since the microscopic view could not be judged by resemblance, success and failure was determined by the sharpness and precision of the image to the human eye. In turn, accuracy was displaced onto the instrument of production as opposed to the image, to create the overdetermined relationship between the observer and the apparatus: "microscopy incorporated the individual observer in a decentralized, self-correcting visual-sensory apparatus," to confuse the mediated relationship between observer and

[13] Carroll, *Theorizing the Moving Image,* 57.

[14] Carroll's reading of photography underlies numerous scientific appropriations of cinema and photography in science, including Edward Muybridge's chronocinematography, and Charcot's taxonomy of female madness. This conflation can be found in histories of microcinematography that conflate the eye with the instrument: " Like the retina of an eye which never tires, the film follows, over a prolonged period, all the changes which occur; even better, the cinematograph is, like the microscope itself, and instrument of research, while the one concerns visual space, the other concerns time" Landecker, Hannah. "Cellular Features: microcinematography and film theory," *Critical Inquiry* 30(4) (2005): 914.

object of the gaze.[15] This confusion expresses what Lorraine Daston and Peter Galison have named *mechanical objectivity*, or modern standard of objectivity that privileges mechanically rendered visualizations. Tracking the innovation of instruments like the microscope, x-ray, and camera, they argue objectivity's alignment with technological forms of mediation is the product of a historical process in which scientific standards of evidence increasingly sought to suppress the role of human intervention. The instrument in the mechanical objectivity paradigm must therefore be both present and absent: the object that affirms the mechanical means of production, but denies instrumental mediation.[16] While the mechanical nature of protocol might serve a similar function, minimizing the influence of the human hand, the ontological transformation from process to object relies upon the relationship between the instrument and human gaze. *Mechanical objectivity* helps describe how the microscopic image appears to be an idealized extension of human vision, free of subjectivity. As a passive tool, the instrument both supports and facilitates the privileged view, only to withdraw with a single look.[17] The primacy of human vision, coupled with the objective status of the mechanically produced image, effectively erases the labor of protocol and instrumental mediation.

From this perspective, the microscopic image reveals itself as an absence masked as presence: a dubious object upheld by the protocol, instrument, and expert.[18] After all, what does the

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[15] Cartwright, *Screening the Body*, 85.

[16] Daston & Galison , *Mechanical Objectivity,* 116.

[17] Latour claims within the sciences there is "no distinction has been made between what is called a 'scientific' fact and what is called a 'technical' object for artifact." In other words, the instrument or technical object is perceived as a fact rather than a mediator or form of manipulation. Latour, *Science in Action,*132.

[18] In her analysis of contagion on film, Kirstin Ostherr claims that disease on screen operates through a dialectic of visibility and invisibility. Faced with the microscopic, imperceptible virus, films often displace disease onto sick bodies or populations by using skin color, social behaviors like shaking hands, and physical symptoms like sneezing to designate the presence of the virus. Concluding, she claims that with the rise of digital scientific imaging technologies, viral indexicality has been achieved. However, this notion is entirely dependent upon the mechanical objectivity paradigm and our vested belief in the instrument. Today, as we become increasingly dependent on complex technologies and data-driven processes, mechanical objectivity increasingly shapes our perception of scientific and medical facts and evidence. Thus, contrary to Ostherr's final claims, I might argue that the dialectic persists in a much more epistemologically

microscopic image provide on its own by way of information? The fuzzy, abstract collection of black, white and gray splotches cannot say much beyond the suggestion of material registration. These questions express the anxiety of the microscopic image as an objective piece of evidence. This section has shown how science and popular culture have tried to manage this problem through protocol and instrumentality to proclaim a product that is capable of expressing biological presence. The next section will dwell on how and why these images invite interpretive questions and analysis by focusing on the relationship between aesthetics and legibility.

Reading Images

As a form of scientific and medical evidence, the microscopic image is meant to be analyzed and interpreted. Epidemiologists use microscopic images of biological samples in order to gain information about the viral type, reproduction processes, and transmission patterns. However in the context of popular film and television, there remains a gap between perceiving an image's evidentiary value and using it to understand an outbreak. Indeed, for most viewers even describing the microscopic image proves to be an impossible task. With little sense of scale, or familiar forms of correspondence, the average viewer lacks the vocabulary and expertise to interpret the image.

Take for example the following scene from Steven Soderbergh's global outbreak film, *Contagion*: traversing Asia and North America, the film moves between the domestic drama of the infected patient, to the work of the research scientists, to the large-scale political, social, and economic ramifications of contagion. By implementing and interrupting the formal and diegetic protocol illustrated in the last section, the film offers a compelling criticism of common diagnostic and interpretive structures of epidemiology and scientific representation on screen. The first glimpse of the microscopic virus comes after the methodical movement through a Biosafety Lab Level 4

charged form: through the microscopic image. Upheld by the paradigms and structures of scientific evidence and film

(BSL-4) sterilization sequence. Using a step-by-step structure akin to *House, Contagion* follows Drs. Ally Hextall (Jennifer Ehle) and David Eisenberg (Dmitri Martin) through laboratory safety protocol. This processural structure extends to the transportation of the viral sample from storage to sample preparation. Action and editing exhibit deliberate control—the quick cuts between actions fragment the stages of the process, dwelling on the careful hand off of the container and sterilization of the sample bag flagged with a dramatic orange biohazard symbol. Jargon-heavy dialogue transitions the scene out of the BSL-4 space to a darkened room illuminated by a computer screen in the foreground. Drs. Hextall and Eisenberg stand gazing down at the monitor, and Hextall points to the screen, narrating the findings: "It's pleomorphic, but tends toward ovoid in shape. I can see some structures on the surface that look like glycoproteins, but there's nothing morphologically pathognomic." While the speech fails to articulate a coherent reading of the image for the viewer, her tone of voice conveys doubt and concern. Eisenberg's response continues to mount tension, as he shake his head and responds, "We tested all of her antibodies. I didn't see much cross-reactivity. Her body didn't know what to do with it. It just kept amplifying." Finally, the microscopic image is revealed on a computer monitor [Fig 2.1]. Shot from a slight angle, the sleeve of Dr. Eisenberg's coat obscures the right half of the frame that contains two abrasively lit screens. Shrouded in darkness, the monitor frames the microscopic image with a nondescript image-viewing software that masks the abstract collection of dotted clusters surrounded by dark, fragmented outlines. The black and white collection of these blobs—composed of dense dot clusters and squiggle outlines—vary in size, ranging from the small fuzzy gray splotches around the edges, to the large group that dominates the middle of the frame. A few oblong clusters fill in the gaps between the larger blobs, and the lower right hand section of the image fades into a dense and out of focus cascade of specks. Dr.

form, the image appears to be an indexical rendering of the outbreak. Ostherr, *Cinematic Prophylaxis,* 190.

Hextall draws the scene to a foreboding conclusion, "Send it to Sussman. If he doesn't know what it is, no one does."[19]

Fig. 2.1: First microscopic image featured in *Contagion* (Soderbergh 2011).

My own struggle to describe the microscopic image here illustrates many of the concerns I will address in this section. *Contagion's* use of montage and dialogue suggest building to a major visual revelation, but the image on screen ultimately gives us little to grasp onto. Without language or the capacity to interpret these images, how are we as audience members to *understand* them as the virus? Unlike *House's* revelatory microscopic image, which unlocked hidden biological secrets, *Contagion's* mediated version emphasizes the opacity of the evidentiary image to the common viewer. By withholding a point of view shot, the film never grants the viewer direct access, in favor of foregrounding the disconnect between scientific evidence and audience. In this sense, the scene dramatizes the epistemological instability of the microscopic image, showcasing our dependence

[19] The following scene shows Dr. Sussman recording his description the virus in the same incoherent scientific terms.

upon human interpretation. Following the standards of protocol—both formally and diegetically—Soderbergh delivers objective, viral materiality in the form of an image, only to evacuate insight.

While *Contagion* might suggest skepticism or offer a criticism, the microscopic image persists as a paradigmatic evidentiary object in the representation of emerging infectious disease. The examples from *House* and *Helix* attest to the image's epistemological value and representational function. But if indeed, audiences cannot interpret these images, what about them connotes this sense of legibility? Histories of technology have shown how visual clarity has shaped the development of instruments but that speaks very little to the aesthetics of the images themselves.[20] What about their appearance invites the act of reading or triggers the possibility of knowledge production? The microscopic images of *House, Helix* and even *Contagion* are so familiar that we take them for granted. Though Soderbergh frames the shot from an odd angle, we still recognize the abstract black and white image on screen as the microscopic view.

In spite of a wide array of image types, shared aesthetic markers have made the category of the microscopic image recognizable. Black masking typically frames a selected view for the human eye, while at the same time, the collection shapes tend to extend beyond the frame, giving the sense that we're only seeing a fragment of a larger biological universe.[21] Bright staining in pinks, purples and blues, or stark black and white, create high contrast, two-dimensional images that more closely resemble an abstract pattern or diagram than a photograph [Fig. 2.2]. These aesthetic manipulations are meant to render a legible image by highlighting a general sense of structure. The graphic, bright, and flattened perspective of these images pushes it further from a recognizable referent, while the vibrant stains and high contrast lighting create abstract, often beautiful images that appear to bear

[20] See Cartwright and Lynch.

[21] Alpers claims the microscopic view simultaneously fragments and multiplies, dwelling on "innumerable small elements within a larger body…. [and] enables us to see an enlargement of a small part of a larger body or surface." Alpers, *The Art of Describing,* 84.

instrumental intervention. Unlike contemporary criticisms of digital photography and realism, microscopic images are rarely understood as fabricated or false documents.[22] Operating within the paradigms of scientific protocol and objectivity, the manipulated images are instead legible documents or data of the biological world. Their familiarity and paradigmatic position as forms of scientific evidence seem to assert interpretation: that is they seem to carry an epistemological charge.[23]

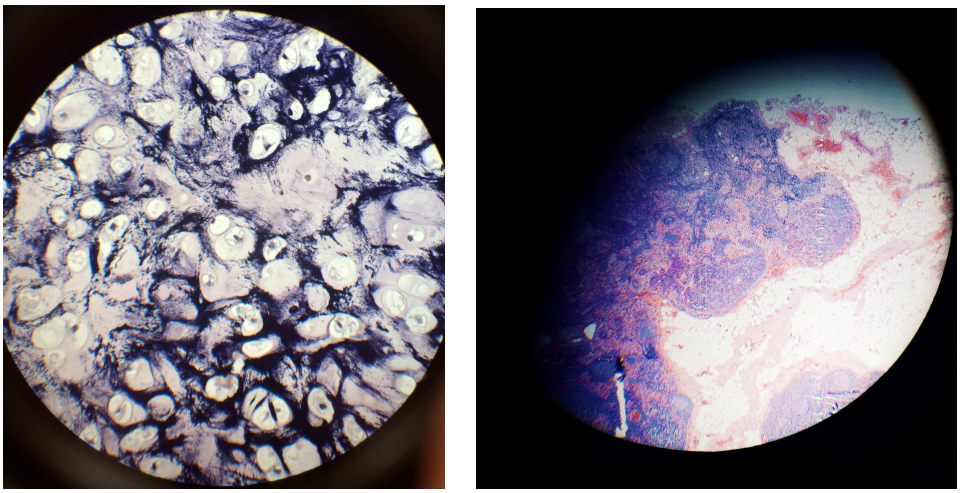

Fig. 2.2: Examples of Microscopic Images (photo credit author)

The microscopic image is one of a wide range of abstractions that are used as evidence in science and medicine. However the microscopic image offers a unique set of anxieties and representational structures. The high contrast image creates a structural outline that elicits the act of reading, much like a map or diagram. Indeed, the microscopic view's flattened perspective suggests an image that our eyes should inspect, decipher, or read like a document, pattern, or codeakin to

[22] See a large body of work on digital photographic realism, including, but not limited to Mol, Anne-Marie. "Digitization and the Living Death of Photography," *In Culture, Technology and Creativity in the Late Twentieth Century*. Ed. Philip Hayward. (London: John Libby, 1990); Vaughan, Dai. "From Today, Cinema Is Dead," *Documentary: Twelve Essays* (Berkeley, University of California Press, 1995).

[23] *Contagion's* microscopic image however very overtly rejects the objective observational principles designed to invite the act of reading of an image. Unlike the use of the point of view shot in *House* or *Helix,* the use of lighting and framing dismantles the privileged Cartesian position.

film historian, Paula Amad and the photographer and writer, Alan Sekula's discussion of "decoding" aerial photography.[24] Producing an image without a horizon line flattens the image of nature into an abstraction that blocks normal habits of seeing. The microscopic image (and aerial photograph) offers a view "enmeshed within complicated layers of encoding," that suggest a dominant gaze evoking the sense of control, and containment of the biological specimen.[25] While aerial photography is more closely aligned with the map, Amad and Sekula's work suggests a particular aesthetic mode that elicits the act of reading or interpretation.[26] Borrowing from this language, Bruno Latour uses the term "oversight" to describe the encounter with scientific visualization. He claims the view from above imposes a powerful gaze over the object while ignoring its content or meaning.[27] This description is perhaps similar to the previous chapter's discussion of the map; however, unlike the aerial photograph, the microscopic image remains divorced from temporality. The aerial photograph expresses a surveilled, historical moment, and its evidentiary status is wedded to the capture a specific time and place. In contrast, the microscopic image often generalizes a biological phenomenon; it does not "record" a biological event, it actualizes a previously inaccessible entity.

While a microscopic image begins as a single sample taken from an individual source, it unique in that it both maintains its specificity— as an objective piece of evidence—and signifies a

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[24] "Scientists start seeing something once they stop looking at nature and exclusively and obsessively at prints and flat inscriptions." Latour, Bruno. "Visualization and Cognition." *Knowledge & Society* 6 (January 1986): 16

[25] Amad, Paula. "From God's-Eye to Camera-Eye: Aerial Photography's Post-Humanist and Neo-Humanist Visions of the World." *History of Photography* 36, no. 1 (February 2012): 81.

[26] A particularly good example of the aesthetic overlap can be seen *Arrested Development's* season two episode "Sad Sack" (Lauer 2004). There we see the confusion between a close up shot of human anatomy and aerial surveillance images. Read by the wrong type of "expert" the extreme close up of testicles is mistaken for images structures housing weapons of mass destruction.

[27] Latour, Bruno. *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, Mass.: Harvard University Press, 1999), 38.

broader biological phenomenon that can be identified, categorized, and ideally treated. In this sense, image *is* the virus, both *that* specific sample of the virus *and* The Virus, or the broader taxonomic viral type. Typically we quickly move from the apparition of the microscopic view to its identification and categorization. This affinity to generalize the microscopic image expresses the perceptual encounter with what Svetlana Alpers calls the "microscopic view." In dividing the sample and enlarging it, the instrument gives a fragmented, singular, directed gaze that at the same time multiplies, dwelling on the "innumerable small elements within a larger body."[28] The microscopic image is a part that implies a whole, appealing to two impulses simultaneously as both a specific object *and* a larger biological phenomenon.[29]

Navigating this scalar movement in film and television however, always requires the interpretation of an expert and surrounding protocol. Consequently, the image proves to be a useful organizational tool. In an effort to understand what I mean by this I'd like to return to the microscopic image in *House*. What would it mean to try an interpret one of these images? If "to see is to know," then description could functionally offer a form of interpretation; after all, a scientist is merely reporting on what is "in plain sight."[30] My initial lack of description capitalized the familiarity of the microscopic view, assuming that most readers were capable of imagining an example. The descriptive absence was an attempt to avoid analogy and metaphor, however now I will return to description in an effort to explore what it would mean to read one of these images closely.

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[28] Alpers, *The Art of Describing,* 84.

[29] This expresses what has become known as medical gaze, originally articulated in Michel Foucault's *Birth of the Clinic.* There he examines the development of diagnostic practice, which transformed the singular symptom into total disease. This movement often occurs instantaneously—in a single glance as the clinic emerged—thereby erasing the analytic process in a single look. See Foucault, Michel. *The Birth of the Clinic; an Archaeology of Medical Perception* (New York: Pantheon Books, 1973).

[30] This conflation of vision and knowledge can be traced back to Plato, but was perhaps most influential through the work of Rene Descartes' dualism.

The ovoid, black masking blurs into the darkened edges of the microscopic sample, framing a hazy collection of mauve, white, and gray shapes. The white swirls at the top like a kind of cloud sitting atop the wrinkled pink collection of hills and valleys. A white streak slashes through the pink nooks and crannies pushing into a small collection of dark veins. The pink and purple bottom of the image resembles the surface of an organ, fleshy, wrinkled with pockets and crevices highlighted in fuzzy streaks of black and gray. It appears wet: collections of bubbles dominate the right hand side. The white clouds and pink mass sparkle and glisten [Fig. 2.3].

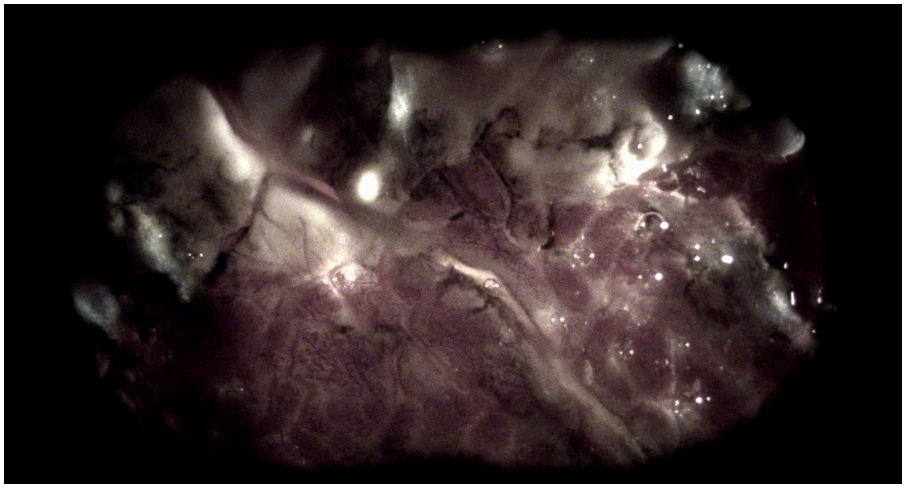

Fig. 2.3: *House's* microscopic sample revealed. "All In." (Gerber 2006)

If my language supported the possibility of picturing the microscopic image, it ultimately required comparisons to more concrete, material forms of the imaginary.[31] We tend to assume that scientific visuals are immediately clear and understandable, which is why they tend to form the baseline of evidence in diagnostic or experimental interpretation. But in the context of popular films and television, the image itself remains a recognizable, but illegible to the average viewer. However,

[31] This exercise speaks to Perini's claim that micrographs lack a systematic symbol-referent relationship, and are therefore "no translatable into a linguistic form of representation…essential to generate the appropriate statements comprising a definition of truth for a symbol system." Perini, "Image Interpretation," 282.

the appearance of these images does not disrupt the flow of the text. Rather I argue, film and television use this illegibility to their advantage, overcome the epistemological instability and the desire to interpret the image, allow the show or film to draw upon alternative diegetic and formal supports to guide the viewer toward an interpretation or diagnosis. Bruno Latour argues that visualization helps ground scientific communication through the transparent presentation of "proof objects," or representations of absent ideas or entities. Scientists "present absent things" that can be transferred, aligned, and juxtaposed against other immutable objects. In this sense, he claims all scientific visuals are metaphors, and therefore all forms of scientific communication operate by way of metaphor. My attempt to return the visual to language helps elucidate this point: the microscopic image (or Latour might argue, any image in science) is always overdetermined, incapable of standing on its own or speaking for itself.[32]

While my description does not offer a scientific interpretation of the image it attests to the way evidentiary images achieve meaning and value by calling upon shared languages and points of reference. In order to overcome the absence or instability of the microscopic view films and television draw upon formal editing and narrative conventions to read the image for us. For Latour, the immutable scientific fact of visualization's meaning is engendered by situating them along side other objects or within a larger linguistic inscription: "proof requires the assemblage of an archive [of evidence] but also the inscription of that archive into language that result in the reduction and abstraction of the original source proof."[33] Visuals, like words, essentially *carry* ideas, but maintain their original integrity as a "proof object" as they move across actors and contexts. This formation is

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[32] This method also draws on Foucault's analysis of diagnosis in *Birth of a Clinic,* where he states, "It is in description or, rather, the implicit labor of language of description, that authorizes the transformation of symptom into sign and the passage from patient to disease and from individual to conceptual." My examples, however, illustrate that this transformation occurs through the collection of authorities including but not limited to, language, technology, and form. Foucault, *Birth of a Clinic,* 114.

[33] Latour, *Science in Action,* 14-18.

articulated and produced through formal structures and narration, rendering the image a useful structuring device for these evidentiary-assemblages, and indeed, complex networked outbreaks.

Interpretation and Network Assemblage

In *House,* Dr. Cameron's voice of expertise helps interpret the abstract image for the audience. Her final statement—"definitely not red"—communicates the significance, effectively overcoming the epistemological instability by translating the image to the audience. Drawing upon the linguistic and geometric definitions, Latour claims translation involves the movement ideas in a particular direction: slowly channeling ideas, evidence, and interpretations creates the perception they are "solidly tied" to much larger truths.[34] This mobile definition of translation helps articulate the progressive logic of the scene: reading or translating the image is not a matter of identification, but channeling its significance in a particular direction. The show draws on the voice of the expert to helps create the perception the image is bound to clear and concrete narrative implications, satisfying the cause-effect logic of scientific interpretation. Cameron's voice *guides* us toward knowledge production, while simultaneously remaining tied to a concrete evidentiary object.

Coupling the image with the voice of the expert demonstrates the conventional "show and tell" interpretive structure: it appears as though Dr. Cameron is merely reporting on evidence in plain sight.[35] *House* treats the image like a fact: as a self-evident object solidly tied to a single interpretation. However, understanding the implications of that interpretation—truly overcoming the absence—requires leading the audience down a questionable channel, further and further away from the evidentiary anchor. In this sense, the image could be described as a "black box," a term Latour

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[34] Latour, *Science in Action,* 118.

[35] Latour calls this structure an "audiovisual spectacle" wherein an expert speaking and presenting a scientific report produces a spectacle of facticity that seemingly erases the underlying signifying structures and processes. Latour, *Science in Action,* 72.

develops to describe how science produces artifacts or facts that appear unmediated and autonomous.

Latour's rigorous body of work on the social and political dimensions of laboratory science offers a detailed analysis of the production of scientific facts. Drawing from cybernetics, *Science in Action* uses the term "black box" to describe a complex concept deeply embedded in existing paradigmatic practice, obscuring the social and technological influences that bear upon it's production. Reliant upon standardized protocol, the black box merges content and context to function as an autonomous object or statement. Anything from the microbe to gravity, to a computer chip qualifies as a black box; they operate as truths to be layered on top of one another in the service of producing more and more "boxes."[36] In many ways, my analysis suggests we understand the microscopic image as a black box. Indeed, Latour describes the black box as a collective product of statements, processes, and pieces of machinery, which create invisible links between individuals, systems, and technologies.[37] And the microscopic image in film and television participates in a similar chain of meaning-production that obfuscates the instrumental input, in favor of interpretive output. Most importantly, the black box is "an *in between* [for] two systems of alliances, that is it is the obligatory passage point that holds two together, that when it is successful, concentrates itself in the largest number of hardest associations, especially if it has been turned into an automaton."[38] Without being too heavy-handed—simply applying this term to the image—I'd like draw upon Latour's language to understand the structural function of the microscopic image on screen—however it should be noted that to directly apply this concept ultimately erases the labor traced in the first half of this chapter. For Latour, the black box is a complicated artifact capable of

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[36] Latour, *Science in Action,* 2-14.

[37] Latour, *Science in Action,* 30.

[38] Latour, *Science in Action,* 139.

standing on its own—it's a 'matter of fact'—but the microscopic image, as I have argued, cannot simply speak for itself.[39] Rather, it operates *like* a fact: a necessary passage point or link in the representation of emerging infectious disease. In an effort to overcome the anxiety of absence, texts introduce alternative forms of authority to guide the viewer toward interpretation. Treating the microscopic image like a black box facilitates the narrative construction of an emergent outbreak, piling authoritative networks into a causal chain, anchored, yet driven by, the microscopic image.

To track this structure, I turn to another example from *House*. The season one episode, "Cursed" (Sackheim 2005), radically disorients the viewer through the dramatic cut from a wide exterior shot to a microscopic image. The familiar circular, black masking frames a slightly blue-gray image with an oblong orange spot in the middle [Fig 2.4]. Scatterings of orange and black dots are part of a hazy mix of lines resembling scratched glass. The image shifts in an out of focus, reminding us of the mediating instrument, and cuts to Dr. Foreman (Omar Epps) gazing into the scope with Dr. Chase (Robert Sean Leonard) posed in the background, who narrates: "He fell on it. Some kind of insulation. It's old. House was built in the sixties." By simply reversing the protocol structure traced earlier in this chapter, this cut successfully realigns the object of the gaze with the authority of the instrument and expert gaze. The shot tracks outward to reveal the dark lab space with Drs. Cameron and House in the background. Attention shifts to Dr. Cameron, who stands directly center inspecting some object, "What's it made of?" Dr. Chase provides a response: "Felt. Or cotton?" With our spatial and scalar coordinates reestablished, Dr. House interrupts with a personal joke and moves toward the scope. The camera follows, finally framing him in close up as he peers into the instrument. The point of view shot shows the same microscopic image, which quickly transforms

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[39] Importantly, the "fact" functionally erases the social and historical circumstances on which it depends. It often serves as an autonomous statement divorced from the conditions of production. The fact appears to be "godly" and often brings uncertainty to a "full stop." While it is often mobilized and treated as a form of evidence, doubt is never directed at the singular fact. Resistance is directed at the structures or use of the fact, which serves as at the essential standard of proof. Latour, *Science in Action,* 23.

into a "closer look:" an animated circular wipe mimics the experience of shifting between lenses to reveal a digital animation of three criss-crossing orange lines with the same gray blue background. Navy blue streaks partially bisect each line, dissipating into the orange to give a wood grain effect.[40] Cutting back to close up, Dr. House provides a reading, closing off the black box: "animal hair." Pulling his face from the eyepiece, his face darkens and he suddenly shifts his gaze toward the camera. With urgency, "get me the CT scans."

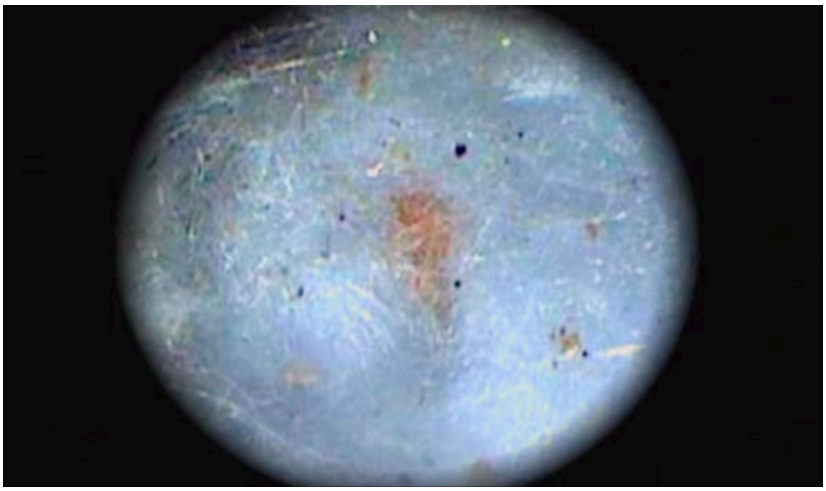

Fig. 2.4: Microscopic image of "animal hair." "Cursed." *House* (Sackheim 2005)

To viewers, the microscopic image immediately asserts its evidentiary charge: revealing an unseen perspective and perhaps information about the ongoing diagnostic mystery. While "animal hair" helps assign the image a referent, it does not effectively overcome the lingering epistemological instability. Instead, the show leaves us speculate on what the hair may mean in the context of the episode's narrative. Indeed the dramatic call for CT scans reinforces the divisive nature of the image: as diagnosis and context are withheld to produce suspense and aid the progression of the narrative.

[40] It is worth noting that this image appears highly constructed and does not hold the epistemological weight of the previous image. Though the digital image fails to mimic the photographic quality of the prior view, it uses the familiar gesture of the transitioning lens to link the two, suggesting we understand them in the same terms.

The paradigmatic pairing of image and voice of expertise reinforces this forward momentum, or what Latour calls an, "audio visual spectacle…There is a *visual* set of inscriptions produced by the instrument and a *verbal* commentary uttered by a scientist."[41] Pairing the two functionally strengthens the black box by layering multiple forms of authority—both the mechanical production of the image and expert exposition—to create the perception that "he or she is just commenting on what you yourself directly see."[42] While House's reading effectively closes off the black box, rendering it immutable and mobile, for audiences it remains divorced from narrative context and requires additional representational reinforcements. That very ambiguity marks the distinction between Latour's black box and my reading of the microscopic image: despite the recognition of a microscopic view, it cannot exist as an autonomous fact or object on screen.

Mirroring the spatial disruption of the scene's beginning, *House* cuts to a close up of a light board as the CT films are thrust into the frame. A quick cut repositions us at an impossible angle, as though we're standing inside, but slightly adjacent to the light box. The grid of oblong black and white shapes hangs in the foreground with Dr. House's face out of focus, lit by the glow of the box, and the camera tracks backward to reveal the presence of the diagnostic team scrutinizing the scans. Dr. House begins, "First, find me the name of the company that made the insulation. And second tell me what makes me want to short their stock." Cutting back to the scans, the camera tracks in mimicking the act of "looking closer." The CT scan offers a new set of epistemological ambiguities, and Dr. Foreman attempts to fill them in, "uh…enlarged hyper lymph nodes." Returning to the wide shot, Drs. Cameron and Chase interject, "parabronchial thickening. Pleural effusion." Gazes fixed on the slides, Dr. House responds, "Less obvious, more scary."

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[41] Latour, *Science in Action, 72.*

[42] Latour, *Science in Action,* 74. Foucault articulates a similar effect produced through speech and vision in his development of the "clinical gaze:" In this regular alteration of speech and gaze, the disease gradually declares its truth, a truth that it offers tot he eye and ear, whose theme, although possessing only one *sense* can be restored, in audible totality, only by two *senses:* that which sees and that which listens." Foucault, *Birth of a Clinic,* 112.

House's appeal to the CT scan parallels the methods of modern medicine, which often draws upon multiple forms of evidence to link the singular symptom to diagnosis. While both the microscopic image and CT scan bring their own epistemological instabilities, insofar as there remains a gap between image and understanding, layering them on top of one another helps erase that doubt. The cut between the microscopic image and the CT scan supported by Dr. House's voice creates a *sense* of rational links across forms of evidence capable of leading toward a final diagnosis. For Latour, the more technological actors in the chain, the stronger the box.[43] *House* demonstrates how interpretation emerges from the collection of authoritative actors (and here I quite literally mean the actors on screen and Latour's extension of the term to any human or object).[44] Diagnosis operates akin to the construction of a black box, layering and leading audiences through a variety of sources. In other words, black boxes not only help establish the authority of the new fact, but also transmit authority across actors to strengthen their individual autonomy.[45]

Prompted by Dr. House's diagnostic hint, the team squints harder at the image, while the camera dollies in to focus on Dr. Cameron: "Oh god." Linking CT scans back to the microscopic image: "It can be transmitted through infected animal hair! But the graham stain would have shown…" House interrupts, "the cefuroxime would have killed some of it, clouded the results." Dr. Cameron's response prompts her to exit the frame, "We've got to get this kid on Levaquin." Like *Contagion,* this scene uses scientific jargon to convey diegetic authority and withhold information. Coupled with the medical images, the dialogue postpones diagnosis and aids the movement between spaces, technologies, and characters. Image and narrative suspension work hand-in-hand, using the epistemological doubt to guide the viewer toward diagnosis, across these spaces and evidentiary

[43] Latour, *Science in Action,* 137.

[44] Latour, *Science in Action,* 129-30.

[45] Latour, *Science in Action,* 109.

objects. Again, despite the evidentiary authority of the microscopic image, the show is forced to draw upon alternative authorities to achieve medical diagnosis. While the microscopic image might serve as an anchor, it simultaneously triggers the analytical protocol necessary to fill in the anxious absence of the image.

Dr. Cameron's appeal to the animal hair helps articulate the reversibility of this structure. In order to verify a black box, one must be able to retrace the logical steps to account for all the autonomous actors: the interpretive machine must be capable of being broken apart and put back together again.[46] Though editing has linked the CT and microscopic images, the larger diagnostic narrative still needs causal organization. Dr. Cameron's expert voice traces the "transparent" link between the two objects and creates a sense of narrative causality. Here, the microscopic image of animal hair becomes a vector for diegetic viral transmission *and* the representational system of diagnosis and interpretation. Dr. Cameron's statement quite literally translates the transition between images, while the use of editing locates the autonomous evidentiary images in a causal chain of actions. Translation occurs in the formal weaving of these diegetic devices to guide the viewer between "allies" toward a diagnosis, or as Latour claims, "to build a machine."[47] Entirely reliant upon this interpretive machine, for viewers, the microscopic image remains relatively ambiguous, entirely dependent upon the show's broader formal context. As a result, we move further and further from the specific information contained in that original microscopic image. The initial encounter instead functions as a trigger for the movement across spaces, events, and technologies to produce the sense of logical translations across actors. This diagnostic machine is finally put to use as the camera swings around to Dr. Foreman's puzzled gaze landing on an over-the-shoulder shot of

[46] Latour, *Pandora's Hope,* 74.

[47] Latour, *Pandora's Hope,* 130.

Dr. House. "What does he have?" Dr. House responds, "anthrax." Cut to a wider shot of the three men lit by the light of the box; House adds, "the house belonged to old man Hussein."

While any epistemological instability present in the image becomes increasingly diffused across various forms of authority, leading toward a diagnostic resolution, *House* draws out this process to link discrete spaces and forms and evidence. The show could have remained in the original lab space; after all, Dr. House had already diagnosed the illness with a single look at the microscopic image. Rather the show chooses to capitalize on the ambiguity of scientific and medical imaging to build interpretation by moving between multiple sources of authority. "Anthrax," only emerges as the show forms a diagnostic chain, linking the patient's history: an encounter with old insulation and animal hair—examination of the sample using the authority of the microscope—and the interpretation of the microscopic image by the expert; verification using another form of visual technological authority; interpretations by additional experts; and finally the translation of expert diagnosis. These elements function not only to produce tension, but also to construct a larger portrait of the disease that moves from location to infected patient, and even beyond. By fusing the interpretation of the image with the structures of the show's narrative, the movement between these forms of expertise and spaces appear logical, seamless. However, it's important to track the epistemological function of the microscopic image in this sequence. In the end, we've lost the evidentiary image; it is *not* a symptom, merely a necessary tool to mobilize the interpretive process. In fact, the initial movement between the microscopic image and CT scan presupposes the animal hair as the vector for infection. In doing so, *House* performs an immaculate conception, conflating origin with image and setting off an analytic chain of events. How do we *know* this animal hair is the site of outbreak? Because *House* uses editing, diegetic expertise, and medical imaging technologies to tell us so. The evidentiary status of the image introduces an inductive analytical chain that seeks to prove an assumption. Layering formal and narrative devices on top of one another assembles origin,

cause-effect, diagnosis, and treatment, and knowledge production is revealed as the product of this organization. In the process, the show treats the microscopic image as a black box: a necessary "in between…[and] *multi-conductor*" to create continuity and alliances among sources of authority.[48]

Dr. House's final words demonstrate how the microscopic image as a black box can be used as a "multi-conductor" across social, political, and economic networks. Originally airing in 2005, the mention of Saddam Hussein clearly makes reference to the contemporaneous political climate. While this comment doesn't have direct bearing on the interpretation of the image, it does illustrate just how quickly the voice of the expert can create bridges between completely unassociated elements. Riding the momentum of the interpretive chain, it becomes easy for the right source of authority to lead the audience out of the laboratory. Moreover it gestures toward the way emerging infectious disease operates as a larger collection of actors, and networks of social, political, and cultural influence. This microscopic image has nothing to do with the Middle East, but the reference questions the scale of the outbreak, mobilizing the newly constructed black box in service of novel interpretive chains. And again, the epistemological gap reemerges. How far does it go beyond the single patient? How might it spread?

Contagion offers a dark answer using the structures traced throughout this chapter. Like the scene described earlier, the film operates by way of viral ambiguity: while we continuously see the effects of outbreak, narrative resolution remains tied to the control and analysis of the biological pathogen. By withholding a translation of the image, *Contagion* effectively evacuates any sense of control afforded by the evidentiary image of the virus. Rather, the film treats it as a narrative and structural tool to move between the film's networked narrative.[49] The earlier scene dramatized the failure to

[48] Latour, *Science in Action,* 105.

[49] Wald claims the contagion narrative like the microscope, functions as a tool to organize and understand outbreaks. Contagion demonstrates how these powerful tools simultaneously control knowledge, and therefore anxiety and fear, about those viral outbreaks. Here, we see how revealing the microscopic view and the contagion narrative work in tandem with one another. To say that this is merely a metaphorical relationship between the microscope and the

comprehend the microscopic image of the virus. Unable to recognize the image, the CDC outsources to Dr. Sussman (Elliott Gould) at a private BSL-3 lab in San Francisco. However, as the death toll rises, viral ambiguity poses too great a threat, and he's instructed to destroy all samples. The scene opens with Dr. Sussman suiting up to enter his laboratory space. A wide shot frames a window looking onto the lab space, where a woman in full safety gear enters the frame and calls Dr. Sussman using the intercom system. The two discuss the CDC's instructions and he quickly convinces her to head home while he takes care of destroying the samples. The scene cuts to a close up of the petri dish and a gloved hand removes the sample from the storage container; followed by a cut to a darker lab space dramatically lit by the microscope's illuminator. The camera pans with Dr. Sussman as he enters the space, takes his seat, and places the sample beneath the scope. A close up show the sample and the camera pans slowly between the illuminated dish and Dr. Sussman's gazing profile. He looks up in revelation with his satisfied look of astonishment [Fig. 2.5].

narrative structure would be to overlook the epistemological paradigms that facilitate their harmony. Wald, *Contagious,* 19.

Fig. 2.5: Preparing us for microscopic revelation. *Contagion* (Soderbergh 2011)

This first section of the scene demonstrates many of the structures traced in the first half of this chapter. The movement from the decontamination room, to sample, to scope facilitates the transition between the microscopic and human scale, and reinforces the authority and objectivity of its apparition. Soderbergh's use of the slow pan between the sample and Dr. Sussman at the scope creates the illusion of a harmony of man and instrument. This camera movement dramatizes the extension of human vision, capable of granting "direct access" viral sample. However *Contagion* radically disrupts this convention by withholding the corresponding point of view shot of the microscopic view. Instead, the disembodied voice of CDC director, Dr. Ellis Cheever (Lawrence

Fishburn) transitions us across space and time: "he grew it." The microscopic image is revealed on a laptop screen, partially obscured by the backs of Drs. Hextall (Jennifer Ehle) and Cheever [Fig. 2.6]. Hextall provides a reading, "He tried antibodies and immunological knock out lines like we did, but the key was a fetal bat cell line from Geelong. We didn't have it."

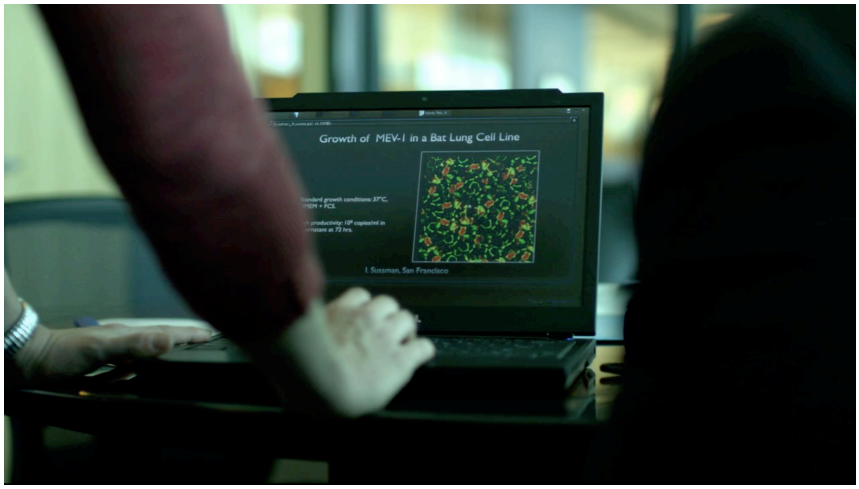

Fig 2.6: The mediated microscopic image finally revealed. *Contagion* (Soderbergh 2011)

Here, *Contagion* plays with our expectations by withholding the image. Once it's finally revealed, the image is tiny, mediated through a computer screen, framed in a slide presentation, and accompanied by supplemental information. There is a sense this image has already been translated, processed, and interpreted and we're left to follow its movement across spaces and technologies, suspended between apprehension and comprehension. The image shows a collection of illegible orange and yellow splotches with bright green crescent shapes, and the surrounding text requires the same expert eye. The image quite literally feels distant as though we're scrutinizing it from a carefully constructed—scientific—perspective. In this sense, the film aspires to the objective distance of scientific knowledge.[50]

[50] Indeed Latour claims the division between experience and observation is arbitrary: there is no difference, "both are constructions." Latour, *Pandora's Hope*, 38.

Scientific knowledge operates through the assumption of an ideal apriori world that experimental practice interrogates from a distance. Knowledge is the product of observing mimetic recreations of actually occurring phenomena from a distance. But, as Latour argues, knowledge is not the product of empirical discovery or deduction, but fabricated through internal systems of self-verification.[51] Like mechanical objectivity, distance creates the perception of unmediated access, or the absence of human subjectivity.[52] Indeed, the image is perceived as evidentiary not in spite of the radical scalar, geographic, and ontological displacements, but rather indebted to it. In other words, the further away the object appears to be—both in the sense of observing from a distance, and the sense of moving through multiple processes—the more stable and factual it seems.[53] While one might argue *Contagion's* image bears more traces of human intervention, thereby undermining its objective status, the supporting text and dialogue insist upon its authority. This image already has functional value—it has already achieved its status as a factual black box, capable of constructing new black boxes in service of scientific progress.

The cut linking East and West coasts tests the limits of that authority and actualizes the microscopic image's absence, leaving the unmediated microscopic view somewhere in void between these disparate spaces and times. Like *House,* the voice of expertise helps translate, threading together the authoritative laboratory spaces and gazes, but the expositive scientific jargon functionally participates obfuscation; "We didn't have it," provides just enough context to keep the viewer oriented, but the image ultimately remains an opaque black box. Our only source of

[51] Latour, *Pandora's Hope,* 56-58.

[52] Latour, *Pandora's Hope,* 40.

[53] This sense of distance is central to Latour's understanding of the black box as an autonomous object. Latour, Bruno. "The More Manipulations the Better," ed. by Michael Lynch and Steve Woolgar. *Representation in Scientific Practice Revisited* (Cambridge, Massachusetts: The MIT Press, 2014).

information lies in the expressive tone of the Drs. Hextall and Cheever, whose tentative excitement fuels a growing sense of anticipation and give us a sense of narrative progress.

In response to the power point slide, Drs. Cheever expresses the economic and scholarly implications of the image to allude to the difficulties of managing private and institutional research. "Day 12" flashes on screen and an omniscient voice takes over:

> The Center's for Disease Control in the United States and the World Health Organization of Switzerland confirm today that Dr. Ian Sussman of San Francisco has succeeded in growing the MEV-1 virus in a laboratory setting. Officials at the CDC cautioned that the breakthrough is only the first step toward developing a vaccine, which are likely months away from human trials. The WHO estimates number of people infected world wide to be over eight million.

The report overlays a montage of grim conference rooms across the globe, each featuring the same slide of the microscopic image [Fig. 2.7]. The sequence begins with a series of deep focus long shots at a slight angle, each containing a conference table with individuals gazing at the slide. The pattern shifts focus to the backlit stares of the executives, who gaze blankly out of frame. Despite the diversity of spaces and faces, all are shot in a washed out slightly yellow-green filter, emphasizing the bleak fluorescent lighting. The pulsating soundtrack pushes us forward, finally returning the familiar space of the CDC labs through a close up of Dr. Eisenberg with the same blank stare. Following the back-and-forth structure of the montage, the sequence ends with a wide shot of white-coated bodies assembled in front of a screen.

Fig. 2.7: The circulation of the microscopic image. *Contagion* (Soderbergh 2011)

This montage is a very clear example of how the image is capable of anchoring the movement across networks. The blank faces, read as global pharmaceutical executives, and the voice of the newscaster point to the political and economic stakes of vaccine production and disease management. The image in this sequence is figured as the catalyst not only for hope of viral management but the potential site of exploitation and contention. The microscopic image is the visual and narrative anchor for this discussion. Adapting the "show and tell" convention we saw with *House,* where expert reads or interprets an image for an audience, Dr. Cheever's expert voice flows from experimental protocol to the mass communication network. Indeed he assumes the lucrative possibilities of the image at the beginning of the montage, demanding, "what does he want?" His response signals a shift beyond the cold, hard logic of scientific interpretation, channeling us toward the broader social, economic, and industrial implications.

This shift is coupled with the movement from scientific to social authority. The newscaster's monotone, British voice delivers forceful declarative statements on the image and outbreak. Mimicking the persuasive tone of the scientists, we take these statements are taken as facts. Our belief stems from both the social capital of the news, insofar as we deem them a credible public

resource, *and* the support of the preceding scenes. *Contagion* prepares us for answers, but chooses to deliver them through a complex weave of spaces, voices, and images. The news narration rephrases Dr. Hextall's explanation of the image, and helps locate it the broader portrait of the outbreak. Drawing upon statistical information and speculating on the possibilities for a vaccine, the report ostensibly gives the image a beginning, middle, and end. In accordance with Priscilla Wald's claim that the "epidemiological narrative, like the microscope, is a technology," *Contagion* uses narration to locate the image in a causal structure. Epidemiologists explain outbreaks through the techniques of storytelling to create clear, logical links across disparate events and spaces. For Wald, the outbreak narrative is "paradigmatic," granting both scientists and society the necessary tools to understanding and assemble a viral event.[54] This account helps highlight the importance of using the logic of narrative to translate the outbreak to the public. Narrative performs the work of an instrument, collecting and assembling disparate events across space and time to create a coherent sense of how the virus spreads. And indeed, like the protocol and expert exposition that surround the microscopic image, the epidemiological narrative, participates in the attempt to locate the virus in a series of causes and effects.

While the summary of events offers the comforts of causality, the lingering word of caution from the CDC leaves traces of the absent microscopic image, questioning a clear trajectory assumed by the new development. The lingering ambiguity allows the film to contextualize the image within the global marketplace and privatized medical industries. *Contagion* uses this authority to invoke the economics of outbreaks, staging the image as a kind of commodity object. As the microscopic object moves into the sterile conference rooms, and the voice over speculates on the development of a vaccine, the film implicates the role of the pharmaceutical industry to remind us that the microscopic image is often a site of economic exploitation, and contagious events often intersect

[54] Wald, *Contagious,* 3.

with global corporations and large scale industrial processes. Soderbergh seems to suggest that to understand this image—to understand the virus—is to understand the larger economic and industrial responses that help shape the organizational structure of the emergent outbreak. The rhythmic montage implies that viral prevention and treatment is not isolated to government organization and scientific laboratories. The cold spaces and blank faces of executives create an ominous portrait of the private sector as a powerful, global threat, with the microscopic image at the center as a coveted object.[55] Circulating the image through mass media both solidifies its evidentiary and objective status, and leaves it open to speculation on its use and value. *Contagion* highlights how the microscopic image and the outbreak cannot be divorced from the networks of laboratory research, privatized industry, and mass media dissemination. We see again how fully understanding the microscopic image is not a matter of identification but locating its role in larger systems of meaning production.

Indeed, emergent outbreaks have profound effects on the global marketplace, industrial production, and the public perception of political organizations. This sequence translates the virus across these platforms—moving from a private research lab, to the CDC, to mass media, and privatized industry—to demonstrate the diversity of interested parties that intersect in an outbreak. The virus does not merely move across bodies, populations, and geographies, but circulates through industrial, political, and communication networks. The contemporary emergent outbreak cannot be reduced to the pristine realm of scientific discovery and treatment, but is part of constellation of forces. In this sense, the montage articulates Latour's claim that "constructing a phenomenon in successive layers renders it more and more real within a network traced by the displacements."[56] I

[55] The microscopic image here functions like Latour's concept of the "immutable mobile." The term describes things that are easily transportable and transferrable across forms and audiences, but remains intact. Anything from numbers to diagrams qualifies as "immutable mobiles." Latour, *Science in Action,* 15-16.

[56] "To shuttle back and forth, we rely on the notion of translation, or network. More supple than the notion of system, more historical than the notion of the structure, more empirical than the notion of complexity the idea of network is the

won't debate the "reality" of the circulating microscopic image, but point out how the sequence mobilizes the microscopic image to construct the phenomenon of contagion. Our understanding of the image and its full implications are the result of this series of spatial and contextual displacements, which require treating the image as an stable, evidentiary object that is capable of being interpreted to different ends. It is only as we move further and further away from the image—finally abandoning it all together—do we understand its full potential.

Conclusions

As the first half of the chapter demonstrates, the microscopic image within film and television carries a unique, unstable, epistemological charge. The second half of the chapter shows how overcoming this instability prompts a series of movements across authoritative actors through editing patterns and diegetic content. Thus to understand an image in film and television, I argue, involves tracing its production and circulation within the context of scientific standards of evidence and the formal construction of the text. Following the microscopic image in *Contagion* shows how visual evidence can link disparate spaces, temporalities and networks, illuminating the scale and complexity the outbreak. In this sense, the image *reveals* the networked structure. Following the image from San Francisco, to the CDC, and across the globe, draws attention to the political, economic, and industrial impacts of the virus. The film gives us a "hypervisibility" of the capitalist and political structures that participate in contagion at the global scale and comments on the systems afforded by our increasingly globalized world that facilitate, even perhaps encourage, the spread of a deadly virus.[57] This reading of *Contagion's* microscopic image supports Alexander Galloway and

Ariadne's thread of these interwoven stories." Latour, Bruno. W*e Have Never Been Modern* (Cambridge, Mass.: Harvard University Press, 1993); Latour, *Science in Action,* 76.

[57] Benson-Allott, Caetlin, "Out of Sight," *Film Quarterly* 65, no. 2, (2011):14–15.

Eugene Thacker's claim that the emerging infectious disease *is a network*. From their perspective, emergent infectious diseases exhibit the same interdependent and relational qualities of networks, exploiting their position in an increasingly interconnected, globalized world. But to claim that the microscopic image simply reveals a network overlooks the systems of sensibility at work in fictional accounts of emergent infectious disease in film and television traced in this chapter. Indeed, to focus purely on the way the film reveals a network is to treat the image as "black box." Rather, as Latour reminds us, "the microbe is not an idea floating in the head of scientists; it is a means of locomotion for moving through the networks that they wish to command. The microbe is a means of action, designed for a certain use and a certain type of movement."[58]

Throughout I have tracked the locations, the actions, and movements of the microscopic image on screen. Attending to the paradigms and epistemologies that underscore editing patterns, reoccurring signifiers of scientific and medical authority, and logical patterns of diagnosis and interpretation, I have shown how these structures are formally integrated into the text's epidemiological narrative. The careful combination of cinematic and scientific forms, I argue, is what makes the apparition, presence, and interpretation of the microscopic image a useful representational tool. *Contagion's* network of scientific, economic, and communication systems remain grounded by the evidentiary image and offers an example of the power of the seemingly transparent evidentiary object.

Representing an emergent illness in the age of networks is undoubtedly challenging, but examining *Contagion* and *House M.D.* shows how narrative films and television use the authority, and surrounding signifying structures of the microscopic image to organize our understanding of outbreak. Placed at a critical juncture between the visible and invisible, the microscopic image is unique in its representational capacity to simultaneously grant access to the unseen world and

[58] Latour, Bruno. *The Pasteurization of France* (Cambridge, Mass.: Harvard University Press, 1988), 45.

transform it into a stable evidentiary object. At the same time, *Contagion* reminds us that seeing and knowing are not necessarily linked, but the product of broader conventional systems of meaning production. Film and television recreate those systems by combining conventions from science and cinema to guide the viewer from the anxious image to the emergent outbreak.

In *Pandora's Hope,* Latour's most concise articulation of actor-network theory and reality, he argues, "If the world is to become knowable it must become a laboratory." Later clarifying, "[the laboratory is] any place that gathers one or several instruments together."[59] Scientific thought is the basis of our conception of reality, and as such, we treat the world like a laboratory. Latour proposes an expanded laboratory of life, one that seeks our instruments beyond the tools and methods of modern scientific thought in favor of understanding the relationships across actors. In this sense, to make contagion knowable is to locate it in a larger constellation—laboratory—of instruments borrowed of science and cinema. *Contagion* and *House* demonstrate the integral role scientific rhetoric plays in the organization and understanding of the microscopic image to the emergent outbreak in contemporary films and television. Tracking the image is therefore perhaps closer to tracking a method—the very methods that link up the micro and macroscopic scales of interpretation and analysis. Looking closely at how visual media construct the perception of objectivity and interpretation is to track the methods that give shape the facts and truths of modern science. Placing this method in Latour's expanded laboratory suggests that visual media too might be an instrument we bring to bare on the analysis of the world, one that is capable of making sensible those very structures that help us make sense of the world from within our networked conditions.

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[59] Latour, *Pandora's Hope,* 43.

CHAPTER 3

AN ACOUSTEMOLOGY OF EIDS ON SCREEN, OR HOW TO HEAR AN OUTBREAK

Following the violent prologue and title card, *28 Days Later* (Boyle 2002) opens with an extreme close up of an eyelid. Suddenly the eye opens, looks from left to right and we hear a gasping breath. A shot from above shows a naked man as he slowly moves from the corpse-like position to standing. His movements are punctuated through abrasive sound effects: the crinkle of the papery hospital sheets, the clatter of the metal IV stand, and the labored sound of his breath. He moves to the door and every interaction with the surrounding environment rings out against the oppressive lack of ambient sound.

Clothed in scrubs, he slowly wanders through the debris-laden hallways of the hospital calling out in search of others. The scratchy sound of his hospital scrubs and hesitant footsteps pierce through the silent space. Nearing the entrance to hospital, he finds a row of telephones with receivers dangling off their hooks. As he picks one up and taps the switch hook in search of a dial tone, the blunt metallic sound it produces echoes in the cavernous lobby walls. Dropping the headset produces a caustic clatter of banging noises as the line of telephone receivers hit against each other. Frustrated, he throws the final phone down and bends forward, crying out a loud, final, "hello!" A jump cut paired with the sharp sound of a cracking soda can causes a slight jolt: the pop of the can's top and subsequent sizzle and spray feels too loud against the quiet of the lobby. After gulping down the drink, he gathers a few unbroken cans into a discarded plastic bag. Exiting the hospital, he shuffles through a pile of garbage toward the door and we hear faint sounds of rolling cans, the rustle of the plastic bag, and a burp.

The opening of *28 Days* remains one of the most memorable moments in contemporary horror cinema, particularly with respect to the changing landscape of the zombie subgenre[1]. Most remark on the spectacular images of deserted London and eerie silence that washes over the modern metropolis. As the scene continues and the man moves outside of the hospital, the film remains quiet, showcasing his body dwarfed against vast stretches of concrete and towering buildings. Cutting to a wide shot of London skyline with the Thames in the foreground, we can hear the feint static of a recording camera. The noise increases in volume and a few soft cords begin to emerge from the quiet landscape. The man makes his way through the city, posed against iconic landmarks, the only indications of life we can see or hear come from the slight rustle of his plastic bag or the subtle sound of his footsteps. The melancholic twang of the score begins to surge as he arrives in Piccadilly Circus and makes his way to an abandoned car. Reaching out, he grabs the handle and alarm suddenly sounds, causing him, and us, to leap back in surprise. The alarm rings out, clashing with the steady beat of the music. As he stumbles toward a newsstand, the alarm fades away and music escalates to an uncomfortable volume, and he picks up a discarded newspaper that reads: "EVACUATION."

This vision of the city stands in stark contrast to the familiar images of London, a bustling, crowded metropolis [Fig 3.1]. The vacant shots were captured through a series of early morning, one hour filming blocks in which police would shut down roads and allow Danny Boyle and his crew to

[1] Both critics and scholars often remark on this opening scene; in some cases, it is cited as a historical moment for the history of the horror genre, reflective of contemporary social anxieties. Some critical examples include: Scott, A.O. "Film Review: Spared by a Virus But Not by Mankind," *New York Times,* 27 June 2003; Ebert, Roger. "28 Days Later," *RogerEbert.com,* 27 June 2003, http://www.rogerebert.com/reviews/28-days-later-2003; Bradshaw, Peter. "28 Days Later," *The Guardian*, 31 October 2002, https://www.theguardian.com/culture/2002/nov/01/artsfeatures7; Scholarly citations include**:** Wetmore, Kevin J. *Post-9/11 Horror in American Cinema* (New York: Continuum, 2012); Birch-Bayley, Nicole. "Terror in the Horror Genre: The Global Media and the Millennial Zombie," *The Journal of Popular Culture* 5:6, (2012): 1137-1151; Wonser, Robert and Boyns, David. "Between Living and Undead: How Zombie Cinema Reflects the Social Construction of Risk, the Anxious Self, and Disease Pandemic," *The Sociological Quarterly,* 57 (2006):628-53.

shoot.[2] However, the city's emptiness is not merely signified by a lack of people but the relationship between diegetic sound effects and the still environment. As the man interacts with the surrounding space, his actions result in abrasive and alarming noises that counter the muted environment. While the dramatic shots of the city help visualize a deserted London, Boyle's use of sound is critical to the scene's haunting effect. From the man's echoing cries in search of people, to the crinkle of the plastic bag, *28 Days*' sound design is central to our sense of vast, empty space. The most familiar use of sound and space comes in the form of the echo, which has come to signify the absence of objects or persons. His unanswered cries repeat, fading in volume as the uninterrupted sound waves reverberate through the hospital hallways or empty streets. The scene lacks ambient sound: no hum of florescent lights or air conditioning, no chirping of birds, or sound of wind—the sounds of modern, urban life. Rather, the cracking of a soda can, the bang of the telephone receiver break through the quiet, causing us to recoil or leap slightly from our seats. These effects collectively signify a major social event, one capable of completely upending the visual and aural codes of modernity; that is, the devastating effects of an outbreak.

Fig 3.1: Empty and quiet effects on an emergent outbreak. *28 Days Later* (Boyle 2002)

[2] Newman, Kim. "The Diseased World, interview with Danny Boyle and Alex Garland," *Filmmaker Magazine,* Summer

28 Days opening presents the way in which sound, or its absence, can be a critical tool in our perception of an on screen environment, particularly within the horror genre. By interrupting the familiar codes of the urban and cinematic soundscape, the scene highlights the intuitive link between sound and understanding diegetic space, which in the context of the film's generic project, works to unsettle the viewers and create anxiety. Boyle's use of echo, volume, and silence demonstrates the role of sound in our perception of presence and absence that we use to locate and map our surroundings. On the one hand, sound fuels the generic project by unsettling the sonic codes of an urban metropolis, and the viewer. On the other hand, the film foregrounds the epistemological function of sound, or the way sonic cues like echo and volume help us sense a space on screen. Disrupting these phenomenological and epistemological codes creates the feeling of *vulnerability,* susceptible to the intrusion of noise. Boyle's use of silence produces the necessary context for the aural jump scare, where the metallic clatter of the IV stand or the blasting car alarm cause us to leap from our seats. However this horror extends beyond these acute generic encounters to the film's larger narrative project. The use of silence and sound here is integral to how the film stages a devastating outbreak, showcasing that much of the horror of an emergent infection often lies as much in what we hear as what we see.

Much of the anxiety that *28 Days* produces is related to the codes of cinematic sound and space, particularly how sound works to make present—makes sensible—spatial relationships on screen. The perception of a deserted London relies on the film's play with the representational and epistemic codes that link sound and knowledge—the relationship between echo and presence, volume and distance. While film scholars acknowledge the critical relationship between sound and the perception of cinematic space, there has been little account of what upholds the inferences,

2003, http://filmmakermagazine.com/archives/issues/summer2003/features/diseased_world.php#.WcGArNOGPPA

intuitions, and deductions of hearing.[3] Turning to historical scholarship on sonar and ultrasounds, I examine the paradigmatic relationships between space and sound that, I argue, can be located in the epistemological principles driving sonic transduction technologies. Examining these technologies shows the epistemic principles that have helped codify the intuitive relationship between hearing and the perception of space on screen. Through the close analysis of *The Last Ship* (Kane and Steinberg 2014-) and *28 Days Later,* I demonstrate how these sonic codes can be used to create the sense of spatial organization of an emergent outbreak.

By attending to the intuitions and impulses of sound, I offer what we might call an "acoustemology" of EIDs, or the way in which sound functions to makes sense of an outbreak on screen. Anthropologist, Steven Feld proposes "acoustemology" to describe the potential "for acoustic knowing, of sounding as a condition for knowing, of sonic presence and awareness as potent shaping forces in how people make sense of experiences."[4] Sound helps us understand our surrounding environment both on screen and off; It helps us gauge distances, proximities, locate objects and entities. This epistemological and perceptual value is tied to sound's ability to signify presence of material objects and surrounding spaces. I locate this acoustemology in the structures of scientific epistemology and historical sonic transduction technologies that have helped codify the relationship between sound and material presence: codes that we have come to intuit and internalize in our experience of everyday sonic environments and audio visualization. At the same time, sound is deeply ephemeral, and hearing is entirely dependent upon an individual's subjective experience of a particular sound or sonic environment. As such, it continually pushes against the standards of

[3] Perhaps most famously, Michel Chion and Rick Altman invoke the language of space to theorize sound. Rick Altman, et al. *Sound Theory/sound Practice* (New York: Routledge, 1992); Chion, Michel. *Audio-vision: Sound On Screen* (New York: Columbia University Press, 1994); Chion, Michel. *The Voice in Cinema* (New York: Columbia University Press, 1999).

[4] Feld, Stephen. "Waterfalls of song: an acoustemology of place resounding in Bosavi, Papua New Guinea," *Senses of place* (Santa Fe NM: School of American Research Press, 1996), 97.

scientific objectivity and evidence. While science and medicine made have found ways to visualize—and instrumentalize—sound, we can never really grasp at the thing itself.

I offer "duplicity" as a way to describe this quality: the way that sound points to knowledge, only to fall short of fact or evidence. Locating sound in our experience of sonic environments on screen, I show how sound's duplicity makes it a useful tool in the representation of EIDs. Hearing gestures toward knowledge—"a radical epistemological thrust"—but that experience always seem to exceed the standards of scientific epistemology, leaving us instead with feeling or affect.[5] For example, locating a sound's source might offer pieces of information—the distance from the point of audition, the type of amplification, or medium through which its produced—but that can hardly account for what that sound *is*. Indeed, the principles of sound design rely on the epistemological thrust of sound and uncertainty of hearing. Sound foley, in particular, operates through the imprecise relationship between hearing and perception, where sound and source need not be linked to produce sonic perception. As I will show, these films exacerbate this tension between the epistemic drive and ambiguity of sound to produce the perception of EIDs in film and television. Sounds are used to trigger an affect linked to that feeling of knowledge, but leaves audiences unsatisfied. It unsettles us precisely because cannot know for certain, we can only sense, discern, and feel. As Maurice Merleau-Ponty claims "perception does not give me truth like geometry, but presences," or a sensory experience located first and foremost on the level of the body.[6] What I want to suggest is that, to use Merleau-Ponty's terms, geometry and presence coexist in the

[5] LaBelle, Brandon. *Acoustic Territories: Sound Culture and Everyday Life* (New York: Bloomsbury Publishing, 2010), xvii; This structure can be compared to Malden Dolar's claim that the voice "points toward meaning," but will always escape meaning. "Meaning" for Dolar refers to the content of speech, and the impulse we have to understand the content of spoken language. The voice, he argues, is the medium for utterances, and therefore will always escape linguistic. In other words, the voice cannot be ascribed to a semiotic structure of meaning. Dolar's analysis offers a useful example of the impulses that guide hearing and perception, but I contend that in the context of film and television, all sounds are capable of generating this epistemic thrust. On screen, sound and knowledge –which is most often understood as source, like the voice—are intimately related, continually fueling one another. Dolar, Mladen. "The Linguistics of the Voice," *The Sound Studies Reader* (New York: Routledge, 2012), 539-554.

perceptual experience of sound: that sound suggests geometry—alludes to its possibility—only to give way to a imprecise, experiential sense of presence. The experience of this duplicity gives way to the acoustemology of an encounter or environment, allowing us to sense a space but never quite offers its concrete, objective geometry.

Linking the phenomenological tools of sound studies, with the formal analysis of film studies I explore the how film and television use this duplicity and its affects to represent an outbreak. The first half of the chapter pairs *28 Days'* opening with *The Last Ship,* a series that follows the last naval ship circling the globe in search of a cure to a deadly global pandemic, to track the standardized aesthetic codes of sonic space. I situate these intuitions and codes within the context of sonar and ultrasound to trace how they are tied to epistemological structures of science and medicine. Structures that the horror film, *Pontypool,* tests in the representation of a dangerous disease spread through language. Confined to the space of a radio studio basement, *Pontypool* relies on sound to make us feel the presence of a deadly outbreak to horrifying affects. *Pontypool's* use of audio visualization uses the imaginative impulse and epistemological desires of hearing to exacerbate the duplicity of sound and create an aural landscape where the virus feels palpable and omnipresent.

An account of sound's duplicity helps us understand how EID films can use the intuitions and impulses of hearing to allow us to sense an outbreak. Representation, in these texts is located not in the microscopic or macroscopic vision of a viral outbreak, but in the way sound and image are used to create the feeling of an outbreak. So far this dissertation has parsed the paradigmatic visions of viral outbreaks by turning to very tools epidemiologists use to track and organize emergent infections; this chapter examines how the experience of sound on screen can offer us an alternative articulation of an outbreak: one located in the relationship between the epistemic drive of sound and its affect. EIDs can be translated into maps, statistics, evidentiary images, and other factual

[6] Cited in Feld, "Waterfalls of song," 97.

representations, but they are also deeply felt in our contemporary networked conditions. Maps and microscopic images can let us look up close or see the vast scale an outbreak, but this chapter turns to affect in order to understand what it means to encounter an outbreak: that is, what it feels like to sense the effects of epidemiological strategies like containment labs or quarantine, or feel vulnerable to the threat of an invisible viral pathogen. The representation of outbreak cannot be confined to cold, rational scientific visualizations: they are sensed on the level of the body. Indeed, as the tagline for *Contagion* (Soderbergh 2011) suggests: "nothing spreads like fear." Setting aside the word play, the *Contagion's* message articulates the goals of these sonic landscapes in EID films: to collapse the boundaries between rational representation and the feeling—the fear or anxiety—of an outbreak. At the same time, this affective or experiential representation of an outbreak does not simply lie in the "emotional, contentious, fluid" experience of sound, but remains tethered to scientific and technological epistemologies.[7] As the analysis of sound will show, it's precisely the scientific appropriation of sound that makes it an affective tool. By alluding to knowledge about a sonic encounter, space, or event, and failing to deliver, sound creates a representation of disease that feels omnipresent and inescapable.

The experience of sound produces the vulnerability and anxiety we feel when faced with the threat of an emergent infection. Like *28 Days* opening shows, disease has unsettling sonic and social implications. The feelings of anxiety and fear experienced in those opening moments lie beyond the generic tropes of the horror genre. The empty, quiet images and sounds of London express a picture of a possible future—one that feels increasingly tangible in the wake of disease scares over the past decade. Importantly, this possibility is located in sonic perception of space. Imagine if Boyle had chosen to show the same shots of a deserted London without sound effects and sound mixing, in favor a musical score. While the use of echo and volume all help instill a sense of uncertainty and aid

[7] LaBelle, *Acoustic Territories,* xxii.

the film's generic project, they simultaneously render the effects of a deadly outbreak palpable on the level of perception. This is not the same as an image or graphic that *tells* you the city is empty, this scene makes you *feel* it. With this turn to affect in favor of information, Boyle exploits the major way in which we have come to interact and understand globalization and its effects. In an era saturated with uncertainty about the impacts of our increasingly globalized world, we live in what Joseph Masco has deemed, "an affective atmosphere of everyday anxiety."[8] As discussed in Chapter One, Masco's work on the American counter-terror state remains closely tied to experience of life in a globalized society. He shows how these feelings of insecurity have come to shape and be shaped by the very infrastructures that cause them. And indeed, *28 Days'* image of quiet London haunts us precisely because it locates the effects of the outbreak in our experience of the city. EIDs often impact urban city centers because the population density and transportation infrastructures allow pathogens to travel quickly and quietly. *28 Days,* captures the vulnerability of urban living conditions at the hand of a deadly virus, forcing us to see how the very structures that are celebrated as markers of human progress have lead to our potential demise. This chapter attends to the subtle and often-overlooked elements of sound design to track the critical relationship between sound's epistemic drive and affect in the representation of EIDs on screen. By attending to this acoustemology, or the assumptions, affects, and epistemologies of sound in film and television, this chapter shows how media are capable of producing the anxious anticipation and effects of living a world where infection may emerge at any point in time.

[8] Masco, Joseph. *The Theater of Operations: National Security Affect From the Cold War to the War On Terror* (Durham: Duke University Press, 2014), 18.

Soundscape, Sound-space

My initial reading of *28 Days* relies on familiar codes of cinematic sound and space; from the echo, to mixing, and score, the film isolates sonic patterns that we would usually overlook or take for granted in a different generic context. Through the absence of familiar sonic cues and ambient noise, the film foregrounds the expectations and impulses that drive the viewing experience. Cinematic soundscapes have been discussed through historical and technological accounts of the coming of sound, classical Hollywood cinema, and the emergence of Dolby multi-track surround sound, each attending to their unique social and cultural specificities.[9] As a theoretical extension of this work, this section considers how contemporary film and television use sonic textures, layered sound effects and soundtracks, and spaitialized mixing to shape to our experience of on screen space. Rather than assigning the sonic experiences to particular technologies, I attend to the phenomenological effects of the most conventional and often unnoticed sound editing and mixing strategies in *The Last Ship*: the subtle ways shifts in volume, the grain of a sound effect, or use of off-screen sound shape our understanding of diegetic space.

Premiering in 2014, *The Last Ship* is set in the context of a deadly pandemic that has wiped out 80% of the world's population. Prior to the outbreak, the American naval destroyer, the Nathan James, sets out on a top-secret military mission in the arctic that places them under radio silence for four months. Epidemiologist Dr. Rachel Scott (Rhona Mitra) and her assistant, Quincy (Sam Spruell) are among the crewmembers, tasked to collect ancient viral samples in the arctic ice. Upon breaking radio silence, the crew discovers the world has been decimated by the outbreak and they are left to face a world without centralized communication systems, government, or economic infrastructure. Only upon revealing the scale and magnitude of the outbreak does Dr. Scott confess

[9] Altman, *Sound Theory/Sound Practice*; Kerins, Mark. *Beyond Dolby (stereo) : Cinema in the Digital Sound Age*. (Bloomington: Indiana University Press, 2011); Lastra, James. "Fidelity versus Intelligibility," *The Sound Studies Reader* (New York: Routledge, 2012), 248-50.

their original assignment was just a rouse to disguise the real mission: to help her find a cure. Circling the globe, scavenging for supplies for vaccine research and development, *The Last Ship's* narrative premise relies on the isolation of the Nathan James. In fact, the show's primary mode of narration seems to be networked through technological communication across divided spaces, from commands between captain's deck and the navigation room, to the battles with pirates, submarines, and other threats.[10]

The Last Ship organizes its divided diegesis by drawing sonic contrasts between spaces and foregrounding mediating technological devices. The radio, for instance, plays a critical role in the show as a resource to connect the captain's deck with the navigation room, or as a way to communicate with unseen naval threats. Scenes featuring radio transmissions often juxtapose shots of speaker and listener with speech edited to mimic the sound a voice in a telephone; or when the ship communicates with someone located on a land ambient sounds, like the chirp of birds, or rustle of wind contrast with the beeps and other mechanical tones of the vessel's interior. The show's soundscape creates the compartmentalized naval setting and upholds the post-apocalyptic premise, which relies on the isolation of the ship from the rest of the world. This extends to the construction of the ship, which uses radio to connect discrete spaces aboard the ship, reinforcing the massive scale of the naval vessel. In lieu mapping the ship's interior, the show offers numerous parallel editing sequences that use communication technologies to traverse the ship's spatial divisions and distances. Sound and image, in these instances, offer a practical way of navigating the representational challenge of the naval setting. These imaginary geographical relationships are extended to intense naval battles, produced entirely through shots of beeping navigation screens, bombastic explosions, and reaction shots juxtaposed against haunting images of a silent, empty

[10] This narrative structure persists across seasons one and two. Season three re-boots the narrative, as Dr. Scott finds a successful cure, only to be brutally murdered in the final episode of season two. Season three situates the narrative in the geopolitical aftermath, much more concerned with the politics of vaccine production and distribution.

ocean. *The Last Ship* uses the imaginative powers of sound to give shape to its post-apocalyptic universe. By alluding to spaces, relationships, and global events using sonic codes, it implies the presence of a global outbreak.

Sound is often central to our understanding of a diegesis: it can create depth, locate objects and persons, and extend the world beyond the edges of the frame. Consistent across anthropological, phenomenological and cinematic studies of sound is an attention to how hearing forces us to think about spatial relationships.[11] In his analysis of sound in cinema, Michel Chion makes the sonic-spatial connection explicit, claiming, "there is a *spatial magnetization* of sound by image," that is, when we hear a sound, we naturally try to orient its source within visual space.[12] Interestingly, he turns to space, not sight, to explain this phenomenon; in other words, understanding through sound entails *locating* a source in space more not necessarily *seeing* the origin of the sound. Chion's choice of "spatial magnetization" describes how sound becomes understood through distance and proximity, which is central to shaping a viewer's perception of a diegesis. While the cinema prioritizes the visual, sound elicits spectatorial responses that give depth to the two dimensional image of space, which is perhaps most palpable in the use of off-screen sound. Hearing the clatter of an object might prompt us to look deep into the image and explore the surrounding space, or an off-screen voice might create the desire to "look around" the diegesis in search of the speaker. However, Chion is careful to note that this sonic-spatiality is not inherent to hearing but located in the imagination: he calls the distinction between on and off-screen sound "an illusion" that sound helps reinforce. By

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[11] Rick Altman, *Sound Theory/sound Practice*; LaBelle; Revill, George. "How is space made in sound? Spatial mediation, critical phenomenology and the political agency of sound," *Progress In Human Geography* 40, no. 2 (April 2016): 240-256; Douglas, Pocock. "Sound and the Geographer," *Geography* no. 3 (1989): 193; Sterne, Jonathan. *The Sound Studies Reader*. (New York: Routledge, 2012).

[12] Chion, Michel, *The Voice in Cinema*, 70.

withholding a sonic point-of-audition, films prompt the viewer to imagine that source out of frame, thereby extending the boundaries of the diegesis.[13]

Indeed, for Chion, the spatial possibilities of cinematic sound have made it a powerful tool to condition the perception of on screen space. Chion's work on the acousmatic and acousmêtre, in particular, highlights the ways that space and sound are intimately connected to the impulses, intuitions, and experiences of listening. Pulling the term from sound engineer, Pierre Schaffer, Chion uses acousmatic to describe the unseen sound on screen. While acousmatic resonates across sonic media, to describe technologies like radio and telephone, in cinema, the relationship between the unseen sound source and image endows the acousmatic with incredible power. As an extension of this theorization, Chion offers the acousmêtre to describe the sense of the presence of a "being" associated with the unseen voice: "a being in the scene and not, wandering the source of the screen without entering…He invites the spectator to *go see*."[14] Both the acousmatic and acousmêtre produce a tension between the heard and unseen has immense spatial possibility, capable of creating a sense of a world far beyond the edges of the frame where the source of the sound may lie. This formation suggests an epistemology of sound that draws a direct correlation between sound and point of audition, wherein the ontology or nature of the sound appears to be directly related to the material source located in space.[15] However, more often than not, when a sound is heard on screen, the particularities of the recording event or even its source are not registered. Cinematic sound design, in fact, relies on this epistemological uncertainty between hearing a sound and seeing it source: wherein the perception of sound is one produced through an imaginary relationship between listener/viewer

[13] Chion, *The Voice in Cinema,* 70-73.

[14] Chion, *The Voice in Cinema,* 24.

[15] His sentiment is echoed in the work of Rick Altman, whose historical analysis of cinematic sound argues that every sound registers the event of recording, or a "spatial signature" that can be traced back to its material production. Altman, *Sound Theory/Sound Practice.*

and image.[16] Indeed, as Chion argues, our perception of sound is "reciprocal" with the image, both working together to determine our perception of image and sounds on screen.[17] However, as Chion's vocabulary reminds us, this reciprocity is a spatial one. In other words, we might say that sound and the perception of cinematic space are reciprocal, mutually effecting one another to shape the sense of diegetic geography. The muffled, flat quality of a telephone voice, against a clarity of a frontally-miked recording with little reverberation creates the perception of mediated communication; shifts in volume connote depth and distance between points of audition. Through subtle manipulations in sound, cinema provokes the spatial imagination.

In the representation of emergent infectious disease, sonic spatiality and the epistemological uncertainty of hearing frequently play an important role in articulating social and physical boundaries between the safe and unsafe, contaminated and clean spaces. These boundary-building sonic codes are most often exploited in scenes featuring laboratories or biohazard suits. Not unlike *The Last Ship's* coupling of sound and communication technology, sonic contrasts work with images of biohazard suits and glass laboratory walls to help fortify the separation of spaces. As discussed in Chapter One, disease management is most often articulated through spatial control. Sound helps code and categorize space and spatial relationships, much like a map, but locates them in the experience of an environment or the acoustemology of space. This acoustemology can be used to draw perceptual lines around quarantine or contain a biohazard lab, giving shape to the prevailing social and spatial modes of outbreak management.

In *The Last Ship,* sound helps code diegetic divisions between interior and exterior spaces, and define the boundaries between sterile and contaminated environments. The season one episode, "Lockdown," for example, uses ambient sound and vocal contrasts to draw boundaries between Dr.

[16] Mott, Robert L. *Sound Effects: Radio, Television and Film* (Jefferson, North Carolina: McFarland & Company, Inc., Publishers 2014).

Scott and Captain Chandler. The scene opens with a series of close ups of test tubes, syringes, Dr. Scott's suited figure, and the monkey test subjects. In the background we hear the beep of unseen machines, the slow pump of compressed air, and the quiet squeaks of the caged monkeys. The score mimics the sonic qualities of a lab as a subtle synth sound punctuates a cut to a wide shot of Captain Chandler (Eric Dane) entering the helicopter bay housing the temporary structure, finally offering a glimpse of the lab and the surrounding environment. Large sheets of plastic surround the rows of lab benches, monkey cages and instruments: bathed in florescent blue and yellow lights, lab coats, machines, and red biohazard containers line the edges of the structure. Dr. Scott's white suited figure stands at the center of the room, hunched over her experiment, back to Chandler who looks on through the transparent plastic. The artificial light of the lab creates a stark contrast between it and the surrounding environment, which remains largely obscured in shadows. The clatter of Dr. Scott's tools against the metal surface of her workbench, are followed by a cut to Chandler as he raises a walkie-talkie to his mouth. With the familiar click of the walkie, he speaks, "So that's the vaccine?" Shot through the plastic sheet that separates the captain from the lab, half of the image is obscured by the wavy reflection created by temporary walls and the sickly yellow glow of the florescent lights. This division is reinforced the muffled quality of his voice transmitted through the walkie and the recognizable crackle of the device as it turns on and off. Sound and image work here to reinforce the division between the spaces and produces a sense that we're positioned in a contained environment that neither sound, nor hazardous biological materials could escape. The sound of Chandler's muted, flat voice contrasts with the clear, frontally-miked quality of Dr. Scott's voice, who, eyes focused on her work, leans forward and answers, "These are vaccine prototypes." She explains the vaccine testing process and the camera tracks her movements as she fills the syringe and approaches the caged monkey. The camera lands on a medium shot framing Dr. Scott and

[17] Chion, *Audio Vision,* 32.

Chandler facing one another, bisected by the lab wall. To the right, Chandler is cast in shadow, his dark figure set against Dr. Scott's white biohazard suit and the lab's bright yellow glow. Despite their close proximity in this shot, the vocal contrast persists [Fig. 3.2].

Fig 3.2: Sterile versus contaminated spaces in *The Last Ship* (Kane & Steinberg 2014-)

While we can see the physical barriers in this sequence, sound helps us understand and perceive those boundaries. Indeed, the show's sound design helps us sense the impenetrability of those transparent walls, the isolation of the lab from the outside world. The medium shot of the two in conversation exemplifies the critical role of sound in maintaining the spatial and social boundaries of the scene. The two stand merely feet from one another in this shot, and yet, the contrast between Chandler's mediated voice and walkie against Dr. Scott's clear speech accentuates the strength of the wall separating them. Sound is used to help us understand the surrounding environment, from the physical relationship between characters and space, to the discrete functions and qualities we associate with them: it is through sound we sense containment. Make no mistake, seeing those barriers, instruments, and other objects meant to signify science aid in this representational project, but *The Last Ship* uses sound to make us to *feel* it.

The sonic enclosure of the space creates a microcosm of audible textures that help reinforce its functionality. The hum of the hood fan and mechanical beeping in the background help create our sense of the scientific location. The soundscape feels technical: apart from the squeak of the monkey test subjects, everything we hear registers as inorganic, emitted from machines or produced by scientific instruments. While we might not be able to locate or identify the source of these sounds, collectively they characterize the feeling of scientific authority and containment. In film and television, ambient sound is often used to help code the diegesis: rustling branches tell the audience that a scene is outside, or traffic sounds might indicate a crowded city. Through these stock ambient soundscapes might seem a bit artificial and conventional, they do provide instantaneously recognizable audible codes that shape our perception of a diegetic space's function and purpose. In the context of *The Last Ship,* sonic conventions extend the visual clues afforded by the image to the create the perception of an enclosed, carefully controlled space.

Indeed, anthropologists of sound have noted how ambient soundscapes have profound influence on an individual's behavioral and perceptual patterns. Tom Rice notes in his study of hospital soundscapes that the quiet of the recovery wings, the crackle of the hospital intercom, and the echoing steps of doctors and nurses, all contribute to shaping a patient's experience. The oppressive silence of the recovery ward conditions patient behavior and social codes in ways that fundamentally impact the individual's perception of space, authority, and sense of patienthood. Rice's analysis articulates how the experience of sound is central to how we understand and conceive of our sense of self within a particular sonic environment.[18]

[18] Rice, Tom. "Soundselves: An Acoustemology of Sound and Self in the Edinburgh Royal Infirmary," *Anthropology Today* (2003): 4.

This "tacit knowledge" of the sonic and spatial structures is discerned through *The Last Ship's* mechanical soundscape.[19] Not simply derived from the auditory source, this knowledge allows us to understand the geographical organization and social quality of the diegesis. In other words, the sense of control and containment are perceptual effects that emerge from the experience of image and sound that help code the function of social space, which would undoubtedly be diluted without the careful use of sound design. Dr. Scott's work feels meticulous and precise when cloaked in the hum of machines and the metallic sounds of sterile surfaces and tools. "Containment" is a feeling that cannot simply be ascribed to the image of the lab, but is the product of the sonic contrasts that produce perceptual boundaries between the lab's interior and exterior. This is a space fully enclosed by the scientific soundscape, only traversed using media and technology.

This analysis of sonic spatiality risks raising the classic debate in film studies on sonic fidelity versus intelligibility, or whether the application of sound—particularly voice—in cinema seeks to convey narrative information ("intelligibility") or a sense of located perception within a space ("fidelity"). Indeed, in linking sound and space, my analysis seems subscribe to the fidelity model of cinematic sound, where sound is assumed to construct a particular point of view or aspires to create the sense of "a physically real observer" within the diegesis. *28 Days'* use of echo, for example, locates us as the reverberation registers a spatial signature unique to our point of reception. Historically, sound scholarship has aligned this model with classical theories of realism and the "invisible witness," which aesthetically sought to suppress the privileged position of the viewer offered by the "intelligibility" model. Sonic "intelligibility," by contrast, is typically associated with recording practices that aimed to convey information, namely through dialogue, to construct a privileged, distant viewer/listener. While this dichotomy has long been dismissed in Film Studies, it

[19] In his analysis the laboratory soundscape, Cyrus Mody claims that sound is often integral to the formation of "tacit knowledge" in science. Cyrus C. M., Mody. "The Sounds of Science: Listening to Laboratory Practice," *Science, Technology, & Human Values* (2005): 177.

is worth returning to James Lastra's influential piece on this bifurcation. Lastra shows how *both* models construct a privileged mode of viewership; in seeking to construct a point of view through sound, the fidelity model ascribes to 19th century models of human perspective by reinforcing the logic of depth and single-point-perspective. At the same time, the intelligibility model constructs an "ideal observer" who is allowed to look into the cinematic world from a powerful distance.[20] Lastra's analysis of artistic perspective can be extended to the structures of scientific vision: both the intelligibility and fidelity models are Cartesian, creating worlds from the perspective of a individual looking in on that diegesis from a distance. In this sense, both models position listener as distinct from the world, using sound to mediate the viewer's relationship the diegesis. This geometric model of hearing presupposes rational model of the viewer or subject who is capable of discerning and knowing space from a located distance.

This perspective stands in contrast to many assumptions about the activity of hearing, especially the impulse to align sound and listening with subjective experience as opposed to the rational, objectivity of vision: "sonic space and the experience of sonic spatiality are often contrasted with visual and Cartesian spaces."[21] As a subjective experience, hearing fails to ascribe to the standards of rational judgment and scientific evidence.[22] Science privileges immutable evidence that can be circulated and verified amongst experts. While sound can be recorded, reproduced, and circulated, its reception—listening—is less stable: who is to say that the sound you hear sounds the same to me? However sound in film and television often organizes spatial relationships to create depth and

[20] Lastra, "Fidelity versus Intelligibility," 248-50.

[21] Revill, George. "How is space made in sound? Spatial mediation, critical phenomenology and the political agency of sound," *Progress In Human Geography* 40, no. 2 (April 2016): 241; Also see Carpenter, Edmund, and Marshall McLuhan. "Acoustic Space." *Canadian Theatre Review* no. 6 (Spring 1975): 46.

[22] While the subjectivity of sound is reiterated across discussions of sonic objectivity, it is worth noting that similar discussions have plagued the project of visualization, particularly through the discussion of color. The perception of color, much like hearing, is entirely located in individual encounters and poses similar challenges to determining objective iterations or interpretations of color.

locate the viewer, thereby reinforcing the logic of Cartesian perspective and structure of scientific observation. Indeed, the popular term "soundscape," first introduced by composer Murray Schafer, seeks to draw connections between hearing and landscape. In his analysis of Schaffer's influential term, Stephen Hemrich argues that soundscape presupposes "a listener with a distinct attitude toward spatiality…such a listener must have an acoustemology that imagines persons as emplaced in space, possessed with interior subjectivities that process outside objectives."[23] Hemrich's listener, as well as the cinematic one, models the Cartesian rational subject: spatialized, located, and capable of receiving and contemplating sound from a distance. By locating the viewer or listener, sound is therefore capable of reinforcing a particular subject position— perceptual location—and subsequently a particular, rationalist perspective of the cinematic world.

Sound thus helps reinforce a scientific way of looking and hearing the world on screen, on which the diegetic perception of space depends. The Cartesian model of the viewer/listener suggests the soundscape and image offer information the can lead to knowledge about diegetic space and action, not unlike scientific observation. Indeed, any "tacit knowledge" derived from *The Last Ship's* laboratory sequence or *28 Days* opening is born out of this logical formation: they suggest that through this privledged figuration of listening and looking, the viewer is able to understand—to know this world. The spectator is positioned and primed to seek out knowledge within the audiovisual constructs of the film or television show. But can we say that the feeling of sterility or control in *The Last Ship* is the same as knowing? The answer is undoubtedly no, but as the next section shows, our impulse to grasp at knowledge has been reinforced through sonic technologies that have helped instrumentalize sound in science and medicine. Countering purely subjective interpretations of sound, Chion reminds us "perception is not a purely individual phenomenon,

[23] Helmerich, Stephan. "Listening Against Soundscapes," *Anthropology News.* Vol 57:6 (December 2010): 10.

since it partakes in a kind of objectivity, that of shared perceptions."[24] These technologies and methods have helped condition the assumptions and intuitions—shared perception— that shape our viewing experience and allow us to understand an on screen environment, which in the context of the horror genre, urges us to do so.

Sounding Presence

The application of sound in science and medicine, much like cinema, presupposes a located human subject as the sonic receptor. Think of the term "sound wave," for instance, which suggests a point of emission radiating outward, intersecting with object and persons in space. This material-spatial metaphor frames hearing as a relationship between the site of auditory audition and its reception by the ear. In her work tracing sound's metaphorical history, Tara Rogers explains that science has continually used aquatic metaphors to understand how sound operates. Words like "channel," "wave," and "flow" help transform the invisible processes of sound into material spatial relationships. In other words, aquatic metaphors provide a way to ascribe sound to the logic of Cartesian perspective, rendering it an object of inquiry for scientific analysis. Indeed, in an effort to describe the communication of sonic research, Rogers turns to the language of cinema: "acoustics texts to set up a *mise-en-scene* for the observer to establish such a perspective."[25] While this quotation rearticulates the privileged position of the film or television viewer, Roger's use of cinema fascinatingly presupposes a relationship between scientific and cinematic perspectives: the construction of the cinematic subject position is one that enables the communication of information and the production of knowledge.

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[24] Chion, *Audio Vision,* 29.

[25] Tara Rodgers, "Synthesizing Sound: Metaphor in Audio-Technical Discourse and Synthesis History" (Ph.D. diss., McGill University, 2011), 69.

When we speak of "the nature of sound" in cinema, our understanding of that "nature" is the product of the rationalization of sound as a wave that is both quantifiable and mappable in space. For example, Rick Altman claims "every sound has a spatial signature," meaning that as a sound moves through a space (be that an environment or technology) it registers its interaction with its surrounding space or medium.[26] Altman's argument operates through the logic of the sound wave: conceiving of sound as the registration of invisible (yet material) movement through physical space. However, as the first section demonstrated, the perception of sonic spatiality on screen is often afforded through the epistemic uncertainty of hearing that allows for a reciprocal relationship between sound and image. The acousmatic and acousmêtre's aesthetic possibilities rely on the way that sound seemingly indexes, or better yet, *references* a material source of audition. Altman's account rationalizes this perceptual effect, locating the nature of sound itself in that reference. I return to this point not to instill double or invite scrutiny but to illustrate a set of anxieties that persist in sound theorization. If Chion's account of cinematic sound acknowledged, even celebrated the epistemic uncertainty and ambiguity of hearing, Altman gestures toward the ways in which sound has been rationalized to help overcome or suppress it. As I will show, this tension is indebted to a broader epistemic paradigm of scientific research that has helped codify the relationship between sound, space, and presence.

One the earliest instrumental applications of sound came through the attempt to overcome challenges to medical observation, which had consistently struggled with how to observe and analyze the interior of a living patient. Perhaps best documented through Michel Foucault's *Birth of a Clinic,* medical observation relied on looking for exterior signs on the body in an effort to understand the underlying biological processes.[27] While autopsy offered a way to posthumously verify diagnosis,

[26] Altman, *Sound Theory/Sound Practice,* 252.

[27] Foucault, Michel. *The Birth of the Clinic: An Archaeology of Medical Perception* (New York: Pantheon Books, 1973).

with the invention of the stethoscope in 1816, physicians were granted access to the bodily processes of the living patient. Like the microscope extended the human gaze to uncover the invisible microbial world, sound offered a way to overcome the limitations of human vision and gain access unseen organs, track biological processes, and map their movement throughout the body.

The stethoscope laid the foundation for the analytical methods and applications of sound in scientific and medical technologies throughout the 20th century. As Jonathan Sterne and Tom Rice have shown, the invention of the stethoscope offered the radical possibility of accessing unseen interiorities through a hermeneutics of hearing.[28] With the help of the technological apparatus, doctors could listen to the movement of fluids through the digestive system, the passage of air through the lungs, or the pocket of gas trapped in the abdominal cavity. Listening to the body means locating and discerning sonic textures, mapping the movement of fluids, charting the beating of the heart and interpreting those sounds into a diagnosis. Importantly, the possibility of gaining knowledge from stethoscopic auscultation depends on a spatialized understanding of sound: that the sounds heard have direct correspondence to the interior space of the body. For example, when a doctor taps the body, listening for blunt and hollow sounds, they hear the body's organs insofar as we understand sound as a wave traveling through space that changes when it comes into contact with various physical barriers. Sonic qualities are understood as the index of that physical impact, which in turn gives us information about the object and its spatiality. The stethoscope consequently ushered in "a technologically mediated approach to methods of hearing that structured medical epistemology."[29]

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[28] Sterne, Jonathan. "Mediate Auscultation, the Stethoscope, and the "Autopsy of the Living": Medicine's Acoustic Culture," *Journal Of Medical Humanities* 22, no. 2 (Summer 2001): 115-136; Rice, Tom. "Sounding Bodies: Medical Students and the Acquisition of Stethoscopic Perspectives," *The Oxford Handbook Of Sound Studies* (Oxford, 2011): 298-319.

[29] Sterne, "Mediate Auscultation," 117.

To technological mediation, we might also add sound's association with the presence of dynamic life and the possibility of mapping unseen spaces. By the early 20th century, the epistemology of stethoscopic hermeneutics would be directly applied to the exploration of underwater space. Like the doctor's soft tap to an abdomen, active sonar used ultrasonic waves to send "pings" into unseen ocean space, using the corresponding echoes to map the underwater environment. Following the highly publicized sinking of the Titanic in 1912, naval industries and national governments siphoned money and expertise into developing new navigational technologies.[30] While sonic warning systems were developed for fixed physical obstacles, there was little to protect sea vessels from moving threats like icebergs and submarines. In 1913 Reginald Fessenden introduced the oscillator, a device designed to quickly shift from a sender—emitting sonic waves—to receiver of the corresponding echoes, providing the technological and conceptual foundation for what we now call active sonar. Drawing upon the paradigms of hearing cemented by the stethoscope, the "oscillator crystallized the acoustic principle that disturbances in sound waves are indices of objects and events that caused them."[31] The oscillator and the principles of active sonar extended the epistemologies of sonic mapping from an individual body to the vast unseen ocean, concretizing the relationship between sound and space.[32] But beyond this link, the oscillator fortified the link between echo and *presence*; it offered a seemingly definitive correspondence between sound and the presence of objects that has come to undergird our perceptual understanding of echo today.

Direct examples of the sonic spatial understanding of echo are exhibited in *28 Days*. As the man wanders through the hallways, crying out to no answer, his voice repeats, fading away in the distance

[30] D'Amico, Angela, and Richard Pittenger. "A Brief History of Active Sonar," *Aquatic Mammals* 35, no. 4 (December 2009): 426-434.

[31] Shiga, John. "Sonar: Empire, Media, and the Politics of Underwater Sound," *Canadian Journal Of Communication* 38, no. 3 (September 2013): 364.

[32] Shiga, "Sonar," 364.

to give us a sense of the vast, empty space. As we watch the man wander the empty, debris-ridden hallways, we become absorbed in the silence, attuned to disruptions or disturbances and the sound of his calls as they descend into the cavernous space. This scene demonstrates a cinematic soundscape that doesn't seek to adhere to a sense of spatial reality or provide clear, narratively motivated sound cues; rather it is concerned with the experience of a diegetic soundscape and our perception of space. As the man's cries reverberate off the walls, the only answer comes from the repetition of his fading voice across the deserted halls of the hospital. Echo locates the man in space as his cries scatter and bounce off against distant obstructions, and gives the location a sense of texture, highlighting its vast emptiness without objects or persons to absorb the sound waves. Perception of that emptiness is based on our understanding of the echo as an index of objects, which in the context of cinema, allow us imagine off screen space, to map spatial relationships, and garner a sense of the surrounding environment.

The oscillator helped fortify the perceptual experience of echo and space exhibited by *28 Days'* opening by offering a technologically mediated mode of analysis. Whereas auscultation helped draw connections between hearing sounds and spatial composition, the oscillator, as a scientific instrument helped move these principles into the realms of scientific epistemology. The film demonstrates our impulse to draw conclusions about that unseen space speaks to how sound is capable of triggering the imagination of that space, of prompting the viewer to visualize it regardless of the physical restrictions. Indeed John Shiga contends, "sonar and the sensing techniques that it crystallized have always been audiovisual."[33] In other words, the epistemologies of hearing that emerged with the development of sonar helped codify and promote the impulse to imagine space and spatial relationships.

[33] Shiga, "Sonar," 374.

Yet while the technologically mediated analysis of echoes helped place sound properties and patterns in to realm of indexicality, without a visual translation of these patterns, their interpretation still relied on subjective, human interpretation of hearing. It was only once the sonic-spatial relationships could be made visual that sonar became the definitive tool for undersea mapping. Unlike *28 Days'* haunting images of an abandoned metropolis, the oscillator did not offer a visual link between sound and space; rather the perception of that spatiality was produced by developing techniques of listening capable of inferring an environment based on sonic patterns. In the second half of the 20th century, sonar faced criticism for its reliance upon the listener and a lack of an immutable form of evidence. While echo patterns had been used to chart and draw maps during WWII, this still required a skilled listener to hear and interpret sounds into space, and skepticism persisted without a technological and visual means of linking the two.[34]

With the development of medical ultrasound, the epistemic uncertainty of hearing associated with sonar was effectively overcome. Applying the same technologies and principles as sonar, early ultrasound experiments translated echoes onto graph plots, resulting in abstract splotches and jagged lines that were difficult to apply to an understanding of the body's interior.[35] This method proved to be too obscure and inconclusive, prompting scientists to pursue a more mimetic form of visualization. Much like sonar, early ultrasound practice was used to indicate the *presence* of a pregnancy, which only later developed into an instrument of measurement, and as Lisa Meryn Mitchell claims, a source of entertainment. In her rigorous historical and anthropological account of the ultrasound, Mitchell identifies two different functional interpretations of the device: developers were torn between whether the ultrasound should be used as a tool to map the interior body, or as

[34] Shiga, "Sonar," 372.

[35] Yoxen, E, and B Hyde. "Seeing with sound: the development of ultrasound equipment in medicine," *The Society For The Social History Of Medicine Bulletin* 37, (December 1985): 93-95.

an indicator of normality versus abnormality. The mapping function would win out, and by the 1970s, with the help of technology developed in the television industry, the ultrasound offered patients a seemingly intuitive look into the body's interior.[36]

While today the ultrasound image appears to be a window into the body—the ubiquity of photos of women placing their images on top of their pregnant bellies attests to this perception—Mitchell is careful to note the specialized mode of seeing and the rigorous training doctors and technicians undergo in order to both locate and interpret ultrasound images.[37] The ultrasound, printed or displayed on a monitor, produces a two dimensional image that is easily misread as a view similar to that of an x-ray—as though we could see through the woman's skin. In other words, the image creates the perception that the ultrasound wand functions like the eye peering into body with a scope. However, the ultrasound image is a composite of echoes that are used to map slices of the interior, which in turn are recomposed in the form of a two dimensional image. The resulting image is meant to be read from top to bottom: the top of the cone shape being the point of contact between the wand and body, and the fanning of the image below offers a kind of geological perspective of the fetus. In spite of the alternative perspective offered by the ultrasound, one intuitively ascribes the image to the logic of Cartesian perspective. The ultrasound functions as a tool to map and measure the body, and as such, patients have the impulse to see its resulting images as a kind of schematic or diagram that ascribes to the model of human single-point-perspective, attesting to how the development of the technology and its reception by the public is linked to paradigmatic modes of seeing and understanding.

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[36] Mitchell, Lisa Meryn. *Baby's First Picture : Ultrasound and the Politics of Fetal Subjects* (Toronto: University of Toronto Press, Scholarly Publishing Division, 2001), 28-9.

[37] Mitchell, *Baby's First Picture,* 108.

Thus, sound became the way to spatialize the body; a tool to transform dynamic entities, like the ocean or living person into a stagnant object to be measured, analyzed and interpreted. The ultrasound used the principles of mapping taken from sonar to transform embodied, thinking, and knowledgeable pregnant women into a "maternal environment" using sound to dramatize direct correlations between how we understand space and how we understand our bodies.[38] However, in spite of the deeply dehumanizing principles of ultrasound that helped create the ideal body-object of scientific inquiry, for pregnant mothers the ultrasound often proves to be a fundamentally humanizing process. As a way to verify the presence of the fetus, particularly at early stages of pregnancy, the ultrasound is often a way for women to "feel…their 'aliveness:" as a way to verify the presence of the growing human inside of their bodies.[39] Ultrasound offers a way not only to map the interior of the body, but also to reveal the presence of dynamic life. Much like the wave metaphor, the ultrasound provided the perceptual conditions for scientific or medical discovery of human life. By visualizing the relationship between sound and space, ultrasound helped place the correlation of echo and space firmly within the standards of scientific objectivity. This is not to say that ultrasound *proved* the connection; rather, it in a sense helped create the perceptual intuitions that guided the development of sonic technologies like sonar in the 20th century.

Our imaginative impulse to link hearing and spatial mapping is a powerful tool in the representation of emergent infectious disease. With *The Last Ship,* sonic qualities played a critical role in the acoustemology of the containment lab, whereas in *28 Days,* sonic mapping becomes a critical source for discovery in service of the film's generic project. However, both of these examples offer examples of the spatial organization systems that help control and contain the spread of viral outbreaks. But *28 Days* is unique in its use of sonic codes to articulate the experience of uncovering

[38] Mitchell, *Baby's First Picture,* 6.

[39] Mitchell, *Baby's First Picture,* 149.

the spatial and social reorganization of space in the midst of an emergent outbreak. Turning back to the opening, I show how the epistemological codes of sound and space create the experience of encountering the localized effects of epidemiological management. In other words, I argue *28 Days* opening uses sound to produce the sense of encountering the devastating effects of viral quarantine and the radical social upheaval of a metropolis in the wake of an emergent outbreak.

Spatialized disease management, in the form of quarantine or hospitalization, has sonic effects at the local level; *28 Days* references the visual, sonic, and social implications of these management strategies, phenomenologically situating the viewer in the midst of an urban quarantine. As the opening of the film unfolds, sound helps reveal a city devoid of life; with every unanswered cry and seemingly infinite echo, the city seems to expand and empty out. Quarantine fundamentally reorganizes social and spatial relationships, altering behavioral patterns and relationships to familiar environments; Sound is central to how we move through and discern the world around us. *28 Days Later* uses the latter to help us understand the former, locating outbreak's effects in our sense of being in the world. While the disease map allows us to stand back and look at the spatial relationships of an outbreak, the use of sound in *28 Days* situates us within the localized effects of these management strategies. As the man finds his way through the empty hospital and city streets, the silent soundscape dwells in the sonic environmental effects of outbreak: how large-scale preventative strategies can transform our sonic and social relationship to a familiar environment.

Indeed, the film's emphasis on familiarity helps locate *28 Days* within the structures of the zombie subgenre. Like the canonical work *Night of the Living Dead* (Romero 1968), *28 Days'* horror largely lies in the disruption of the everyday. However, *28 Days* has helped mark a critical shift in the subgenre, as one of many recent films that calls upon social and scientific structures of outbreaks to justify the spread of a zombie-like infection. While Romero targeted the domestic spaces of the American suburb, *28 Days* targets the urban landscape and the infrastructures of disease

management.[40] By insisting upon an *epidemiologica*l narrative, *28 Days* strikes much closer to home: tapping into the fears and realities of the emergent biological threats knocking at our doors everyday.[41] EIDs threaten the infrastructure of globalization—systems that help connect and bring individuals closer together. Consequently, urban city centers, like London, are particularly vulnerable to their spread.

Though *28 Days'* silent cityscape might rest firmly in the bounds of fiction, it conjures reference to the hushed quarantine zones during the plague. In his account of the early modern London soundscape, Eric Wilson emphasizes the unsettling silence of the quarantine zone, broken by the cries of the infected. These intermittent sounds reaffirmed the presence of the living, in spite of the deadening silence that cloaked the cordoned urban spaces.[42] Wilson's account reminds us the sonic implication of disease management, and highlights the impulse to align sound with the presence of life. The silence of *28 Days* and the London quarantine zone emphasizes the way in which sound calls upon the epistemologies of audible perception to produce an experience of the structures of disease management.[43] The film offers a sensory exploration of an outbreak. Prior to allegory and

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[40] Zombie films have a long history of being read as allegories for contemporary social and political conditions. *28 Days* has been compared to neoliberal capitalism, terrorism, and globalization. Carroll, Jordan S. "The Aesthetics of Risk in 'Dawn of the Dead' and '28 Days Later," *Journal of the Fantastic in the Arts* (2012): 40-59; Hall, Derek. "Varieties of Zombieism: Approaching Comparative Political Economy through *28 Days Later* and *Wild Zero*," *International Studies Perspectives* 12, no. 1 (February 2011): 1-17.

[41] The CDC as well as a variety of medical education websites and journals have published comedic but educational texts on "How to survive a zombie outbreak." Many of these use these publications as an opportunity to educate the public on disease prevention. See Smith, Tara C. "Zombie infections: epidemiology, treatment, and prevention," *BMJ (Clinical Research Ed)* 351 (19 December 2015): h6423.; Gilmour, Stuart J, Eiko Saito, and Daisuke Yoneoka. "Importance of survival strategies after a zombie pandemic," *BMJ (Clinical Research Ed.)* 532, (January 20, 2016): i259; Kruvand, Marjorie, and Fred B Bryant. "Zombie Apocalypse: Can the Undead Teach the Living How to Survive an Emergency?" *Public Health Reports* 130, no. 6 (November 2015): 655-663.

[42] Wilson, Eric. 1995. "Plagues, Fairs, and Street Cries: Sounding out Society and Space in Early Modern London," *Modern Language Studies*, (1995): 1-42.

[43] This social reading of the sounds of quarantine resonates with Jonathan Sterne's claim that the sonic imagination is "cultural," or capable of "reproducing cultural understandings at every turn." He goes on to say that sonic knowledge is cultural, ultimately defined and inseparable from culture. With the sonic experience of quarantine, we see how given the social and cultural epistemologies presented from scientific and medical innovations, our sonic imagination is bound to the possibility of spatial knowing. Sterne, Jonathan. *The Sound Studies Reader* (New York: Routledge, 2012), 6.

metaphor, first and foremost, we can read this first encounter as the sonic and social effect of a deadly virus. Indeed, much of the anxiety and horror of the opening lies in the proximity of this world to our own: it feels possible, if not imminent.

While *28 Days* opening may demonstrate the principles of sonic spatialization codified through modern sonic technologies, the affect—the sense of vulnerability or danger—attest to the persistence of sound's epistemological uncertainty. The silence of the opening unsettles us precisely because we lack the sonic cues to interpret the surrounding environment. Without ambient sound, or response, we cannot know what will happen: we cannot *understand* this space. Rather we are left with a *sense* of space— of the scale and emptiness—that falls short of the epistemological possibilities afforded by sonic technologies. Ultrasound and sonar helped promote our association between sound and the presence of life, and this association extends beyond the context of science and medicine and into the fabric of our everyday experience of the world: "an environment without sound is lifeless and unreal…with a lack of anticipation, it is also frightening."[44] *28 Days* exploits the affect of the silent soundscape to promote the sense of the lifeless, terrifying city. The use of echo seems to promise the possibility of knowing—the possibility of drawing concrete correlations between sound, space, and seeing—only to leave us suspended in a space devoid of the sonic cues that allow us to understand this space and anticipate what might come next.

In this sense, *28 Days* uses the epistemic structures, codified through sonic technologies, to produce the anxious affects of the horror genre. However, I argue this affect—produced through this duplicity—extends into the film's representational project; *28 Days'* use of sound creates the immediate experience of an outbreak: what it feels like to be on the ground, vulnerable to the spread of deadly virus in spite of being surrounded by the infrastructure of modern progress. Indeed, the film very deliberately asks us to dwell in the downfall of humanity. The use of sound prompts us to

[44] Pocock, "Sound and the Geographer," 194.

not simply to marvel at devastation from a distance— which might be the case without Boyle's precise use of sound—but to sense, imagine, and feel that vulnerability and anxiety. These are not abstract iterations of an outbreak—statistics, maps, or diagrams—that might help us see an outbreak. Nor are they sores, sneezing, or sickly bodies that index the presence of the virus. This is what it feels like to live in a world constantly threatened by a new biological threat, a world increasingly dependent upon the very structures that facilitate its emergence and spread. The "existential threat" of disease increasingly imposes itself on our experience of the everyday, or has "transformed into individualized emotion by specific events [like H1N1 or Swine Flu], becoming a personalized and deeply felt experience." [45]*28 Days* exacerbates this new affective relationship to the world, using sound to ground our sense of the outbreak in the epistemological structures and imaginative impulses of hearing.

Audiovisualization and the Duplicity of Sound

While the previous section traced how technology has given way to the possibility of sonic knowledge, sound continues to connote a sense of uncertainty and ephemerality. For example, in defining the field of Sound Studies, Sterne turns to the "audiovisual litany" or set of assumptions and clichés associated with sound and hearing. Through a series of oppositions between sound and vision, he sketches a slippery linguistic portrait of sound bound up in its relationship to subjectivity and imprecision: hearing is posed against the objectivity of seeing, or the affect of sound against the intellect of vision. In other words, sound is opposed to the qualities of scientific or medical knowledge, relegating it to the realm of feeling and imagination. As the previous section demonstrates and indeed, much of Sound Studies, this opposition fails to hold in the face of technologically mediated appropriations of sound. However, Sterne's litany continues to resonate in

[45] Masco, *Theater of Operations,* 18.

our perception of sound and sonic knowledge on screen. After all, as viewers, sound tends to feel immersive, affective: we tend to dwell on how sound conjures the imagination and memory. Rather than placing these qualities in opposition to the scientific application of sound traced in the previous section, through the analysis of *Pontypool,* I show how film and television use what I call the duplicity of sound to represent an outbreak.

In his analysis of horror sound design, William Whittington analyzes how horror films exploit the tension between cinematic sounds as contextual versus indexical. Drawing upon Chion, Whittington claims that the horror film soundscape is inherently uncanny, constantly playing with the relationship between sound and image to scare and unsettle viewers. This is seen most saliently in discussions of off-screen sound, where audio cues the viewer to imagine the presence of a monstrous threat.[46] Scholars of horror often use Chion's theory of the acousmêtre to link these instances of off-screen sound with discussions of monstrous presence and affect.[47] For instance, in her analysis of *Paranormal Activity,* Nessa Johnston uses the acousmêtre to describe how the film uses sound to transform the supernatural force into an embodied, monstrous threat; while Randolph Jordan argues that *Donnie Darko* uncouples body and voice to produce a disembodied, omnipresent threat.[48] Indebted to Chion's term, these accounts focus on the relationship between heard voice and unseen body, framing sound in terms of generic discussions of embodiment and monstrosity.[49]

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[46] While Whittington primarily focuses on Chion, his use of uncanny evokes the historical work of Robert Spadoni, who argues that early sound cinema spectators experienced the speaking voices as uncanny events. Whittington, William. "Horror Sound Design," *Companion to the Horror Film* (West Sussex : Wiley-Blackwell. 2014), 168-184; Spadoni, Robert. *Uncanny bodies: the coming of sound film and the origins of the horror genre* (University of California Press, 2007).

[47] See for discussions that directly correlate off screen sound and monstrosity: Van Elferen, Isabella. "Sonic Monstrosity," *Horror Studies* 7, no. 2 (2016): 307-318; Jordan, Randolph. "The Visible Acousmêtre: Voice, body and space across the two versions of Donnie Darko," *Music, Sound & The Moving Image* 3, no. 1 (Spring 2009): 47-70.; Johnstone, Nessa. "The Voiceless Acousmêtre," *Music, Sound & The Moving Image* 9, no. 2 (September 2015): 131-144.; Whittington, "Horror Sound Design."

[48] Johnston, "The Voiceless Acousmêtre," 133; Jordan, "The Visible Acousmêtre," 55.

[49] I use monstrosity in line with scholarship in the horror genre, where the monster is not a visible, material threat in the real world, but a product of our imagination: " Monsters do not exist except in our own horrified-exhilarated

While the acousmêtre's relationship to the voice and sense of bodily presence has typically been used to theorize the monstrous being in cinema, Chion's formation is a useful way to think through the representational and epistemological power of sound in cinema. Chion's acousmêtre relies on the tension between the heard and unseen, locating power in the perceptual intuition to see the sonic source. Driven by the very epistemic codes and intuitions traced throughout this chapter, the acousmêtre always taunts the viewer with, "*possible inclusion*…the acousmêtre brings disequilibrium…he invites the spectator to *go see,* and he can be *an invitation to the loss of self, to desire and fascination.*"[50] Thus the acousmêtre illustrates the powerful referential possibilities of sound: that is, the paradigmatic understanding of a cause-effect relationship between sound and site of audition. Sound, at least intuitively, is understood to always *refer* back to its source.[51] The previous section demonstrated how this formation has been codified through scientific and medical technologies. In this final section, I turn to *Pontypool*—a film that uses the relationship between off-screen sound and knowledge through audio visualization technology—to explore how this powerful relationship between sound and source, seen and unseen, demonstrates the imaginative and affective possibilities of sound on screen.

Like *The Last Ship*, *Pontypool* locates its narrative within the confines of a single location, using sound to create an infected diegesis that extends well beyond the boundaries of isolated radio

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imagination: they appear within fictional contexts only, their perfectly grotesque appearance carefully construed from scraps and fragments of textual and visual signifiers." Borrowing from Fred Botting, Isabella Van Eleferen restates the notion that monsters express anxieties, fears, and desires derived from the real world—they are projections of cultural fears. Sound has been a useful way to talk about monstrosity precisely because of monster's relationship to the imagination. Sound's ability to promote the imagination allows a film to tap into the individual's personal fears and desires. Van Elefren, "Sonic Monstrosity."

[50] Chion, *Audio Vision,* 23-24.

[51] Here I draw on the language of semiotics to describe the sonic referent. Within Charles Sanders Pierce's model of the sign, referent is described as the "object," or the material to which utterance or signification attaches. In the case of sound, the referent is understood as the point or souce of audition. Chion's acousmêtre relies entirely on the intuitive link drawn between sonic utterance and object or referent. Peirce, Charles S. *The Essential Peirce: Selected Philosophical Writings* (Bloomington, Indiana: Indiana University Press, 1998).

station.[52] The film's sparse narrative tells the story of a viral outbreak from the perspective of three radio station employees who encounter increasingly strange reports and calls about mysterious events unfolding in town, eventually revealed as the spread of deadly virus through language. Preying on the relationship between hearing and understanding spoken words, the virus transforms citizens into "conversationalists," or babbling zombies. Exploiting the perceptual cues and epistemological promises of on-screen sound, *Pontypool* asks us to imagine the outbreak and sense its presence through disembodied voices, on-air calls, and audio visualization. Though the virus will eventually move into the space of the radio station, infecting members of the broadcast crew, the viral outbreak remains largely invisible. *Pontypool* uses broadcast technology to thematize the tenuous relationship between sound and knowledge to make the virus feel omnipresent.

Pontypool's ambitious narrative relies on contrasting the ordinariness of the radio station with the alarming and ambiguous events unfolding outside. Nearly the first third of the film is dedicated to setting up the banality of the diegesis, as we watch the three main characters move through the motions of a small town radio broadcast. The first interruption occurs about twenty minutes into the film with a call from the studio's weatherman, Ken Loney (Rick Roberts), the primary resource for information on the outside world. With the click of a button, producer Sydney Briar (Lisa Houle) and assistant, Laurel-Ann (Georgina Reilly) interrupt the morning news segment. The "breaking news" jingle chimes on air, Grant leans forward, into the mike, and with a deep, serious tone begins, "We have breaking news folks. It appears as if a large group of people have gathered outside of the offices of Dr. John Mendez." He goes on to vaguely describe the "unruly crowd" as Sydney feeds

[52] Judy Berland argues "radio is an alteration of space and a structuring of time." Berland's analysis of radio suggests that listening to the unseen voice or music has the possibility of shaping one's phenomenal sense of the world's boundaries and temporalities. While Berland discusses this issue with respect to the sense of culture or sociality afforded by radio listening, her spatial and temporal statement marks the way that the experience of radio listening has this phenomenological tie to space and time. *Pontypool,* seems to draw upon this condition of listening to produce its horrifying viral narrative. Berland, Judy. "Contradicting Media: Toward a Political Phenomenology of Listening," *The Sound Studies Reader* (New York: Routledge, 2012), 41.

him information through a computer screen. The weather jingle interrupts and Grant reports on a "special report from Ken Loney in the sunshine copper." Early on in the film, we learn that Ken's sunshine chopper is really an illusion produced by helicopter sound effects: he really reports via cell phone from his car parked on a hill overlooking the town. As Ken's voice comes on air, the rhythmic beating of the artificial chopper obscures his muffled tone of voice. While his tone suggests Ken is shouting over the noise, his voice feels quite distant, overrun with static and unidentifiable sound effects.

The poor sound quality stands in direct contrast to the clarity and proximity of Grant's voice. Throughout the film, Grant's radio voice feels close and blunt—so free of reverberation that it almost takes on a flat quality. Visually, the film insists upon a link between the material conditions of recording and the quality of his voice through close ups framing Grant leaning into the microphone. Even in standard conversations shots, outside of the broadcast room, the voices retain a sense of texture and depth that Grant's radio voice lacks.[53] *Pontypool* uses the relationship between sonic texture and recording conditions to organize and shape our perception of the diegesis. Loney's distant, incoherent voice is meant to signify "on-location" reporting; the opposite to Grant's vocal clarity and the muted tone. Ken's fluctuating and interrupted audio quality places him in a landscape full of uncontrollable unknowns that remain inaccessible throughout the film. This link encourages us to imagine the link between the sound, space, and event, without ever granting us visual access or exposition to affirm the imagined unfolding of action.

Tension mounts as Loney vaguely describes a mob of people outside of the office of Dr. Mendez; and in an effort to maintain the illusion of his aerial illusion adds, "It looks pretty awesome up here, they seem to have crammed themselves into…uh oh oh!" Static overtakes his voice and the

[53] In this sense, *Pontypool* exacerbates Altman's sonic materiality, using the link between recording conditions and audio quality to organize space. Altman, *Sound Theory/Sound Practice.*

film cuts to a series of concerned reaction shots of Laurel-Anne and Sydney. Grant finally interjects, "What's happening, Ken?" Out of breath, Ken shouts, "The side of the office: it's just burst open! It's spilling open! It's just kind of exploding! Ah oh Jesus! [Static] Oh! It's an explosion of people [static]" As we try our best to make out these muffled words, we can hear the subtle tapping of buttons, and the twist of knobs as Sydney tries to adjust the sound levels and reduce the excess noise. This scene, thus far, operates within the existing codes of off-screen sound in horror: by withholding an image of Loney and the action he describes, we're left to imagine the possible horrors that lie beyond the boundaries of the radio station.

In this sense, the scene operates within the generic tropes of cinematic and radio horror, asking us to imagine terrifying events off screen in an effort to produce anxiety and fear. As Richard Coyne notes, radio horror capitalizes on the supernatural affects of the unseen sound.[54] Left to imagine the audio source, listeners can begin to associate the crackles and static of noise with traces of otherworldly or ethereal beings.[55] Like the whoosh or crackle heard in *Pontypool*, we're encouraged to reconcile that sound with an object or entity. However, the film makes a radical representational transition to audio visualization as Ken shouts, "People are getting trampled, people are getting killed down there!" A cut to a close up of a computer monitor reveals a plane of turquoise sound waves dancing across the screen [Fig. 3.3]. The bottom of display shows a field of shallow waves that quiver and shake, while a more pronounced wave is suspended above. The larger wave fluctuates with the changes of volume and tone in Ken's voice. As he shouts, sharp peaks erupt from the center outward, taking over the frame, while a large entanglement of lines appears to the

[54] Solveig Ottman likens *Pontypool* to Orson Welles' *War of the Worlds* broadcast. While this comparison is an apt point of cultural reference, it ultimately disregards the role of visuals. Ottmann, Solveig. "Broadcasting Death: Radio, Media History and Zombies in Bruce McDonald's Pontypool," *Irish Journal of Gothic and Horror Studies* 42 (2014): 38-56. You might also compare the film to recent horror podcasts, including Welcome to Nightvale, which has been compared to Welles' famous radio drama. Hancock, Danielle. "Welcome to Welcome to Night Vale: First Steps in Exploring the Horror Podcast," *Horror Studies* 7, no. 2 (2016): 219-234.

right and sputters with the crackle of static. Here, the film pushes beyond the material conditions of recording to give a computerized model of the sound layers as they unfold in time. Noise and static are transformed into graphic lines and shapes, volume and tone are translated into sharp shifts of movement. This image conjures new acoustemological possibilities for the film, prompting us to draw direct correlations between sound and image, hinting at the possibility to understand the action based on the visualizaed sonic cues.

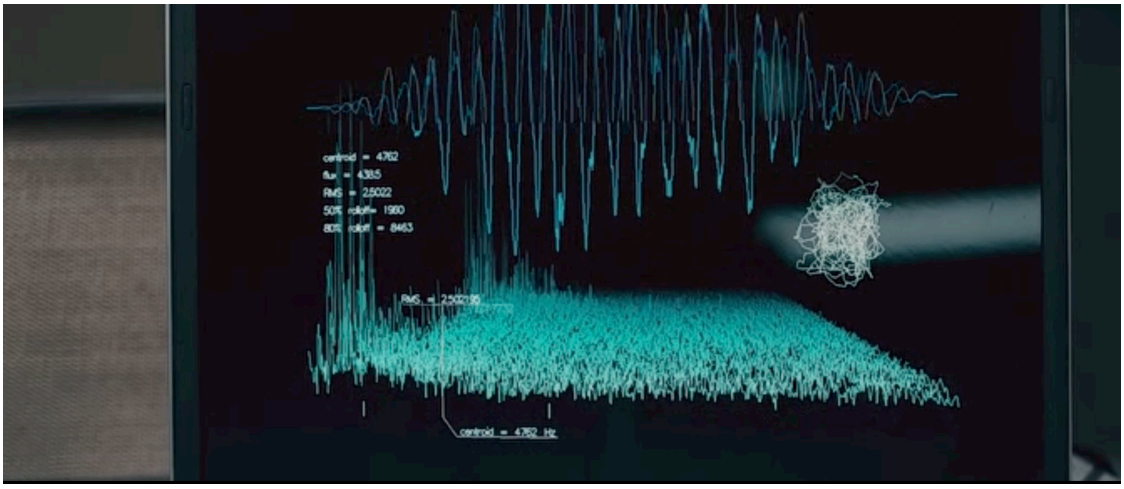

Fig 3.3: Audio visualization screen, *Pontypool* (McDonald 2007)

Coupled with the environmental constraints and narrative project of the film, the use of audio visualization pushes this scene beyond monstrosity and the supernatural toward larger discussions of sonic epistemology and technology. While the visuals of the film remain ordinary and uneventful, the excess of sound asks us to sort information from noise. The use of technology encourages us to seek out information—gain some sort of knowledge—in the noise by teasing us with the possibility of visualizing or understanding of the unseen event. The computer screen helps separate out the voice from noise through symbolic registrations of the different sonic layers— the helicopter sound becomes the rumbling base of the graph, while his voice cuts through the top half of the screen,

[55] Coyne, Richard. "Noise," *Sound Studies: Critical Concepts in Media and Cultural Studies*, ed. by Michael Bull (Abingdon,

only to be interrupted by a ball of static collectively invite false correlations between sound and image, noise and event. While this model doesn't hold the same epistemological weight of the sonar or ultrasound, it encourages a similar interpretive leap using sound and image. The static ball is understood as not just a whoosh of wind or a faulty receiver but also the product of a physical interruption—an unseen event—that quite literally inserts itself into the audiovisual landscape. But *Pontypool* never satisfies the desire to map these graphic abstractions onto seen events: the events remain heard and unseen, dwelling in the epistemic uncertainty of the unseen, but audible event. On the one hand, the scratchy phone call challenges viewers with the task of discerning the content of Ken's speech. However, the diminished quality of sound simultaneously invites viewers to try and translate the surrounding static and surrounding noise. Complicating Schaffer's discussion of sonic attention, Chion claims that diminished sound quality often invites a mode of listening that seeks to assign "sonic textures, masses, and velocities" to the logic of cause and effect.[56] In other words, faced with imprecise audio, viewers will focus on trying to assign sonic textures or qualities to material causes. *Pontypool's* ambiguous on air call uses audio visualization to exacerbate this impulse, but in the end technology and sound are rendered impotent: they remain sonic references that promise knowledge but fail to deliver.

In this sense, *Pontypool's* soundscape aligns the logic of the film's fictional communicable disease. Spread through language, the pathogen preys on the precarious relationship between signifier and signified. The infected find themselves caught up in attempts tie words to meaning, slipping between phonetic sounds and synonyms only to encounter the fallacy of an inherent relationship between word and meaning. The film suggests that correlating ordinary language and understanding has dangerous implications, mainly the collapse of linguistic signification in favor of zombie-like floating signifiers. The horror of the narrative, like the audio visualization, is located in the presumption of

Oxon, New York, NY: Routledge, 2013), 13–35.

knowledge through language. At the same time the audio visualization, much like language, also helps instill a sense of power over the events: we are not yet infected, just vulnerable to the precarious relationship between sound and knowledge, language and meaning. In other words, there is the sense that Sydney can still look to the computer screen to garner information from the transformation of sound into symbol and speak to the events that have occurred. Like Ken's muted tone of voice that sounds distant, the outbreak itself still feels "out there," not here.

As the film moves forward, that sense of mediated mastery over sound dissipates. Ken calls back about fifteen minutes later, following a series of cryptic calls from listeners that allude to "a herd," "babbling," and "75 dead."[57] While the previous scene may have hinted at the possibility of aligning the audio and visual, this time the film deliberately denies us a sense of correlation between Ken's speech and image. His call back to the studio offers a deeply unsettling and seemingly violent account of the outbreak, imagined through the use of audiovisualization. Returning to the computer monitor showing the dynamic hovering line that spikes and oscillates his vocal tone and volume, we hear Ken exclaim, "a cat! A cat!" The line zigzags outward. Then, with a sudden cry, "ugh!" the tangled ball reappears, flashing on screen for a moment. Reaction shots of Laurel-Anne and Sydney are intercut with Ken's incoherent cries and the jagged digital line. As he screams, "look out!" the ball appears again and he launches into an eyewitness account of a herd of people attacking two people in a van. Incoherent background sounds are expressed through the tangled ball that continues to dance on screen, encouraging us to aligns its presence with the haunting noises on the audio track. Ken reports on people devouring each other and his voice rises in tone and his breathing becomes more labored, finally he letting out a dramatic scream. After a pause, Ken whispers, "Oh shit, he heard that. He's coming! Holy shit, I have to hide!" The computer screen

[56] Chion, *Audio Vision,* 32.

shows the central line spike as his volume increases, along side the pulsating ball of lines. He cries out that his attacker is running and suddenly we hear a clatter and rumble. Ken's breathing one again resumes and the screen shows fairly flat, quivering line. In the bottom left, however, the ball of lines lingers as a small speck. Ken describes the scene: a man has thrown himself through the door and appears to be passed out on the floor babbling and announces his approach. Sydney insists that she will not "listen to a man die on air." In spite of their warning calls, Ken pushes on, and the computer screen flashes with the peaks of his voice and the ball begins to inflate.

In this moment we can imagine Ken's approach. The computer screen creates a sense of proximity between Ken—the central sound wave line—and the presence of the infected individual—the growing ball. Whereas the previous scene used audio visualization to sort sound and noise and hint at the correlation between sound and image, this scene deliberately encourages us to bind sound with visual to create a sense of presence and proximity. As the ball bloats and Ken moves toward the dangerous figure, he says he's going to try and record the man's incoherent babble. The background noise rises in volume and we can begin to make out a voice, and just as Ken gets close enough to position the phone to capture the sounds. Just as we think we might have caught a fragment of coherent dialogue, an audio interference overtakes the soundtrack, causing Sydney, Laurel-Anne, and Grant, and the audience to leap from their seats.

Coupling generic tropes of horror with audio visualization, this scene demonstrates how the film navigates the proximal relations between interior and infected exterior using sound. While the characters remain at a comfortable distance from the implied events, the use of sound and audio visualization encourage us to imagine an event that feels uncomfortably close. The muffled audio and sound effects force us to listen carefully, while the use of whisper evokes the sense of bodies

[57] It's worth noting that *Pontypool* deliberately plays with its linguistic premise through the use of the word "herd" to describe the pack of infected individuals. Here we encounter the very linguistic fallacy of the film through the confusion of "herd" and "heard."

speaking close to one another. Ken's hushed voice and quiet background noise force us to almost lean in to try and grasp at information, while the use of the computer screen encourages us to translate the sound qualities into spatialized events.

Rather than offering knowledge of the event by visualizing the sonic source, the film exploits the power of sonic reference. Even if viewers will never see the off screen events or even understand the content of Ken's words, the codified relationship between sound and source encourages the viewer to assign causality: to imagine the source. This tension, between the epistemic thrust of the sound—the impulse to ascribe it to a site or cause—and the failure to provide knowledge, I term, the *duplicity of sound* on screen. Through the logic of Cartesian space, sonic transduction technologies have helped cement the relationship between sound and material referent. Indeed, they suggest that mediation serve the critical link between the two. *Pontypool* calls upon these epistemic and representational structures to tease us with the possibility of accessing the event itself through hearing, tempting us with collapse technological visualization and sonic information. However the audio visualization can only offer us information about sound itself, *not* the content of Ken's speech. This encounter with the false correlation of sound, image, and knowledge produces immense anxiety and frustration. This is not to say that the film's use of audio visualization is merely a trick; rather, I argue, the film foregrounds the epistemic drive of the sonic referent. Sound, as we understand it, is a material registration of an object or event located in space—sound registers something or someone—but the experience of hearing cannot be reduced to that material fact.[58] Nonetheless this impulse persists. Thus the duplicity of sound describes the impulse to assign cause (object) and

[58] Indeed for Peirce, the sign and object do not have a mimic relationship to one another. Rather the object determines the sign in so far as it places limitations on the sign. His famous example of the molehill as sign, object as mole, articulates the imprecise relationship between the two semiotic elements. Sound on screen has an even less precise relationship between sign and object, wherein hearing a sound and correlating it to an object is entirely dependent upon context. *Pontypool's* audio visualization showcases the contradiction between our semiotic impulse to read sounds with respect to referent or object, and the persuasive power of sound and image juxtapositions. Pierce, *The Essential Pierce*; Chion, *Audio Vision.*

effect (sound), or in the case of *Pontypool* sound and visualization, only encounter the limitations of this formation. Rather than fulfilling the desire to discern the event or extract information from the technologically mediated translation of sound, the film leaves us with the mental images conjured in our heads that we've tried to map on to the false representation. Without a clear picture of the action or any stable information about the event, the virus feels like an active and uncertain threat. Unable to locate, visualize, or provide any concrete information about the outbreak as it unfolds, the audio visualization merely verifies the presence of a deadly virus.

Pontypool's use of audio visualization underscores the interpretive impulse to ascribe sound to the standards of scientific visualization to Cartesian perspective. That is, we desire to see a picture of this unseen world in the abstract graphical representation. Like the ultrasound image, *Pontypool* feeds the impulse to see the audio visualizations as a window onto this event—that the lines may transform into perspectival representation of bodies and objects located in three-dimensional space. Indeed, *Pontypool's* opening has primed us to draw these false, mimetic correlations. The film begins with an animated radio wave coupled with Grant Mazzy's voice, which articulates the linguistic logic of the virus by trying to define "pontypool." Through word play, Mazzy defines the difference between meaning and phonetic likeness: pontypool becomes "panty pool" and "pont de pool," to dramatize the slippery relationship between hearing and understanding. Initially we pay little attention to the bouncing line, focusing Grant's voice in an effort to parse its content. However, the rapidly bouncing lines play tricks on the eyes, creating patterns of movement that resemble a mouth [Fig. 3.4]. *Pontypool* quite literally begins by asking us to link voice, visual, and body, encouraging us to connect sound with source and meaning using the technological tools of sonic visualization. The prologue sets up a misleading acoustemology for the film, suggesting that audio visualization may allow us to draw direct correlations between sound and source.

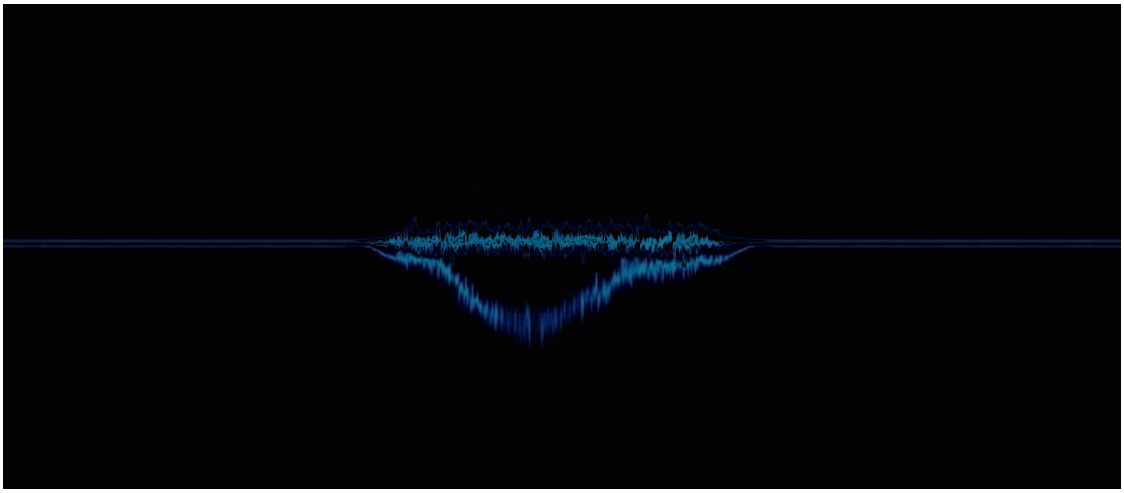

Fig 3.4: *Pontypool's* audio visual prologue. Image composite of two consecutive frames to mimic the experience of watching the rapidly oscillating sound waves. (McDonald 2008)

This logical fallacy aligns itself with the film's narrative that locates infection these hollow correlations. As Dr. Mendez (Hrant Alainak), the primary source of viral exposition, explains, "It is when the word is understood that the virus takes hold and copies itself in our understanding!" That is, it precisely when we translate that word into meaning that we become part of the infected chain of empty signification. The use of audio visualization in all three of these scenes sets up false equivalences, modeling the indirect relationship between signifier and signified. The audio visualizations function like linguistic signs capable of linking—mediating—signifier and signified to produce knowledge about the unseen events, only to leave us anxiously imagining the unseen event. Thus we might extend this use of cinematic sound and sonic technology here to the film's narrative to say that the film's soundscape mimics the very linguistic logic on which the virus prays.

Importantly for the film's narrative project, radio participates in the promotion these false correlations.[59] Drawing on linguistic theory, Solveig Ottman claims that the film's virus in fact articulates the logic of radio. As a virus spread through the precarious relationship between signifier

[59] Chion claims that radio is the perfect example of the acousmêtre, wherein we hear a voice and imagine the presence of the speaking individual. Chion, *Audio Vision,* 22.

and signified, it mimics the use of voice in radio, where listeners are constantly tasked with imagining the meaning of words they hear.[60] Indeed, radio becomes a deadly vector, capable of promoting—transmitting—these linguistic fallacies across vast distances to reach disparate populations. In this sense, *Pontypool's* language-borne disease exhibits how, "the communicability of germs and ideas "broadcast" together in an ever more elaborate network of human existence."[61] The film's haunting end, which assembles fragments of news reports about similar outbreaks, suggests that the virus lives on through the communication structures of media technologies. While the film denounces the possibility of meaningful communication through speech, it also suggests that the modern networks of communication are in part responsible for the production of these empty lines of transmission that result in potentially dangerous and senseless social connections.

However, like the false alliance between speech and meaning, it would be dangerous to assume that we can read *Pontypool* simply as a meditation on the overdetermined emptiness of technological and linguistic signifiers.[62] To draw direct correlations between media technologies and the film's viral logic would ultimately undermine the sonic and linguistic lesson. We cannot merely say that the virus operates *like* a radio wave. To do so would overlook the critical questions this film poses about our relationship to sound, technology, and knowledge that shape the film viewing experience: precisely that we cannot draw simple correlations between what hear and what we know, or perhaps more importantly what we *see,* hear, and know. Rather, I argue the film exploits, if not celebrates, the referential power of sound. Though Ken's babble may not produce meaning—in terms of narrative content—nor does the audio visualization reveal the sonic source, the sounds still refer back to

[60] Ottman, "Broadcasting Death," 54.

[61] Wald, Priscilla. *Contagious: Cultures, Carriers, and the Outbreak Narrative* (Durham: Duke University Press, 2008), 22.

[62] Using Deleuze's theory of language and representation, Jason Wallin argues that the film points to "the viral or symbiotic potential inhering language." Thus the fictional virus, for Wallin, merely serves as useful biological correlate to discuss the ethical problems with linguistic signification. Wallin, Jason James. "Representation and the Straightjacketing

something or someone: an obvious point, but central to the film's representational project. *Pontypool* does not expose the arbitrary relationship between linguistic signifier and signified; rather it demonstrates the epistemic relationship between sonic referent and signification. Sound, it reminds us, is signified by seeing its material referent, and as such, we tend to associate sonic knowledge with seeing its source. Indeed, as I have shown, the epistemic value of sound lies in the technological codification of this relationship. The film's use of audiovisualization reveals this epistemic formation that allows for the extraction knowledge from sound only to foreground the impossibility of sorting through the ephemeral and ineffable qualities, leaving us to dwell in the deeply unsettling fact that we cannot pin down what we hear: that sound seems to escape the empirical systems designed to observe, analyze, and know the world around us.

Indeed Chion's acoutmêtre relies on this perceptual link between sound and referent: the power of the acousmêtre in fact lies in the epistemic impulse to see the unseen and locate sound. Contextualizing this formation in sonic technologies helps show how the power of the acousmêtre can extend beyond the voice to other sound techniques on screen. While *Pontypool's* audio visualization sequences do feature human voices, the static and noise are as epistemologically charged, all seemingly capable of offering information about the unseen event. In other words, this sequence demonstrates that the power of the acousmêtre is not confined to the voice, but rather particular formations of sound and image. Moreover, the acousmêtre and its application in horror have all emphasized the powerful relationship between unseen sounds to an embodied presence. Chion claims as long as the acousmêtre remains unseen—it holds the power to "be everywhere, to see all, to know all, and to have complete power. In other words: ubiquity, panopticism, omniscience, and omnipotence." This formation remains tied to a *figure,* an "immaterial and non-

of Curriculum's Complicated Conversation: The pedagogy of Pontypool's minor language," *Educational Philosophy & Theory* 44, no. 4 (June 2012): 366-385.

localized *body*."[63] In *Pontypool,* this power is not held by unseen individuals or figures—Ken does not have omnipotent power over the diegesis—but is located in the omnipresent threat of viral infection. Encountering the impossibility of extracting information from technologically mediated forms of sound produces a sense of vulnerability and anxiety. By affirming the presence of the virus and alluding to its violent and deadly effects, Ken's calls ask us to imagine the outbreak lurking outside of the walls of the radio station, while simultaneously undermining the possibility of being able to track or prevent its rapid spread. The shifts in sound mixing create the sense that the conflict is escalating, moving closer and closer to the radio station, eventually taking human form as it infects one of their own, Laurel-Anne. At the same time, the imprecision of audio visualization, and the shaky epistemological value of sound itself, never produces a sense of sonic or visual mastery over the event. We instead grasp at clues in the textures of voice, muffled background noise, and sonic interference—pockets of information offered from callers and external news sources—without ever understanding the outbreak's density or scope. Sound makes this virus seem simultaneously material—located— and omnipresent.[64]

More importantly, the film locates this horror in the visual codes, epistemologies of vision and hearing that help us make sense of the world around us. While ultrasound and sonar may have trained us to imagine the link between sound and visualization, *Pontypool* reminds us that sound remains intangible and will always escape the bounds of technological mediation. Sound reveals itself as irreducible to visual translation, inextricable from the experience of hearing. Even if we can channel sound using radio broadcast technologies or translate its vibrations into symbolic visual

[63] Chion, *The Voice in Cinema,* 24

[64] While audio visualization will fall away in the second half of the film as the infection moves closer and into the bodies of characters on screen, these scenes play a central role in how the film produces the contaminated diegetic landscape.

renderings, these mediated interpretations of audio cannot contain the enigmatic and ephemeral nature of sound.

Conclusions

28 Days and *Pontypool* offer us two radically different uses of sound. *28 Days* is relatively devoid of noise: each audible cue functions as a carefully disseminated beacon into a vast unknown, while *Pontypool* delivers sonic abundance, leaving us to sort out information from noise. *28 Days* is precisely located, spatialized, while *Pontypool's* outbreak remains almost entirely abstract and imagined. However, at the center of both these works lies a meditation on the possibilities of a cinematic acoustemology. Both exhibit the way sound prompts us to imagine, understand, and sense the world. Sorting sound from noise, using echo and volume to map an unknown space, and using sonic textures to discern the organization and unfolding of unseen events are basic strategies of hearing we use everyday. Collectively they exhibit the way sound helps us sense the world. In spite of their representational and formal differences, the two films share an attention to the epistemological *activity* of listening. That is, the way sound triggers logical inferences, imaginary maps or mental images of events, or the social codes of a given space.

The unsettling affects of *Pontypool's* audio visualization or *28 Days'* empty city of echoes might suggest that we disregard the epistemological possibilities of sound. One could argue that hearing merely produces false perceptual gestalts that cannot be produce information capable of standing up to the standards of scientific knowledge, or that technologies like sonar and ultrasound simply reproduce logical fallacies that cause us to overlook the dynamic, relational, affective, and social dimensions of sound and hearing. Sound might forever remain "promiscuous," and "exceed the conventional parameters and possibilities of representation," but as this chapter has shown, sound doesn't simply elude us: sound is epistemologically charged and central to how we understand spaces

and events on screen.[65] *28 Days* and *The Last Ship* demonstrate how auditory experience gives way to "micro-epistemologies," where echo and sound mixing provide audible cues that help orient us and sense the surrounding environment. In this regard, they do not give way to concrete knowledge, but a powerful impression of "the local conditions of acoustic sensation, knowledge, and imagination."[66]

This chapter demonstrates how the epistemic drive of listening can be a critical tool in the construction of an outbreak diegesis. Beyond the environmental information provided through sonic cues, all three texts demonstrate how sonic knowledge gives way to a sense of a space shaped by an emergent outbreak. The micro-epistemologies of the echo or silence can give way to an unsettling experience of an urban quarantine, or isolated biohazard laboratory. From *The Last Ship's* sonic containment, to *Pontypool's* off-screen infection, sound constructs the outbreak by drawing upon the paradigmatic impulse to correlate sound and source. Quarantine and containment, central pillars of epidemiological management, require the organization of social space and bodies. They impact basic behaviors, daily movements, and social interactions, and consequently produce new sonic environments and patterns. This chapter's turn toward sensation articulates an understanding of outbreak that acknowledges that we understand the world not simply as abstract representations, but experiences that have localized, immediate, and embodied affects. As *28 Days'* opening demonstrates, a viral outbreak is capable of completely transforming the urban environment; but, more importantly, the film asks us to recognize this transformation—to feel it—through hearing.

A sense of persistent viral omnipresence emerges from the excess and scarcity of sound in both *28 Days* and *Pontypool.* This vulnerability is intimately related to sound's epistemic uncertainty. As such, sound could be understood as a virus itself—invisible, relational, and seemingly omnipresent. Indeed, LaBelle's socio-cultural analysis of sound suggests a metaphorical relationship between sound and networks akin to slippery interpretations of EIDs: sound is *like* a network and "a

[65] LaBelle, *Acoustic Territories,* xvii.

significant model for thinking and experiencing the contemporary condition."[67] Sound and emergent outbreaks, it would seem, are networks. However, as I have shown throughout this dissertation, defaulting to flows and flux fails to account for the very micro-epistemologies and sensory experiences that guide our understanding of EIDs on screen. Rather I offer duplicity to describe how the affect of sound remains tied to scientific technologies and epistemologies. Hearing is not simply a subjective experience, but one conditioned by historical, cultural, and scientific processes. Duplicity offers a way to account for how these conditions have lead to our impulse to derive knowledge from sound, to separate sound from noise, discern distance, or map space. These are not logical fallacies: they are meaningful way in which we engage with and perceive our surrounding environments.

Sound's relationship to immediacy and sensation offers a representation of how an outbreak and its effects are felt at the level of the body. *28 Days* and *Pontypool* use sound to make the immediate and located impacts of an outbreak sensible. These films ask us to feel what its like to walk through a quarantine zone, enter a containment lab, or sense the immanent threat of a deadly virus. As such they offer examples of how outbreaks impact our most fundamental relationships to the world. While *28 Days'* exhibits the vulnerability of an urban metropolis, *Pontypool* tests the epistemological limits of sound and audiovisualization technologies to help us track and understand viral outbreaks. Both of these films use sound to instill doubt in the technologies, infrastructures, and epistemologies celebrated as hallmarks of human progress. The sonic transduction technologies, audio visualization strategies, and their corresponding analytical applications cannot save us from the outbreak. Nor can the public health networks or medical infrastructures of a thriving urban metropolis. Indeed, the horror in both films, in part, lies in the failure of these management strategies and structures. Through the analysis of sound's affects, we see how film and television express how outbreaks

[66] Feld, "Waterfalls of Song," 91.

shape the experience of the everyday and impact our sense of being in the world. That is, the anxiety and vulnerability that we feel in world where increased connectivity leaves us susceptible to emergent pathogens. And perhaps more unsettling, they suggest that the scientific structures and epidemiological methods that we use to control these deadly threats may not be able to secure or save us.

[67] LaBelle, *Acoustic Territories,* xvii.

CHAPTER 4

FOUND FOOTAGE HORROR AND THE EVIDENTIARY EFFECT, OR HOW TO KNOW AN OUTBREAK

Digital static ruptures from the darkened screen to reveal a medium close up of a woman, microphone in hand, staring directly at the camera. In the background we see a line of fire trucks and open garage door looking out onto a busy, darkened street. She addresses the camera, "Good evening, this is Angel Bidal speaking. Tonight, as usual we will share this time…" She pauses and a smile spreads across her face. Hesitating, she looks down and takes on a serious expression. Raising her eyes back to the camera, she takes a breath and opens her mouth to deliver her line, and stops, yet again, "Just a minute. Where does the shot cut?" Off screen, we hear a man's voice and the frame bounces slightly as the two begin to discuss the boundaries of the shot. Finally, she straightens and begins to address the camera just as a siren sounds in the distance. She instructs the cameraman to wait and there is an abrupt cut to the same medium shot in the firehouse from a slightly different angle. With a breath, Angela finally delivers her speech. No title card, no credits, no context: so begins Balaguero and Plaza's 2007 found footage horror film, *[REC]*.

[REC]'s (Balaguero & Plaza 2007) opening deliberately undermines the conventions of classical narrative filmmaking to create the illusion that we are witnessing a "found" digital object that documents a real event. This realist conceit is reinforced by Angela's mistakes, her direct address, the abrupt cuts, and dramatic zoom, which all draw attention to the camera. *[REC]* claims to be a found tape from a local late night news program hosted by Angela (Manuela Velasco), and shot by cameraman, Pablo (Pablo Rosso). While taping an episode featuring their local fire department, the two ride along on a medical emergency call to a nearby apartment where they become entangled in the outbreak of a violent, mysterious, and deadly disease. Shot on a single, handheld camera, the film asks viewers to approach the film as the sole remaining untouched record of that night. This

fictional conceit is achieved through the film's pronounced visual style, which mimics the aesthetics of amateur footage by continually drawing attention to the camera and act of recording, asking viewers to suspend disbelief and engage with the film as an archive of evidence: to search, sift, and seek out the outbreak.

[REC] exemplifies the well-established horror subgenre of found footage, which couples the generic expectations of horror—mainly the suspension of disbelief—with the film's visual style. The origins the found footage horror genre have been traced back to the 1980s through films like *Cannibal Holocaust* (Deodato 1980) and *Ginnea Pig* (Ogura 1985), with particular attention given to the breakout hit *The Blair Witch Project* (Myrick & Sanchez 1999). Since 2007, the found footage horror genre has reached critical mass through the success of films like *Cloverfield* (Reeves 2008) and the *Paranormal Activity* (Peli 2007) series, and has spiraled into countless films that have received wide releases or online streaming distribution. Though found footage aesthetics have been coupled with other horror subgenre narratives, including ghosts and monsters (*The Gallows* (Cluff & Lofing 2015)*, Cloverfield)*, demonic possession (*Paranormal Activity, The Last Exorcism* (Stamm 2010), and supernatural encounters (*Chronicle* (Trank 2010)*,* a large number focus on mysterious and deadly disease outbreaks. *[REC]* and its three subsequent sequels*,* the American remake, *Quarantine* (Dowdle 2008) and *Quarantine 2: Terminal* (Pogue 2011)*,* and *The Bay* (Levinson 2012), all use the found footage aesthetic to tell the story of an emergent outbreak. Moreover, films like *Cabin Fever* (Roth 2002)*, 28 Days Later* (Boyle 2002)*, 28 Weeks Later* (Fresnadillo 2007)*, Contagion* (Soderbergh 2011)*,* and *World War Z* (Forster 2013)*,* which stage themselves in the context of a viral and zombie outbreaks, draw upon found footage aesthetics and surveillance imagery, leaving us to ask: why do so many films turn to found footage aesthetics in an effort to represent an emerging outbreak?

This chapter explores the coupling of found footage horror and emergent infectious disease by examining the relationship between the genre's aesthetics, viewing experience, and its affects

through the lens of visual evidence. Found footage horror's visual style seeks to mimic the appearance of "raw," untouched footage by repeatedly foregrounding the camera and the production process. I contextualize this practice through the lens of scientific inscription and the "mechanical objectivity" paradigm to argue the aesthetics of found footage horror encourages viewers to engage with the images as forms of visual evidence: that is, to watch closely and scan the image in search of information. I develop the term "evidentiary effect" to describe how the aesthetics of the evidence invite an epistephilic impulse and investigatory gaze. This aesthetic activation prompts a mode of spectatorial engagement that leaves audiences vulnerable to shocks and scares: absorbed in the act of investigation, viewers fall prey to the horrifying tropes of the genre. This impression of evidence, I argue, prompts a form of viewing aligned with the methods of epidemiological investigation—the *evidentiary effect* suggest the image is capable of making visible, and therefore knowable, the unseen viral threat.

In the context of found footage horror, the *evidentiary effect* is used to encourage viewers to scan the edges of the frame, peer into the depths of the shot, disrupting the trained mode of seeing that might allow them to predict or anticipate the origin of a jump scare.[1] This mode of spectatorship fuels the genre's conceit that the "found" object might reveal some unknown truth or event. In the case of *[REC]* and *Quarantine*, the epistemological function of evidence works directly with project of visualizing and tracking the spread of a mysterious microscopic pathogen. These films locate horror in the disruption of these structures to reveal the epistemological limitations of visual evidence and the possibility of visual mastery in the face of an outbreak. As a result, *[REC]* and *Quarantine* force us to confront the paradigmatic structures of vision, evidence, and control that shape our perception and knowledge of emergent outbreaks.

[1] Cecelia Sayad discusses this mode of viewing through framing in *Paranormal Activity*. She argues the static frame forces a new relationship to the image, prompting the spectator to look toward the edges and deep into the image. Sayad, Cecilia. "Found-Footage Horror and the Frame's Undoing," *Cinema Journal* 55, no. 2 (Winter 2016): 43-66.

In an effort to theorize the aesthetic practices and narrative aspirations of the found footage genre, scholars have turned to historical perspectives on documentary to articulate the "reality effect" of these terrifying films. Cinema verité, direct cinema, and observational documentary have all served as correlates for found footage's aesthetic and the corresponding viewing experience, or what we might call it's reflexive aesthetic.[2] Most accounts directly align existing documentary traditions with the genre's visual style and viewing experience to claim we see found footage style *like* we do a verité film, or we become present to the found footage diegesis *like* we do in direct cinema.[3] This body of scholarship operates through existing assumptions taken directly from historical documentary traditions in an effort to make claims about the film's narrative project. Aesthetics become a way to talk about our investment in the fictional diegesis or our experience of the horrifying images on screen.

Rather that starting with a specific documentary tradition, I examine this analytical impulse by framing the genre's reflexive style through the lens of scientific inscription and evidence. Historical appropriations of reflexive techniques presuppose the camera of as a documentary instrument. By acknowledging the camera and the filmmaking process, they draw a distinction between the subjective human intervention of the filmmaker and the objective apparatus.[4] I situate this distinction in scholarship on scientific inscription and Lorraine Daston and Peter Galison's

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[2] Heller-Nicholas, Alexandra. *Found Footage Horror Films: Fear and the Appearance of Reality.* (Jefferson, North Carolina: McFarland & Company, Inc., Publishers, 2014); Raimondo, Matthew J. "Frenetic Aesthetics: Observational Horror and Spectatorship," *Horror Studies*, vol. 5, no. 1 (Apr. 2014): 65-84 ; Reyes, Aldana. "The *[REC]* films: affective possibilities and stylistic limitations of found footage horror," *Digital Horror: Haunted Technologies, Network Panic and the Found Footage Phenomenon* (London: I.B. Tauris, 2016); Reyes, Aldana. "Reel Evil: a critical reassessment of found footage horror," *Gothic Studies* vol. 17 no. 2 (November 2015): 122-136; Wetmore, Kevin J. *Post-9/11 Horror in American Cinema* (Continuum, 2012).

[3] This logic can be found in Raimondo and Kjetl Rødje's work on found footage horror. Rødje, Kjetil. "Intra-Diegetic Cameras as Cinematic Actor Assemblages in Found Footage Horror Cinema." *Film-Philosophy* 21, no. 2 (June 2017): 206-222; Raimondo, "Frenetic Aesthetics."

[4] This formation is articulated in Brian Winston's work on documentary and scientific inscription. Winston, Brian. "Documentary Film as Scientific Inscription" *Documentary Film: Critical Concepts in Media and Cultural Studies.* (New York: Routledge, 2012), 412.

mechanical objectivity paradigm, to argue that found footage horror films ask us to engage with them as forms of visual evidence. Through close analysis of *[REC]* and its American remake, *Quarantine*, I argue that the genre's aesthetic conceit depends upon the instrumental function of the camera within the mechanical objectivity paradigm, which encourages us to perceive the images as objective products of mechanical inscription.[5] This is not to say that found footage horror films ask us to believe in the *content* of the images—to see the images of terrifying monsters, ghosts and demons as real threats—rather, they underscore our vested belief in the camera as a device to mechanically record and document events. Using the visual rhetoric upheld by the epistemological paradigms of scientific inscription, found footage films call upon the *impression* of visual evidence.

Correlating documentary and found footage horror serves as a way to then bridge the gap between style and the film's realist, narrative conceit, but never does it consider the epistemological and aesthetic paradigms that underlie the relationship between visual style and realism. Epistephilia, for example, has been brought to bear on the genre as a way to navigate the relationship between a viewer's narrative investment and the reflexive aesthetics. Appropriating Bill Nichols' discussion of observational documentary, Matthew J. Raimondo argues that found footage horror produces a desire for knowledge that leaves viewers susceptible to shocks and scares. However for both Nichols and Raimondo, "knowledge" and its corresponding its sense of realism remain tied how a film produces interest in a film's characters, story, and subject.[6] Consequently in the context of a decidedly fictional genre, Raimondo finds himself in an analytical paradox, asking, "how could the act of watching a film that constantly reminds the viewers of its construction produce such a realistic response?"[7] Indeed, this question could be posed of reflexive aesthetics at large, but becomes

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[5] Daston, Lorraine, and Peter Galison."The Image of Objectivity," *Representations* 40, (1992): 81-128.

[6] Nichols, Bill, and Cathrine Needham and Bill Nichols Christian Hansen. *Representing Reality: Issues and Concepts in Documentary* (Bloomington: Indiana University Press, 1991); Raimondo, "Frenetic Aesthetics."

[7] Raimondo, "Frenetic Aesthetics."

increasingly pertinent in a genre saturated by otherworldly threats. But reflexivity and realism are only paradoxical if one is locating realism on the level of content; that is, if "realistic response" refers to the sense that the image's content is located in our apriori reality in spite of the decidedly fictional nature of the film.

At the heart of this paradox, however, lies not the problem of reconciling realist narratives and visual style, but a question about the aesthetic experience of evidence. By stepping back to consider the relationship between visual style and realism through the lens of scientific evidence and inscription, we can begin to answer Raimondo's question. I argue the reflexive aesthetics of the genre produce a reality effect by way of the mechanical objectivity paradigm, which encourages viewers to understand the images as objective products of mechanical inscription.[8] Contrary to the reality effect or epistephilia, the *evidentiary effect* helps describe a mode of engagement that does not traffic in the language of belief and narrative absorption; rather it confronts the relationship between the viewer and apparatus that influences how we engage with and understand audiovisual materials.

The *evidentiary effect* helps describe the codified relationships between visual style and viewing experience within a broader discourse of scientific evidence and epistemology. The *evidentiary effect* describes the aesthetic activation of an investigative gaze, situating it within the paradigmatic alignment of vision and knowledge, knowledge and control. The aesthetic logic of EID found footage horror films, like *[REC]* and *Quarantine* parallel the structures of scientific knowledge and epidemiology, where to see an unknown is to effectively render it both knowable and controllable. In other words, EID found footage horror films use the *evidentiary effect* to reinforce the logic of epidemiological discovery, which aligns vision with containment. However, in the context of horror,

[8] I appropriate "reality effect" from Roland Barthes' account of 19th century French literature, which though focuses on a particular aesthetic approach using description, describes the relationship between style and the perception of reality. Here I mean it in the most basic, intuitive sense: as an aesthetic effect produced by the film style. Barthes, Roland. "The Reality Effect," *The Rustle of Language* (New York: Hill & Wang, 1986).

these paradigmatic structures of vision and epidemiological management are often disrupted in favor of generic shocks and scares, which I argue creates a feeling of viral omnipresence.

The second half of this chapter turns to *The Bay* in an effort to explore this relationship though the evidentiary effects—plural—of the film, and contextualize the film's project of "making evident" an outbreak within a shifting digital evidentiary paradigm. *The Bay* assembles a vast archive of "digital evidence" in an effort to uncover a deadly parasitic outbreak. Through an analysis of the film's layered, multimedia construction, I will explore the relationship between the suggestive aesthetics of visual evidence and the anxious affect of outbreak omnipresence. *[REC], Quarantine*, and *The Bay* will demonstrate how found footage horror targets the representational strategies we use to understand and control deadly outbreaks to create a sense of anxious omnipresence. In doing so, they call into question the epistemological paradigms that uphold and structure our perception of knowledge.

While previous chapters focused on particular instruments of representation, this chapter steps back and explores the found footage horror aesthetic to ask broader questions about the relationship between form, knowledge, and affect that have run throughout this dissertation. In exploring the aesthetics and epistemics behind the found footage horror experience, this chapter address the dissertation's central questions about the relationship between vision, knowledge, and control in the face of an emergent outbreak. These films bring us back to the critical relationship between images and epistemology that help us sense *and* make sense *of* the world. I turn to found footage horror in this final chapter as a way of collecting the major representational problems and anxieties that have surfaced throughout this dissertation, showing how the genre exploits them to produce its anxious affects. And indeed, like the map, microscopic image, audio visualization, or soundscape, found footage horror aesthetics speak broadly to the forms of knowledge production at the center of disease prevention and containment. Found footage horror questions the evidentiary value of visual

documentation through the experience of the cinematic medium to show the instrumental power of media in understanding our complex networked condition.

From Document to Evidence

Before attending to found footage horror's relationship to EIDs, I want to contend with the genre's aesthetic and realist project with respect to documentary cinema. The genre's realist narrative conceit and the pronounced visual style has made found footage one of the most recognizable subgenres of horror to date.[9] Almost all scholarship turns toward documentary film in an effort to explain the experiential and aesthetic aspirations, while contextualizing it within wider social and cultural conditions. Drawing from a range of documentary styles, including observational documentary, cinema verité, and direct cinema, these accounts focus on aligning historical and aesthetic traditions with the experiential and narrative conditions of the found footage horror film. Alexandra Heller-Nichols' book-long account of the genre's history and influences draws upon mockumentary, reality television, educational documentary, among other resources, in attempt to grapple with the complexity of the genre's aesthetics and affects.[10] Indeed, many scholars have used this comparative approach to recast the problematic name "found footage," offering up new terms including "observational horror," "verité horror," or "mock-documentary horror."[11] Consistent across these accounts is a methodological approach that presupposes the realist aesthetics of the comparative documentary form. The discussion of realism thus emerges from existing claims to reality made in nonfiction film, as opposed to locating the realism in the found footage horror films themselves. I turn to this body of scholarship not to continue the documentary debate, but to try

[9] Heller-Nichols, *Found Footage Horror Films.*

[10] Heller-Nichols, *Found Footage Horror Films.*

[11] Grant, Barry Keith. "Digital anxiety and the new verité horror and sf film," *Science Fiction Film And Television* no. 2 (2013): 153; Heller-Nicholas, *Found Footage Horror Films*; Raimondo, "Frenetic Aesthetics."

and parse the aesthetic and experiential questions that underlie this comparative approach. Rather than ascribing found footage aesthetics to historical documentary traditions, I turn toward visual evidence and the scientific paradigms of vision, instrument, and knowledge in an effort to understand the relationship between the genre's visual style and viewing experience.

Found footage horror has become renowned for its polarizing use of reflexive amateur aesthetics. The chaotic cinematography has helped cultivate a reputation colored by tales of headaches, walkouts, and perhaps most famously, viewers vomiting in the aisles of theater.[12] Though we might ascribe these deeply embodied, physical responses to found footage to a kinesthetic alignment with characters who run for their lives on screen, this narrative interpretation fails to account for how they ask us to reflect on our relationship to the camera. After all, our nausea is a product of a gap between the image and perception: a gap between how fast the camera moves and our ability to comprehend what is going on.[13] We quite literally feel the constraints, affordances, and affect of the apparatus. In that feeling, we also confront our assumptions about the camera itself: as an instrument of human vision, extending, enhancing, and working *for* the eye. While most scholars and critics agree that "found" refers to a film's *narrative* premise, the physical reactions and indeed the conceit itself, cannot be separated from the reflexive aesthetics of the genre.[14] The viewer's headaches are not a product of embodied absorption into the diegesis—a belief that they

[12] *The Blair Witch Project* was reported to have generated countless physical reactions and complaints by audiences. Many theaters screening *Cloverfield* posted warnings signs stating that audiences would not be able to receive due to motion sickness. Elsworth, Catherine. "Cinemagoers Sickened by *Cloverfield*," *Telegraph,* 24 January 2008, http://www.telegraph.co.uk/culture/film/3670695/Cinemagoers-sickened-by-Cloverfield.html; Wax, Emily. "The Dizzy Spell of 'The Bair Witch Project," *The Washington Post,* 30, July 1999, http://www.washingtonpost.com/wp-srv/style/movies/features/witchdizzy.htm

[13] Smith, Michael W. "What's Behind the *Cloverfield* Illness?" *WebMD*. 24 January 2008, http://www.webmd.com/brain/news/20080122/whats-behind-cloverfield-illness#1

[14] Lifted from the avant-garde, the modern found footage horror film is a far cry from the works of artists like Bruce Conner and Joseph Cornell. Though avant-garde found footage traditionally refers to the artist's practice—the recycling or manipulation of footage shot by someone else— the horror's reappropriation of the term foregrounds the material premise of the genre. Heller-Nichols, *Found Footage Horror Films,* 16.

are located in the haunted house or forbidden forest—but rather a confrontation with the medium itself.

Verité and direct cinema offer scholars a way to reconcile the reflexive aesthetics of found footage and the realist conceit of the genre. The apparatus poses a problem for the necessary conditions of horror spectatorship in which audiences must, to some degree, be able to submit themselves to the fictional world of the film, suspend disbelief, and play along in order to participate in the genre's affective project.[15] Though this suspension of disbelief can be applied across genres, horror's cultivation of fear and anxiety expressly relies on this relationship between viewer and narrative. At the same time found footage horror films insist on foregrounding the mediating role of the camera or the recording device, thus insisting upon a spectatorial separation between the audience and the image. Scholars have turned to verité and direct cinema in an effort to explain the relationship between a feeling of realism and an aesthetics that seeks to lay bare the apparatus of production. *[REC]'s* opening, for example, demonstrates how found footage horror often uses formal strategies, like jump cuts and direct address, to draw our attention to the apparatus and production process. From this perspective, we might indeed align *[REC]*'s realism with cinema verité, which foregrounds the relationship between the filmmaker and subject.[16] Or we might turn toward direct cinema or observational documentary to claim that the shaky cinematography creates the sense that we're "present" to the action.[17] In both of these accounts, the perception of the real relies on a viewer who is familiar with the aesthetic codes of the respective documentary

[15] Raimondo and Rødje discuss this contradiction between the horror genre and the aesthetics of documentary, ultimately relying on the rhetoric of "presence" to navigate the paradox. Raimondo, "Frenetic Aesthetics;" Rødje, "Intra-Diegetic Cameras."

[16] Grant uses cinema verité to argue that found footage aesthetics are a response to anxieties about the image in the age of the digital. Grant, "Digital Anxiety."

[17] Raimondo uses Bill Nichols' theory of observational documentary to claim that found footage horror immerses the viewer in the action and creates the perception they are present to the action. Raimondo, "Frenetic Aesthetics."

movements: a prior knowledge and experience of direct and verité modes of documentary. Found footage horror's comparison to verité and direct cinema risks overlooking the specific qualities and representational projects of the respective movements—we cannot simply lump the handheld camera work of direct cinema, and the direct address of verité into the same category. However considering the relationship between the reflexive strategies and the apparatus reveals a critical continuity: a persistent belief in the instrumental role of the camera. Reflexivity presupposes a truth-value not in the representation of events, but in the act of telling, the act of inscription, and the capacity of the camera to record events in space in time. That is, reflexivity connotes the real insofar as it addresses the act of mediation, and the reality of how we capture and tell stories.[18]

Reflexivity, in both its documentary form and fictional appropriation in found footage horror presupposes an understanding of the camera as mechanical device that can record and reveal the world around us. On the level of narrative, films will frequently reference the camera as an objective recording device. Like Angela's call to "record everything" as the outbreak begins in *[REC]*, characters in found footage films continually reinforce the importance of recording the events in an effort to prove their existence. Though we might walk away from a film knowing that the ghosts, zombies, and monsters are not *real,* we still believe in the capacity of the camera to document, to *reveal*. Whether or not we believe in what we see is not the point. In fact, in asking this question we already encounter the assumptions associated with the camera. To believe in an image is to believe in the camera's capacity to record and reveal truth or knowledge. Thus the epistemological or evidentiary value of an image hinges on the instrumental function of the camera and its capacity to objectively capture, record, and reveal.[19]

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[18] Nichols, *Representing Reality*.

[19] While I reserve my argument for the found footage horror genre, in particular, it worth exploring the persistence of the evidentiary effect outside of horror. In particular, the way reflexivity segments, featured in fiction films, television, and video games might also produce the *evidentiary effect*.

Reflexivity thus foregrounds an instrumental understanding of the camera, placing its rhetorical project in line with paradigmatic structures of knowledge in science. If conventional fiction films are signified by the seamless progression of narrative, the reflexive mode draws attention to the camera to pose itself against the manipulations of directorial intervention. The burden of truth is placed on the apparatus, which comes to signify the evidentiary value of the image. Found footage horror scholars have turned to cinema verité, in which directors sought to reveal the process of production as a realist gesture. Their strategy suggests that manipulation and subjectivity are the product of *human* intervention; that the director and subjects complicate the truth-value of an image. Indeed, *[REC]*'s opening acknowledges the labor of production and the relationship between the subject and the apparatus; the footage appears real because it still contains the imperfections and extraneous materials that have yet to be cut by a human hand. Like the display of protocol in a scientific lab, reality is signified by foregrounding the process and instruments of production.[20]

Found footage horror films frequently foreground instrumentality by disrupting access to coherent images and information. Chaotic cinematography, radical framing, and technological failures, or glitches prohibit seamless access to the diegesis, prompting frustrations and viewing habits that highlight our dependence on the apparatus as a instrumental device to extend the capacity of the human eye. Cameras and other recording devices, for example, will often become damaged, which might effect the image at a critical point of the dramatic action. *[REC]* uses a technological glitch in the middle of a violent attack by a young, infected girl, where in a frenzy of flailing bodies, an arm hits the side of the camera and causes the audio to cut out. As the camera waves back and forth, we can only hear the muffled screams of the characters that try to pry the girl off the grown man's neck. Like this sequence, the glitch is often employed to create suspense and

[20] Brian Winston makes a similar comparison in his discussion of the cinema of Jean Rouche. Winson, Brian. *Claiming the real the Griersonian documentary and its legitimations* (London British Film Institute Publishing 1995).

strike fear in the audience. The camera might blink out as the characters explore a new space, only to flash back on to reveal the monster or another threat.[21] Or "damaged" footage might offer a fragmented picture and unsettling sounds that allude to dangers hidden underneath the pixilated visual noise. While these tactics can be aligned with the paradigmatic jump scare and the mysterious, dark corners of a horror film's mise-en-scene, found footage horror films use the recording device itself to justify the production of anxious anticipation and alarming shocks.[22] These aesthetic tropes situate, in part, the fear of the audience in the apparatus to fulfill the desire for visual knowledge. The technological failures remind us of our dependence on the camera to reveal the world of the film, and our own desire to have complete and continuous access to diegetic space. That is, the camera is understood as an instrument of human vision, one that grants access or reveals, but just as easily restricts or inhibits.

The relationship between the camera as instrument and the desire for visual access operates within the mechanical objectivity paradigm. In their rigorous historical account of the atlas, Loraine Daston and Peter Galison locate the modern standard of objectivity in a broader series of paradigm shifts. Following the advent of photography and other mechanical means of inscription, the modern paradigm aligns objectivity and instrument, which appears to visibly free the evidence from the intervention of the human hand. The "neutral" instrument is posed against the human to fulfill the desire for a detached, distant perspective on the world.[23] Paradoxically, within this formation, mechanical mediation signifies the freedom of evidence from intervention, much like we see in the

[21] *[REC]* employs this strategy at a moment when Pablo struggles to turn on the camera light as he enters a dark space. Once he finally manages to flip the switch, the image suddenly reveals a bloody figure that launches at the camera. Quarantine uses a blinking light during a particularly violent attack scene in an elevator. The scene begins in darkness as Angela, Scott and Joke inspect the hallway. As the camera's light blinks on and off, we only catch bloody glimpses of a rabid woman as she launches her body at the trapped individuals.

[22] Sayad has a similar discussion of the *Paranormal Activity* films' use of the static shot. Sayad, "Found Footage Horror and the Frame's Undoing."

[23] Daston and Galison, "The Image of Objectivity," 81.

reflexive mode of filmmaking. To borrow from this logic we might say, in foregrounding the camera and the act of recording, the film affirms the objectivity of the visual inscription. The "raw," or "real" data of the footage is signified by the presence of the camera and the perception of the apparatus as an objective instrument.[24]

The mechanical objectivity paradigm helps explain the relationship between found footage horror's reflexive style and the realist conceit of the film. But in film, reflexivity cannot simply equal objectivity: we must also account for the audience's perception of the image with respect to its evidentiary value. While the camera might objectively capture anything placed before it, the viewer does not necessarily believe in the reality or truth of the content of those images. Instead, it is a matter of *how* they are presented, or how the film sustains the perception of reality through visual style, or what we might call visual rhetoric.[25] Accounts of direct cinema and verité discuss this in terms how the style shapes the viewing experience to draw correlations between the aesthetics and reality effect. Operating within the mechanical objectivity paradigm, direct cinema's shaky handheld cinematography continually reminds the viewer of the apparatus and creates the impression that the subjective intervention of the filmmaker has been suppressed in favor of "direct" access to the events.[26]

This experience has often been discussed in terms of the perception of presence in direct cinema, and by extension its appropriation in found footage horror scholarship. In his discussion of documentary and scientific inscription, Brian Winston argues the roving handheld cinematography

[24] This logic aligns with what Bruno Latour calls the "paradox of realism" in the science, wherein reality is signified by manipulation, or the movement through a referential chain that in turn produces the perception of "pure knowledge." Latour, Bruno."The More Manipulations the Better," *Representations in Science Revisited* (Cambridge, MA: MIT Press, 2015), 349.

[25] I invoke rhetoric here as part of the dissertation's broader project to illustrate the ways science help communicate ideas, truths, or evidence. Rhetoric here describes the way visual style helps produce the perception of visual evidence.

of direct cinema mimics the "flexibility of the human senses."[27] Nichols' discussion of observational documentary echoes Winston by aligning the apparatus and human sense perception, which Raimondo appropriates in his analysis of found footage horror: "handheld cinematography…situates the viewer's subjective vision; the camera moves in ways that are reminiscent of how one observes environments."[28] These accounts express a prosthetic understanding of the instrumental camera. For Winston, Nichols, and Raimondo, the camera is an instrument used to extend the senses, granting access to new and unseen events. This formation returns to Raimondo's paradox: prosthetic presupposes a sense of *unmediated* access that the reflexive aesthetic would seem to contradict. However within the mechanical objectivity paradigm, the instrument occupies this same paradoxical position. Science uses instruments to extend the human sense capacity—to see the microscopic world, to hear the rhythms of the heart. While the objectivity of these inscriptions is associated with particular instruments, we apprehend them as autonomous evidentiary images or objects. Daston and Galison argue that within the mechanical objectivity paradigm, the instrument must be simultaneously present and absent. Present insofar as it guarantees the objectivity of the inscription, and absent in that the subsequent inscription appears to grant unmediated, direct access.[29] This present-absent instrument helps us understand the paradoxical relationship between cinematic reflexivity and realism: by foregrounding the camera it affirms the evidentiary value of the image as an objective extension of human vision.

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[26] Daston and Galison discuss the role of instruments through the language of "access," wherein mechanical instruments function as passive tools to that which lies outside the boundaries of the human sense capacity. The language of "access" can also be compared to the notion of the prosthetic, or the function of a tool to extend the human senses.

[27] Winston, *Claiming the Real,* 412; also see Barsam on American Direct cinema, where the effect is discussed in terms of a "feeling of being there." Barsam, Richard M. "American Direct Cinema: The re-presentation of reality," (1986).

[28] Raimondo, "Frenetic Aesthetics," 70.

[29] Daston & Galison, "The Image of Objectivity."

The prosthetic quality of the camera is often dramatized in found footage horror films, which use of the camera to supplement or substitute for the limitations of human vision.[30] The most familiar example is perhaps the use of the camera's night vision to see in the dark.[31] The camera is often employed as an instrument in the diegesis, but found footage horror films also reserve the prosthetic camera strictly for the spectator, offering information or scene that will never be viewed by characters in the film. In the final moments of *[REC]*, Angela and Pablo find themselves trapped in the pitch-black attic space of the apartment building. When they enter the room, they use the camera's light to explore the creepy apartment of a mysterious tenant who has been conspicuously absent throughout the film. While most of the scene aligns the camera with Pablo's gaze as he searches for an exit—a diegetic visual prosthesis—the scene's climax and horrifying affect depends upon a moment of disembodied technological recording. After locating a hatch in the ceiling, Pablo uses the camera to explore the mysterious space above. The camera is thrust into the opening and spun a full 360-degrees to offer an image only available to the audience: no character will ever see the contents of the attic space. Pablo rotates the camera to give the sense of a comprehensive and continuous view of the space that can be used to verify its safety. However for audiences, the instrumental use of the camera is used to anxiety inducing effects. The camera's bright light renders space shallow and relatively incoherent. Only the wooden beams closest to the center illuminated, while the depths of the space remains cast in black shadow [Fig. 4.1]. Our eyes peer deep into the space and scan the edges of the frame, as we squirm curious and afraid of what the camera might reveal. Our anticipation is rewarded as a ghostly, hallow-eyed face and skeletal hand emerges from the middle of the frame, grabs at the camera, and the image goes black. Unlike the use of night

[30] The climax to the recent *Blair Witch* (Wingard 2016), for instance, pivots on a character's use of the camera to avoid the deadly "medusa-effect" of the monster.

[31] This trope is used extensively in found footage horror films including *[REC], Quarantine,* and *The Gallows*.

vision, this moment foregrounds the fact of mechanical recording that precedes the relationship between the apparatus and human vision. While Pablo feels the impact on the camera and quickly pulls it back into the space of the apartment, he cannot see the source. Importantly, the footage never cuts to indicate that the characters have rewound the tape and discovered the threat. Without the prosthetic view of the attic space afforded by the camera, the characters are left unaware of the dangers lurking just above.

Fig 4.1: *[REC]'s* 360-degree pan: harsh lighting and shallow field of vision. (Balageuro & Plaza 2007)

For many scholars, found footage horror film's direct address implicates the audience in the diegesis and encourages a participatory mode of viewing. Indeed, Raimondo and Wilson both slip between the prosthetic and participatory in their readings of found footage films and documentary. They focus on how the instrumental extension of the human senses helps extend the boundaries of film spectatorship.[32] However this model requires a certain degree of identification with a character

[32] This is also echoed by Sayad's analysis of *Paranormal Activity* and the film's attempt to break down the division between film and reality, as well as Rødje's analysis of intra-diegetic cameras and found footage horror. This notion of being "present" to the action in found footage is linked to discussions of handheld cinematography and documentary, where the use of shaky camera movements articulte the embodied relationship between the filmmaker and the action on screen. Much of Direct Cinema is discussed in terms of being "present" to the action, but more recently, Michel Albright has argued that handheld cinematography in autobiographical documentary helps produce the sense that

(most often the camera operator) and ultimately contradicts the objective distance afforded by the mechanical device of inscription.[33] All of this is to say is that perhaps we cannot simply turn to documentary methods and aesthetics to contend with the found footage horror experience. While Nichols and Winston's account of documentary practice help gesture toward a set of questions with respect to the relationship between aesthetics, reality, and evidence, found footage horror scholarship's appropriation of this theory often takes the effects of historical documentary traditions as a given instead of exploring the underlying assumptions and paradigms that facilitate that drive those representational projects. *[REC]'s* pan destabilizes a coherent sense of identification in favor of a display of the instrumental function of the apparatus. Reading this shot and found footage horror's use of reflexivity through the lens of the mechanical objectivity paradigm helps us understand these moments of instrumental prosthesis that push back on identification. While the camera might "extend" our vision as spectators, that extension can no longer be aligned with any figure located in the diegesis. In these moments, the viewer is located not along side the operator or identifying with them, but in a separate, privileged act of witnessing; this is moment of pure instrumental access.

As the products of mechanical inscription, found footage horror films ask us to engage with them as visual evidence. The mechanical objectivity paradigm helps us understand the relationship between reality and reflexivity, but it also helps frame a mode of spectatorship. Nichols uses the term "epistephilia" to broadly describe the audience's desire to learn and discover from the

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viewers are aligned with the filmmaker. Albright, Michael. "The Visible Camera: Hand-Held Camera Movement and Cinematographic Embodiment in Autobiographical Documentary." Spectator 31, no. 1 (Spring 2011): 34-40; Sayad, "Found Footage Horror and the Frame's Undoing;" Rødje, "Intra-Diegetic Cameras."

[33] While I resist immersive interpretations of found footage horror films, recent VR horror games, I would argue, are capable of making players present to the action. *Resident Evil 7: Biohazard* (Capcom 2017) features a found footage segment where players enter the historical space of a found tape, occupying the position of the camera within the diegesis. The VR features afford players the ability to be the agent of the camera, allowing them to search and navigate the found footage space.

documentary viewing experience. His use of term remains primarily generic, claiming within the established tradition of documentary, which use persuasive rhetoric, or a "moving poetics of knowledge and information," audiences have come to expect the "gratification of awareness and insight."[34] Epistephilia is related to entrenched rhetorical traditions that create and fuel the desire for knowledge and its fulfillment. Rather than confining this experience to documentary, we might consider epistephilia's relationship to the aesthetics and rhetoric of scientific inscription in relationship to found footage horror's reflexive aesthetics. The promise of knowledge is, after all, premised on the evidentiary value of the image. Viewers attain that knowledge by following the logic and evidence upheld by the mechanical objectivity paradigm. Therefore we might align epistephilia not with the promises offered by nonfiction film traditions, but the way in which those traditions engage with deep-seeded epistemological paradigms. By turning toward scientific inscription, I locate epistephilia in codified systems of knowledge production as opposed to an established artistic tradition.

Although epistephilia has been extended to found footage horror, Raimondo's appropriation of the term carries Nichols' generic and narrative investment.[35] Epistephilia, for Raimondo is located in the way the genre mimics verité aesthetics and therefore produces the corresponding documentary expectations. I locate such an effect in a more fundamental property of these films: the mechanical objectivity of scientific inscription. In an effort to move away from generic connotations, I propose the term *evidentiary effect* to describe the acute encounter with the aesthetics of visual evidence. For Nichols, epistephilia is driven by a desire for narrative fulfillment, figuring knowledge as cumulative:

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[34] Nichols, *Representing Reality,* 40.

[35] Raimondo, "Frenetic Aesthetics," 66. Moreover, he links epistephilia to participation that overlooks the subject-object divide. For Nichols, the documentary spectator occupies a socially subjective position that maintains a sense of distance from the film object. While documentary films cue the real material world in which the spectator occupies, the film remains at a distance. This distance upholds the Cartesian standards of knowledge at a distance, which in turn allows the spectator to maintain a privileged, observational perspective. Nichols, *Representing Reality,* 179.

as something attained if we fallow along, watch closely and pay attention to the film's content.[36] I pose *evidentiary effect* to consider how that epistephilic drive can be activated in our initial encounter with the aesthetics of fictional visual evidence: the way cinematic style—camera movement, framing, filters— prompts an investigative mode of attention and engagement with a moving image. In her account of the categories of fiction and nonfiction film, Vivian Sobchack suggests that our perception of these respective categories is not bound by the status of the text—whether it self-identifies as documentary or fiction—but in the phenomenological experience of photographic moving images. Our perception of the documentary and fiction is based on how a film "points to" or cues our experience with the material world.[37] Found footage horror films cue us to this world through the aesthetics of visual evidence to activate a pragmatic response: one that assumes the evidentiary nature of the material can be examined in service of knowledge production. Using Sobchack's language, we might say the image has an evidentiary "charge" that "calls forth a response" based on its continuity with outstanding epistemological paradigms.

Evidentiary effect describes an aesthetic activation, a call to our "pragmatic and phenomenological perspective" of visual evidence.[38] From this perspective, we can understand how films firmly situated within the bounds of fiction encourage viewing practices more commonly associated with documentary.[39] According to Nichols, the documentary film viewer walks into a theater with the

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[36] Nichols' epistephilia is fueled by a film's promise that "we too can occupy the position of the One-Who-Knows." It figures knowledge as "an exterior object, a target for cathexis or concern." Nichols, *Representing Reality,* 179.

[37] Sobchack, Vivian Carol. *Carnal Thoughts : Embodiment and Moving Image Culture* (Berkeley: University of California Press, 2004), 273.

[38] Sobchack, *Carnal Thoughts,* 268.

[39] A focus on visual evidence also helps account for the illogical appropriations of the self-reflexive aesthetic. For example, films will frequently mimic the appearance of rewinding a tape. Frequently, however, this is prompted by a character in the diegesis who asks to rewatch the action captured by the camera. These moments break the integrity of the found footage conceit, by giving us access to what the *characters* watch as opposed to the camera. *[REC]* employs the rewind following the first attack. Angela, shaken by the murder of an infected old woman, asks Pablo "Did you get it?" He responds, "I got everything." Distraught, she demands to see the footage and the film begins to rewind. Bars of static run across the screen and we see the scene replay backwards in fast motion. The film returns to the old woman,

expectation for knowledge, prompting the epistephilic impulse; but horror audiences do not expect knowledge, they often expect to be scared.[40] The *evidentiary effect* helps describe a mode of engagement that is not determined by narrative or generic expectations, but prompted by the very aesthetics of the image. Found footage horror offers an extreme example of this in the way it invokes the reflexive logic of the mechanical objectivity paradigm. *[REC]'s* sonic glitch and *Quarantine's* shaky cinematography participate the aesthetic paradigms of visual evidence to cue us to examine the images carefully, to scrutinize them as evidence that may be mobilized in knowledge production. Indeed, found footage horror neatly aligns the effective project of evidence with the affect of the horror genre. If "fear in horror is derived from the *suggestion* of something horrific,"[41] we might also say that the aesthetics of visual evidence *suggest* the acquisition of information. Found footage employs the suggestive aesthetics of evidence to achieve the fearful affects of the horror genre.

Looking for Outbreak

The *evidentiary effect* is often felt by disrupting the most basic conventions of framing that shape our perception of the diegesis and the role of the camera. The narrative conceit of the genre

covered in blood, slowly shifting toward the fireman and police posed at the edges of the frame. As she lunges forward they fire shots and she falls to the ground. The film suddenly begins to fast forward, bringing us back to the present through an abrupt cut and leap forward in time. While the temporal ellipses between the rewind/fast-forward sequence seeks to maintain the temporal integrity of the film, this sequence disrupts the found logic of the film. If we discuss this scene in terms of identification, we might say that we align with Angela's perspective at that moment. However this undermines the narrative conceit of the film and its integrity as a found document. While this scene is admittedly a dramatic stylistic and temporal rupture from the rest of the film, we can hardly say it jettisons us from the viewing experience. Framing this moment through the lens of visual evidence, this moment exemplifies the investigatory affordances of documented footage: visual evidence can be rewound, replayed, and reexamined. It is also worth noting that *Quarantine* remedies this logical fallacy by omitting the recorded sequence in favor of a temporal ellipsis.

[40] For Robin Wood this suspension occurs through the viewer's empathy with characters. This formation is likely what fuels identificatory readings of the found footage horror genre like those found in Rødje; Sayad; Silver, Alain, and James Ursini. *The Horror Film Reader* (New York: Limelight Editions, 2000), 117

[41] Raimondo, "Frenetic Aesthetics," 66.

proposes a continuous and concrete world through which the camera moves. Swish pans, abrupt reframing, extended tracking shots, and dramatic zooms all help create the perception that the camera exploring and encountering a coherent world. In this sense, found footage horror films exacerbate Andre Bazin's "centrifugal" frame. Posed against the enclosed, centripetal frame of painting, photography and cinema emphasize the image's continuity with the surrounding world.[42] However this is not the fulfillment of Bazin's "total cinema," or a perfect re-presentation of unmediated reality.[43] Rather, found footage horror films make abundantly clear the role of the frame in determining our perception and experience of moving images. The erratic cinematography disorients the viewer and disrupts the perception of continuous space, leaving them to scan the image in search of points of reference and spatial coherence. While dramatic camera movements might draw attention to the mediating technology, the static frame can achieve a similar effect: "when an image lingers it eventually calls attention to itself, to its composition, to the *hold* it exerts over its content, to the frame surrounding it."[44] These are often moments when the narrative contents are at odds with the form, which prompt attention to the constrained, mediated position of the spectator. Take, for example, two corresponding scenes in *[REC]* and *Quarantine* which employ distinct stylistic disruptions to similar effects. After a series of mysterious, violent attacks, health officials enter the apartment building to collect samples from the infected residents and the camera crew is asked to stop filming. In *Quarantine*, the American remake of *[REC]*, the cameraman, Scott (Steve Harris), pretends to turn off the camera but continues to shoot as he holds the camera at his side. The out of focus close up slowly moves through the lobby space as suited bodies slip in and

[42] Bazin, André. "Painting and Cinema," *What is cinema?* (Berkeley : University of California Press, c2005):164; For an extended discussion of framing and found footage horror, see Sayad, "Found Footage Horror and the Frame's Undoing."

[43] Bazin, "Myth of Total Cinema," *What is cinema?* (Berkeley : University of California Press, c2005), 17.

[44] Nichols, *Representing Reality,* 60.

out of the frame, and the soundtrack is nearly overtaken by the rhythmic sounds of breathing masks [Fig. 4.2]. A shaky and blurry image of body fragments give way to suited silhouettes as the men walk away from the camera and enter the room across the lobby. The camera tilts up to the ceiling to reveal a glimpse at the silhouette of the figures against the wall of windows. Throughout this sequence, the camera movement and angle forces the viewer to constantly scan the frame for visual information. The shallow focus and lighting deny access to the background as the viewer squints in an effort to discern the mysterious figures and actions. In *[REC]* this same scene unfolds but the camera is placed on the ground showing an image that remains largely out of focus and contains no dramatic action, which forces the audience to *listen* for information [Fig. 4.3]. At the same time, the long, static take encourages the viewer to look deep into the image and along the edges of the frame. In the upper left hand corner we can discern a collection of feet that presumably belong the audible off screen voices.[45] The right hand side of the frame is dominated by the out of focus staircase and our eyes naturally travel to the top of screen, waiting and watching for someone to descend.

Fig. 4.2: *Quarantine's* moving camera. (Dowdle 2008)

[45] Sayad's analysis of the static frame of *Paranormal Activity* offers a similar account of the ways the located camera prompts alternative modes of spectatorial engagement.

Fig. 4.3: *[REC]'s* camera placed on the ground. (Balaguero & Plaza 2007)

Both of the scenes use the frame to draw attention to the mediated position of the spectator. In failing to grant access to coherent visual information, *Quarantine* and *[REC]* frustrate the viewer with restricted, technologically determined views of the action. Without bodies or a composed sense of space to direct vision, the eye moves to the edges of the frame in an attempt to connect the fragmented perspective to a coherent whole.[46] Viewers are incredibly aware of the camera's role in determining the perspective, quality of the image, and subsequently their perception of space and narrative action. The frustration experienced as we attempt to investigate the image in search of information is directed at the limitations of the apparatus, and the impossibility of gaining visual access to the events. But that frustration also extends to the assumptions associated with visual evidence. Coded as evidence, *[REC]* and *Quarantine*, suggest their images *contain* viable information or traces of the visual threats, prompting viewers to scan the frame in an effort to gain information and knowledge, only to encounter the technological restrictions of the limited viewing position.

These frustrations are related to the paradigmatic relationship between vision and knowledge, and by extension, knowledge and control. The evidentiary value of an image hinges upon the assumption of a causal relationship between seeing and knowing: that visually apprehending something will produce information and insight. These structures have upheld scientific inquiry and discovery for centuries and places inscription as a critical centerpiece for the production of scientific knowledge. Indeed epidemiology operates through this very logic. Scientists seek to visualize a pathogen in an effort to gain information, study, and hopefully control it. Visualization takes many forms, including microscopic imaging, mapping, and statistically driven graphic representation.[47] Each *contain* additional information, ranging from biological structure, to rates of spread, or infection density, that can be read, deciphered and understood. Controlling an infection or outbreak begins by apprehending, seeing and therefore knowing, forms of visual evidence. Viruses are terrifying because they cannot be seen by the naked human eye; we often cannot tell a healthy individual from sick, or how it travels, we often only know once its too late. Epidemiologists rely on methods of visualization in an effort to stay ahead of the spread: to predict, anticipate, and prevent where it might strike next.

Outbreaks, particularly those that spread by way of globalized networks like EIDs, challenge these very structures of scientific knowledge and control. There is a sense that no matter the quantity or quality of visible evidence, scientists may never know the virus. Found footage horror films like *[REC]* and *Quarantine* exploit this anxiety by continually suggesting the acquisition of knowledge only to withhold or deny information through cinematography, framing, and generic shocks and scares. These films locate anxiety in the act of looking: the first step in tracking, and

[46] Sayad discusses found footage framing and scanning in to argue for a breakdown between the barriers of the cinematic diegesis and reality. Sayad, "Found Footage Horror and the Frame's Undoing," 51.

[47] The foundation of the field of epidemiology is built on the diagrammatic attempt to visualize outbreaks, the earliest case being the disease map. Koch, Tom. *Disease Maps* (Chicago, IL: University of Chicago Press, 2011).

understanding outbreaks. If the aesthetics of evidence suggest knowledge production—a prosthetic and privileged view of a virus, for example—, EID found footage films disrupt a sense of causality between vision and revelation in favor of a suspended feeling of anxiety and outbreak omnipresence. Take, for example, a scene from *Quarantine* immediately following a violent attack in an elevator. Upon arriving at a new, seemingly deserted floor, the camera's light begins to flash on and off as an infected woman launches herself into the cramped elevator car. The flashing camera light illuminates fragments of the body parts and bloody limbs flailing in a series of jerky swish pans. Angela, Scott, and Jake (Jay Hernandez) manage to escape the shaft and run for the stairs. Off screen Angela screams and Scott pans the camera to a shot of her fighting off the infected attacker. She falls to the ground and Scott drops the camera in an effort to help. While the footage continues to roll, the audience is left to watch the remainder of the scene play out from the camera's position on the floor [Fig 4.4]. The foreground of the shot is dominated by an iron railing that remains in focus, while the bulk of the dramatic action unfolds out of focus in the background. The camera's bright light shines on the center of the frame while the edges remain cast in shadow. The restricted perspective shows the feet of Jake (Jay Hernandez) and Scott as they manage to grab hold of the thrashing infected woman. In the distance amidst the shuffling feet, Angela crouches on the floor screaming, holding her chest. We hear a crack and the woman's legs fall limp, implying that Jake has successfully tamed the threat. The body drops to the ground, and the bare legs of the corpse lay stagnant in the middle ground of the image. Angela begins to shriek that she's been bitten; Scott hastily replies with force, "No! No you haven't! I saw it."

Fig. 4.4: The camera is placed on the ground and the viewer is left to discern the action. *Quarantine* (Dowdle 2007)

To this viewers are left questioning what they just saw. In the chaos of flashing lights and swish pans, it was almost impossible to know for certain whether she's been bitten, let alone track and locate the movements of the infected attacker. Angela continues to scream, convinced she's infected as Scott tried to console her and Jake's bright yellow coat obscures left hand side of the frame and the deafening sound of a helicopter swells off screen to obscure the dialogue. While this shot could offer what we might consider a "breath" amidst the action, the static shot, framing, and obscured perspective leaves us deeply unsettled. The shallow focus and obscured point of view offer only fragments of the actions as they unfold. We have very little sense of space and no clear view of the characters; instead our attention is directed at the partial, out of focus, clues contained in the frame as we attempt to infer the events as they unfold off screen. In this shot we feel the restricted position of the camera and our impotent perspective as viewers. We must look and listen carefully, scanning the edges of the frame for answers, keenly aware of the physical restrictions of the apparatus.

While the visual restrictions of the shot code it as spontaneous documentary inscription, they simultaneously prompt a shift in attention and engagement. The shallow focus distracts the eye from the character-driven action unfolding in the background to shift attention to the boundaries of the frame where we might be able to see or anticipate another attack. While the characters remain deeply distracted, the viewer is left to inspect the image. The destabilized framing forces the viewer to make logical inferences in the image.[48] By this I mean the viewer must deduce actions and meaning based on fragmented details.[49] They scan the image in search of information—taking note of the stilled corpse in the fore, watching for movement in the dark corners of the image, tracking Jake's movements in and out of the frame—that might lead to a sense of coherence, or knowledge. Indeed for Charles Pierce, scientific reason begins through this type of engagement with the visual world: the collection of instinctual inferences might lead to perceptual judgment.[50] However *Quarantine's* limited view does not lead to reason or knowledge about the disease, but constantly reminds the viewer of their vulnerable, restricted perspective. Viewers are exceptionally aware of the unseen, the unknown, provoking a deep anxiety about the surrounding conditions and capacity for the camera to capture and reveal the lurking threat.[51]

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[48] We might also compare *Quarantine's* shot to the conditions for diagnostic and investigative engagement. Diagnosis is framed in the negative: as the collection of non-normative details that form the disease. It is the non-healthy state that creates the conditions for diagnostic reason, much like *Quarantine's* destabilized image. Eco, Umberto, and Sebeok. Thomas Albert. *The Sign of Three: Dupin, Holmes, Peirce* (Bloomington: Indiana University Press, 1983), 43.

[49] Abductive reasoning comes out of the work of Charles Piece and has been further discussed in the context of scientific reason through Eco and Sebeok, *The Sign of Three,* 18.

[50] Eco and Sebeok, *The Sign of Three,* 18.

[51] This shot operates within the formal tropes of the horror genre to *suggest* an off-screen threat, but it ultimately precipitates that threat in the physical and visual restrictions of the apparatus. Adam Hart goes as far to claim, "The horror film has become obsessively concerned with the limits of the frame, constantly calling attention to the space just surrounding the field of vision from which threats can, and do, suddenly materialize." This account of on and off screen space is indebted to David Bordwell's formal analytical approach to film scholarship wherein he claims the relationship between on and off screen space is the core of the viewer's understanding of the cinematic diegesis. Bordwell, David. *Narration in the Fiction Film* (Madison, Wis.: University of Wisconsin Press, 1985), 161; Hart, Adam Charles. 2014. "A Cinema of Wounded Bodies: Sensational Abjection and the Spaces of Modern Horror," (The University of Chicago), 111.

Restricted point of views and the invocation of off screen space are central to horror genre. Indeed, the notion of monstrosity, as opposed the monster, is often a product of withholding vision, which creates the sensation that the terrifying threat is located everywhere and anywhere at all times.[52] It is only once the camera can visualize—capture—the monster that the threat can be neutralized; but as long as the monster stays out of frame, there is a sense of an omnipresent threat.[53] The horror genre operates through the paradigmatic alignment of vision, knowledge, and control to create the sense that if the camera can make visible the monster, we can contain the threat.[54] Control is therefore posed against the unseen, much like the methods of outbreak management; however, seeing an outbreak is not the same as revealing a monster. After all, there is no singular image that can account for all of the conditions and factors at play in an emergent outbreak: no visualization can encompass the multiplicity of visual scales, social, economic, and political factors. While we might claim that the infected, zombie-like figures in *[REC]* or *Quarantine* function as the monsters, the films make it abundantly clear that the illness does not remain confined to a body or entity, but remains a persistent and omnipresent threat. Viruses often spread discretely, and while an infected body might express an iteration of an outbreak, containing that individual does not necessarily result in containing the pathogen which could spread through the air, fluids, or animal vectors. EID found footage films use the *evidentiary effect* to encourage viewing habits that result in this feeling of insecurity, or sense of viral omnipresence. The scene from *Quarantine* emphasizes the feeling that an attack could occur at any moment from any direction by

[52] This can also be compared to Michel Chion's discussion of the acousmêtre, wherein an off screen voice is imagined as a powerful, monstrous body. See the previous chapter for an extend discussion of the perceptual effects of on and off screen sound. Indeed the relationship between on and off screen space and anxiety is one of the central themes running throughout this dissertation. Chion, Michel. *Audio-vision: Sound On Screen* (New York: Columbia University Press, 1994).

[53] Hart, "A Cinema of Wounded Bodies," 111.

[54] Both films suggest that the virus has spread beyond the walls of the apartment building. Moreover both films resulted in sequels that verify their suggestive, ambiguous endings of viral contamination.

withholding the ability to apprehend or control the conditions of vision. As a result, the virus feels ever-present, lurking just beyond the edges of the frame and always just out of sight. The sense of danger is constant and can never be quelled through the revelatory potential of the camera.

[REC] and *Quarantine* exploit the impulse to see a virus in an effort to create the affects of the horror genre. Our anxiety stems not only from the shocks and scares offered by film, but the way in which the film aesthetically disrupts how we sense and make sense of an emergent outbreak. Found footage horror films point to the problem of representation with respect to EIDs. By this I mean EIDs highlight our anxiety about the structures of knowledge and representation in the context of an emergent outbreak. Contemporary disease outbreaks are increasingly intertwined with the networked conditions of globalization. They travel through global transportation systems, emerge from industrialized environmental conditions, and accelerate in the densely populated metropolitan hubs across the globe. Given the speed and ease with which the modern pathogen travels, it becomes increasingly difficult to represent the collection of impacts and infrastructures that constitute the emergent outbreak. If we traditionally relied on the alignment of vision, knowledge, and control, the networked structure of EIDs poses problems to this epistemological paradigm. In the face of real life EIDs, like H1N1, Ebola, and Zika, the public relies on a limited collection of representational forms in order to make sense of the outbreak. More often than not, this comes in the form of scientific and journalistic evidence, including data sets, maps, images, and interviews. At the same time, this collective body of work never quite reveals the totality of the outbreak or creates a sense of control. This fragmentary look upon the outbreak leaves us anxiously anticipating the virus' arrival, sensing its omnipresence. Found footage horror films draw upon those same representational problems and epistemic paradigms that underlie these materials to exacerbate the anxiety of an emergent outbreak. In other words, they target the very aesthetic and epistemological structures that underlie the nature of scientific evidence.

Evidentiary Effects

As *[REC]* and *Quarantine* call upon the contemporary anxieties that surround the threat of emergent pathogens, found footage horror aesthetics participate in contemporary shifts in aesthetic and epistemological standards of evidence. While the reflexive aesthetics of found footage horror participate in a longer history of instrumentality codified in the 19th century, they simultaneously call upon contemporary paradigm shifts emerging from the rise of digital evidence.[55] For Sobchack our perception of documentary's truth-value comes out of our own subjective experience that is informed and shaped by our embodied social, cultural and historical position.[56] We must also extend this discussion to our perception and experience of visual evidence; mainly we must consider what constitutes visual evidence today, and how found footage films activate those aesthetic paradigms. Like the historically conditioned mechanical objectivity paradigm, shifting modes of communication, distribution, and reception shape the perception of evidence.

In order to situate the *evidentiary effect* within contemporary discourses of digital evidence, I turn to the faux horror documentary, *The Bay*. The film borrows from the familiar visual accounts of outbreaks by amassing an extensive archive of partial evidentiary materials. Combining these fragments, the film seeks to visualize the virus through the logic of total surveillance. Through the collection of amateur audiovisual evidence, the film makes a statement about the "legitimate" forms of representation in an increasingly networked, digitized age.[57] *The Bay* pushes the *evidentiary effect* to

[55] Daston and Galison's argue that the 19th century marks the emergence of mechanical objectivity paradigm, contextualizing it's genesis in the proliferation of mechanical instruments of inscription including, most prominently, photography. Daston and Galison, "The Image of Objectivity."

[56] Sobachack, *Carnal Thoughts,* 261.

[57] Though *The Bay* was released in 2008, its rhetorical project offers a compelling correlate to contemporary debates around news media and truth. Indeed the conspiracy logic of the film, and its use of digital materials suggests that the official sources of evidence are suspect. Today this debate is central in the academy and public around the circulation of

its representational limits by quite literally revealing the disease in all its mediated forms. Unlike *[REC]* and *Quarantine*, *The Bay* does not sell itself as a self contained, found object; rather it assembles found digital material in an effort to reveal the outbreak of a deadly pathogen and an elaborate government cover up.[58] *The Bay* seeks to fulfill the promise of the evidentiary materials, to make visible and knowable the pathogen; but in doing so, the film shows that the very representational strategies used to make an outbreak evident create the feeling of viral omnipresence. The film's array of digital materials helps us expand the reflexive aesthetics of *[REC]* and *Quarantine* to consider evidentiary *effects*—plural—of visual evidence in an era saturated by amateur digital footage.

The film begins with a series of clips from cable and local news fragments showing a massive fish extinction in the Chesapeake Bay and speculations on the cause of the biological event. With a cut to black, a subtitle appears: "Those were the events covered by the media. The following story was never made public." *The Bay* begins with a fairly standard found footage horror frame by staging the truth of what's to come against the standards of evidence, in this case, the news media. Though viewers are meant to understand all of the found materials as "raw" evidence, the film features a central narrator and testimony, as well as a nondiegetic soundtrack, and intermittent subtitles. The film's narrative conceit is framed around the representational project of making evident the devastating outbreak of July 4, 2009. This is achieved by collecting "all of the digital information that was recorded" to amass a complete archive of visual documents that reveal the emergent outbreak. *The Bay* features news footage captured by the film's narrator, Donna (Kether Donahue) and her cameraman (Brandon Hansen), surveillance and police dashboard cams, audio recordings,

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fake news and alternative facts. Today, however, it remains to be seen what standards of evidence will emerge in the context of digital ubiquity and online news circulation.

[58] It is worth comparing this massive archive of digital materials to contemporary data breaches which seemingly offer truth about secret activities or cover ups by dumping massive archives of data onto online resources: the most famous being the NSA breach of 2013.

smartphone and computer video chats, home movies, and scientific documentation, among others, which layered on top of one another, are meant to cohere in the irrefutable representation of a mysterious and deadly outbreak. Unlike *[REC]* or *Quarantine*, The Bay's rhetorical project depends less on the authority and authenticity of a single "raw" material form, and more on the impact of a mass of evidence.

This massive archive of digital footage attests to the vast range of digital materials available in the contemporary moment: from smartphone cameras to public surveillance cameras, it seems as though no moment can ever go uncaptured or undocumented.[59] Indeed found footage scholars have traced the genre's historical relationship to 24 hour news networks, reality television, internet piracy, and online video streaming platforms.[60] Kevin Wetmore and Heller-Nichols point to the contemporary mass media landscape, which increasingly showcases the violence of war and terror through amateur video footage. Wetmore, in particular, turns to the 9/11 news coverage as a critical moment when amateur footage and journalistic reporting achieved equal authority in the eyes of the public. The fragmented, shaky images of the streets of New York provide a visual and affective analog to the found footage aesthetic.[61] As one of the most widely documented events in history, our cultural memory of 9/11 is tied to the sheer volume of the amateur video material circulating across internet streaming platforms, mass media, and reappropriated in documentary films.[62] For

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[59] In this sense, the film attests to the pervasive role of recording today, speaking to the countless amateur videos that have been used in recent years to evidence violence.

[60] See Heller Nichols, *Found Footage Horror Films*; Benson-Allott, Caetlin Anne. *Killer Tapes and Shattered Screens: Video Spectatorship From VHS to File Sharing* (Berkeley: University of California Press, 2013); Wetmore, *Post-9/11 Horror in American Cinema*; McRobert, Neil. "Mimesis of Media: Found Footage Cinema and the Horror of the Real," *Gothic Studies*, vol. 17, no. 2 (Nov. 2015): 137-150.

[61] Wetmore, *Post 9/11 Horror,* 57-59.

[62] Benson-Allott dedicates an entire chapter to the relationship between amateur video footage and online sharing habits and the rise of the found footage horror genre. For Benson-Allott, the horror of these films lies in the allegorical relationship between found footage aesthetics and the anxieties that surround privacy and media. Benson-Allott, *Killer Tapes.*

Wetmore, the 9/11 footage directly feeds into the rise of found footage horror, which calls upon the cultural associations between amateur video and terror.[63]

Like the 9/11 footage, EIDs are deeply tied to a particular historical moment. Indeed, it is tempting to align the rise of found footage EID horror films with the anthrax attacks on the US postal service. Following Wetmore, one could argue *Quarantine* uses found footage aesthetics produce the horrors of bioterror.[64] As Scott and Angela make their way to the attic and discover the outbreak's source, they discover walls covered in scientific equations and news headlines that suggest the virus was engineered for an attack, making reference to the increased fear of bioterrorism following the events on September 12, 2001.[65] While it is useful to remember the film's relationship to historical events and cultural anxieties, I believe and account of found footage horror and EIDs can offer insight into broader questions about the standards and perception of visual evidence in an age of digital media and internet accessibility. While Wetmore's symptomatic reading of the genre helps trace in the fictional premise of found footage horror films, it also attests to a shift in how we perceive evidence and documentation. If we once needed the official authority of documentary film or news journalism to communicate knowledge, today we are more accepting of a variety of media forms and aesthetics.[66] Footage shot on smart phones or captured on computer screens can have the

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[63] Like Raimondo, Wetmore's analysis suggests a form of aesthetic mimicry, locating the viewing experience in a cultural analog as opposed to an aesthetic tradition. Wetmore, *Post 9/11 Horror.*

[64] In *[REC]* the origins of the disease are associated with religious fanaticism, suggesting that it emerged as an otherworldly or spiritual demon.

[65] Though the ending of the film is rewritten to perhaps tap into these American anxieties, we cannot for the film's Spanish origins. Looking at these films from the perspective of EIDs versus bioterror helps open the films up to global questions, and indeed, the nature of evidence at large.

[66] Of course it also attests to the affective and emotionally manipulative power of these amateur aesthetic materials. It is worth considering the horror genre's appropriation of this style and the genre's affective project in relationship to historical accounts of amateur footage and the public perception of evidence. Linda Williams' account of melodrama and the Rodney King footage, for example, is part of this historical lineage of "raw" footage and mass media. Williams, Linda. *Playing the Race Card: Melodramas of Black and White From Uncle Tom to O.J. Simpson* (Princeton [N.J.]: Princeton University Press, 2001).

same effect as the expertise of news journalism or documentary film. Films like *Unfriended* (Gabriadze 2014) or *The Den* (Donohue 2013), which unfold entirely on laptop computer screens, or the snuff-like segments of *V/H/S* 1, & 2 (Bettinelli et al 2012 & Barett et al 2013), demonstrate the diversity of amateur media forms capable of creating the found footage reality effect. This turn toward a wider variety of media and distribution systems demonstrates an expanding archive of accepted evidentiary forms, as well as an expansion of the affective value of amateur footage at large. In the case of 9/11, the fragmented, shaky footage gave audiences a sense of events as they unfolded on the streets of New York City. While the blurry footage shot by individuals running to and from the towers might offer little by way of visual content, they are suggest evidence of certain actions and affects. As we look a the abstract swish pans and grainy images, we still seek out information in the image, our eyes still scan the edges of the frame in an attempt to orient and understand what the camera captures.

The expansion of found footage horror film sources also attests to the complexity of discerning the authority or authenticity of these materials. This anxiety is even explicit in the contrasting conceits of the films discussed in this chapter: while *[REC]* and *Quarantine* locate their documentary authority in television news coverage, *The Bay* expressly opposes the evidentiary value of journalism and government sources. *The Bay* instead turns to the expanded body of evidence to create a total, surveillant record of the outbreak. Rather than privileging a single form of digital evidence, the film uses a variety of materials to track the event over the course of approximately twelve hours.[67] Mixing anything from suggestive text threads to CDC surveillance footage, the film seeks to create an exhaustive and irrefutable representation of the event. Extended sequences will often feature a

[67] In a very brief comment on *The Bay*, Rødje claims the film demonstrates the "distributed agency" of the camera as witness. The film's use of multiple materials attests to the power of the fact of recording. While I agree with Rødje's attempts to foreground the value of the apparatus, it's important to contextualize *The Bay's* archive of materials within shifting evidentiary paradigms. What is important is not only the technologically recorded footage, but also how multiple types of footage help produce its documentary claims. Rødje, "Intra-Diegetic Cameras," 219.

space captured by multiple sources, mixing footage shot on webcams and digital cameras with grainy surveillance images. Knowledge in *The Bay* is figured as a comprehensive and cumulative audiovisual assemblage of evidentiary forms. At the same time, the representational project relies on the *evidentiary effects* of each of those individual resources. Each encounter with a new material impacts the viewer with its *effect*, triggering the inquisitive and investigative gaze that helps maintain the spectatorial conditions and desire to see and understand the outbreak. The Bay exhibits the structuring capacity of *evidentiary effects* that can collectively drive the representational and affective project of the EID found footage horror film.

The surveillant logic of *The Bay* begins with the film's affinity for surveillance footage. Sequences will often be bookended by extended surveillance shots, or intercut with a variety of stagnant surveillance footage in an effort to concretize the events in space and time. For example, one of the most chilling scenes in the film come from footage shot on the dashboard cam of a cop car.[68] The sequence begins with a wide-angle forward tracking shot of a tree-lined street and the hood of the cop car at the bottom of the frame [Fig. 4.5]. The upper left and lower right-hand corners display the cop car number and time stamp, while a crane watermark on the bottom left indicates the source of the footage, and its historical specificity. A cut to a reverse shot within the car, shows two officers looking beyond the frame. The angle of the shot only allows us to see a fragment of the driver, whose face is often obscured as he leans forward or turns the wheel. Neither man acknowledges the camera and their gazes remain fixed on the windows of the car. Unlike *[REC]* and *Quarantine*, where the acknowledgement of the camera signifies its evidentiary value, the surveillance footage connotes authenticity by suppressing the relationship between the characters

[68] *The Bay's* inclusion of this footage references the surveillant aesthetics of shows like C.O.P.S. (Langly & Barbour 1989-) and footage that is often leaked or released online surrounding contentious police conflicts.

and apparatus. At the same time, this fixed, limited perspective points back to the mechanical device of inscription.

Fig. 5.5: Police dash cam footage from *The Bay*. (Levinson 2012)

Though surveillance footage comes in a variety of forms, it tends to be associated with a disembodied, continuous, mechanical recording. The recording device is often fixed in a particular location or attached to an object, like the cop car dashboard. In the case of *The Bay*, the camera's position implies a lack of human intervention and manipulation: a physically situated device that continually records without discretion. *The Bay's* neutral camera is signified by the physical and technological limitations of the surveillance cameras, which can only capture half of the driver's body, or the frontal perspective from the hood of the car. As the policemen pull up to the house, the front-facing dashboard cam lands on a static shot of a darkened house at dusk, lit by a single porch light. Off screen, a car door opens and closes, prompting our eyes drift to the edges of the frame, and the driver enters into the field of vision as he approaches the front porch and knocks on the door. Lit by a single porch light, the diminished image quality and a bush outside of the home obscure a clear view of the door as the officer pushes his way into the house. The stasis and lack of

content here helps connote the surveillant status of the images, which appear to be limited by the physical constraints of the mounted camera. Sitting in the dark, waiting for something to unfold, we feel our technologically determined perspective, eyes scanning across the image in an effort to extract information.

The extended static shot signifies the temporal and mechanical conditions of surveillance footage, which acquires its evidentiary value through the unrestrained recording of space in time. Surveillance provides a temporal prosthesis for the human eyes, capturing and documenting well beyond the bounds of human vision and attention. Thus the sheer amount footage signifies the inscription device, which could only be captured by a technology that operates without a human operator. The footage appears to offer a visualization of space and time that is both comprehensive and quantifiable.[69] Given the physical constraints and extended duration of surveillance, the majority of the footage seemingly contains no action or information. Locating the evidentiary value within surveillance footage instead requires searching through the archive of footage, looking for details in an uneventful image. *The Bay's* static shot mimics surveillance aesthetics to create the *evidentiary effect* and trigger the investigative gaze. We peer into the depths of the image, and scan the edges of the frame in an effort extract information, eyes and ears attuned to the slightest diversions from the norm. Within the horror genre, *The Bay's* static long take creates anxiety as we anticipate a shock or scare. While the *evidentiary effect* has cued our investigative gaze, as time unfolds and we scan the image, we increasingly dread the fulfillment of our desire to see the outbreak, whether that takes the form of an infected body, parasite, or a wide range of other terrifying indications of an outbreak.

[69] The history of cinema and cinematic observation can be traced back to the origin of the medium. Scott Curtis' work on early German cinema and medical and scientific observation attests to the instrumental value of continuous film recording for the principles of scientific and medical observation. Curtis, Scott. *The Shape of Spectatorship: Art, Science, and Early Cinema in Germany* (New York: Columbia University Press, 2015).

The surveillance image is meant to help us calculate and measure space in time, while suspense involves carefully watching and evaluating the visual patterns and clues in an effort to anticipate the coming events.[70] Here, the two reinforce one another, as the aesthetic codes of surveillance prompt a vigilant mode of spectatorship as they scan the image anxiously awaiting what's to come. This calculated gaze exhibits how found footage horror genre aligns the instrumentality of visual evidence with the affective project of the horror genre. As with the 360-degree pan in *[REC]*, the fantasy of total surveillance often comes with anxieties about what might appear within the generic context of the horror film. While surveillance and evidence often promotes the fantasy of total and complete vision, *The Bay* foregrounds how that desire—or, we might say that epistephilia—can simultaneously create anxiety and fear. As we watch the darkened house in *The Bay*, we both desire to see and know what lurks behind closed doors, and fear for what may or may not appear.

The film exacerbates this anxiety as it cuts to a slow forward tracking shot of the water as the sun sets and then to Donna's news footage. The canted shot shakes as the camera bobs slightly and Donna addresses the audience with hesitation. Off screen cries echo in the distance and she stops her speech to listen and the camera zooms into an extreme close up of her face. Here, the use of off screen sound is juxtaposed with the off screen action of the static surveillance image to taunt the audience with the suggestive capacity of the evidentiary image. Both express a mounting desire to access what is not shown, but remains suggested by the film's aesthetics. Cutting back to the surveillance footage, a gunshot sounds from within the house, followed by a corresponding reaction shot of the officer inside of the car. Another shot rings out, followed by a cut back to the image of the house, where the remainder of the scene unfolds. The sun has almost completely set, and the only source of light comes from the porch and the car headlights. We're left searching the darkened windows of the house and edges of the frame in an effort to discern the source of the shots and any

[70] Turner, JS. "Collapsing the interior/exterior distinction: Surveillance, spectacle, and suspense in popular cinema," *Wide*

suspicious activity. We hear the officer get out of the car as he radios into the station, reporting on the gunfire and calling for back up. He stands in the beams of the headlights, hand resting on his gun as he slowly approaches the house. Our eyes track back and forth across the image, keeping watch and waiting for a dramatic shock or scare. However, just as he approaches the front door, the film cuts to an insert shot of the house, and the camera creates a false zoom into the second story window. An intertitle appears, "The following audio has been digitally enhanced in an attempt to understand what took place in house" [Fig. 4.6]. Rather than satisfying audiences' anticipation with a shock or scare, the film leaves them suspended with a collection of audio-visual evidence. The audio recording—"digitally enhanced" or rather, made evident through technology— plays a panicked conversation between the two cops and the individuals located inside of the house. They cry out in horror and describe the mangled, half dead individuals who beg for death. While these sounds provide narrative information, they simultaneously taunt us by denying us access to the image.

Fig. 4.6: *The Bay's* insert shot foregrounds the manipulations of the filmmaker. (Levinson 2012)

Angle-A Quarterly Journal Of Film History Theory Criticism & Practice 20, no. 4 (1998.): 97.

The Bay locates anxiety not only in the suggestive possibilities of the *evidentiary effect*, but also in the fulfillment of the desire to see and know an outbreak. While each of the digital materials offers a fragmented glance of the outbreak, no single element is capable of capturing or making the outbreak evident. Rather each element generates an evidentiary charge that fuels the desire to see, know and understand. Layering *evidentiary effects* helps build a momentum that forces viewers to continually search the materials for information at the expense of questioning the authenticity or authority of the individual document.[71] As our eyes scan the images, moving between materials, the film builds the suggestive force of the *evidentiary effect* that fuels the viewer's epistephilia. Take, for example, that final static image of the house and audio recording. While the image and audio have been manipulated, within the representational structure of the film we are caught up in the effects of evidence. By this I mean, as we move between evidentiary forms, continually scanning and searching out information in the image, we loose sight of the individual mediations and manipulations of the film. The impact of this moment, the fear and anxiety we feel in not knowing or seeing what is going on *in spite of* the evidence, attests to the incredible structural and affective power of *evidentiary effects*. Scanning the static surveillant image, we succumb to the project of discovery that draws us from one evidentiary material to another.

The affect of this moment is less related to the banal content of the image or even the absurdity of the audio recording, and more to the evidentiary charge that drives our attentive mode of spectatorship. As the intertitle and audio recording appear over the insert shot, they ride the investigative momentum generated by the extended surveillance image. Individually, each element wears its manipulations on the surface and lacks the sense of objectivity achieved by the preceding surveillance imagery; but layered on top of one another they provide enough of an evidentiary

[71] It also reinforces the film's documentary rhetoric and realist conceit.

charge to fuel our investigative investment. Caught up in the instrumental, the prosthetic, and epistephilic promises of the *evidentiary effect*, it is easy to lose sight of the argumentative rhetoric and manipulations of the film. This is not to say that the individual evidentiary materials are not important, or that the image or audio recording functions as a kind of floating signifier. Rather, it attests to the power of an immediate encounter with the aesthetics of evidence. *The Bay* reveals the way a single image or visual code is capable of tapping into our perception of evidentiary authority and the powerful force of these materials when they are assembled in mass. These individual impressions of evidence are what guides the film's larger argumentative project: bombarding audiences with images and audio coded as evidence, the film assembles a collection of weaker charges in order to keep the viewer invested in the revelatory project.

The Bay layers evidentiary forms in an effort to make a strong and irrefutable representational claim: to make us see and therefore acknowledge an outbreak. As I discussed in chapter two, science employs similar methods in the construction of facts. Structuralist readings of scientific protocol argue that facts are not inherent to evidence, but are constructed through signifying practices. Science makes knowledge or facts by layering them on top of one another, which helps suppress doubt or skepticism in the individual evidentiary forms. As a result we are less concerned with the objectivity of a single form of evidence and more concerned with the end product.[72] This logic help us understand *The Bay's* evidentiary structure and its effects. Each piece of digital evidence can be scrutinized and criticized for its manipulations, but juxtaposed with a whole host of other examples, that doubt in the singular is suppressed in favor of the larger representational project. However, what drives this project, I argue, is the *evidentiary effect*. It is not just about the collection of evidentiary materials, but the way in which the *evidentiary effect* creates a viewing experience that encourages this

[72] As discussed in Chapter Two, Latour argues science operates through signifying chains that are overlooked when encountering scientific facts, evidence, and representations. Latour, Bruno. *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Mass.: Harvard University Press, 1987).

layered construction. Activated by the evidentiary charge of the material, the viewer gets caught up in the investigatory mode of looking and the desire to discover information that will ultimately fall short of revelation. Thus the apparition of a new evidentiary form continues the cycle and helps build the momentum. Each element seems to carry with it a charge of evidence, a promise of information that creates a spectatorial investment in the film: a desire to see, to know the outbreak.

This can be found in the film's use of quick-paced montage, the most pronounced of which occurs at the halfway point in the film. Following a long segment of CDC surveillance footage captured by desktop and ceiling mounted cameras in which the group of scientists discuss news coverage and surgical images from the hospital, *The Bay* cuts to black, and an intertitle appears giving a time stamp, indicating that the recorded audio was taken from an voicemail left by a mother to her daughter. The film quickly transitions to hospital surveillance images of panicked crowds, to home video footage of a young couple on a boat out on the Chesapeake Bay, to surveillance images of an operating room, to handheld footage of doctors amputating a leg with the sounds of vital machines beeping in the background, back to the home video footage, and finally to an out of focus shot of a television monitor documenting the skin abnormalities of patients. This entire sequence comes accompanied with an ominous soundtrack that generates a sense of dread. While individually none of the elements could be said to evidence the outbreak, each offer an evidentiary charge that builds as the film layers one on top of another. Like the dash cam sequence, the film uses surveillance as a launching off point to "fill in" the suggestive gaps left by a single evidentiary form. Rather than creating a sense of fullness, this sequence merely gestures toward the outbreak, prolonging the *evidentiary effect* to create anxiety and suspense. The evidentiary materials suggest, even promise, a fulfillment of knowledge or understanding of an outbreak, only to leave audiences anxiously anticipating its revelation. Indeed even once the film effectively makes the outbreak evident, exposing it through the visual archive of materials, viewers are left with the impression that the viral

threat persists: and moreover, that visualizing its presence through these digital materials is not enough to control its spread.

The Bay's suggestive logic of surveillance creates the sense of an outbreak that is present and inaccessible, evident in its omnipresence. Each brief encounter with the visual evidence prompts the investigatory gaze, however as we gain access to the mangled limbs, blistering skin, and mass panic, we don't gain a sense of understanding or visual mastery; Instead we're left with a feeling of overwhelming anxiety. Fulfilling the fantasy of total surveillance creates a sense of biological contamination that undermines the alignment of sight, knowledge, and control. There is no sense of containment or power in the visual, here; in making the disease visible, *The Bay* simultaneously renders it affectively omnipresent. While *The Bay* effectively executes the logic of outbreak management, visualizing the pathogen through evidentiary materials and tracking its movements in space and time, the film's comprehensive account simultaneously fuels the affective project of the horror genre, leaving audiences overwhelmed and anxious. From this perspective, our anxiety becomes located in the very methods and materials of epidemiology to which we turn in the wake of an emergent outbreak, The representational project of the film thus instills doubt in epidemiological methods and even our paradigmatic understanding of vision, knowledge, and control to locate anxiety in tracking, capturing, and representing outbreak.

Conclusions

EID found footage horror films produce anxiety through the materials and methods we use to represent outbreaks. By combining the aesthetic codes of evidence with the affects of the horror genre, these films locate anxiety in the spectatorial practices that produce knowledge and help us understand disease. Seeing the virus does not contain or control its spread, rather it creates a sense of an omnipresent and unstoppable threat. The outbreak is not figured as a tangible, locatable

monster, but an inescapable affect of spectatorship. By targeting the evidentiary materials and epistemological structures of outbreak management, EID found footage horror films reveal the slippery relationship between the representation of disease and our fear of its omnipresence. As I have argued in Chapters One and Three, representational forms like the disease map and sound mixing and audio visualization, which suggest spatailized representations or encounters with an outbreak, simultaneously create a sense of viral contamination. While epidemiological maps allow us to see relationships between disparate spaces in time, they simultaneously place the threat in proximity to the entire global landscape to create the feeling that any untouched space is still at risk. EID found footage horror films create similar affects by employing the aesthetic and experiential structures we associate with understanding diseases. They create desire for seeing and tracking outbreaks, only to undercut them by restricting vision, like we saw in *[REC]* and *Quarantine*, or to overwhelm us with its totality in *The Bay*. All three of these films express how seeing an outbreak often leads to sense of impotent understanding and no control. They reveal that knowledge does not necessarily allow us to control an outbreak, but can actually exacerbate the sense of anxiety and anticipation.

The *evidentiary effect* helps us understand how the aesthetics and experience of evidentiary materials can lead to a visual and affective representation of an outbreak. Representation comes out of a relationship between the visual codes of evidence, mode of spectatorial engagement, and its affects. The found footage aesthetic foregrounds understanding an outbreak as a process of seeing, looking, and feeing. Combined with the generic tropes and expectations of the horror genre, the *evidentiary effect* creates anxiety through spectatorial engagement. However, rather than simply leading to narrative-driven scares and shocks, a focus on the film style helps us understand how those anxieties begin with encounters with aesthetic codes, not necessarily the content of the narrative or images. As a result, our anxieties no longer remain contained to a located, monstrous threat, but in

the way we represent and understand emergent outbreaks. It casts doubt on the very tools and logic we use in everyday accounts of real infections. EID found footage films therefore allow us reflect upon the very aesthetic and experiential structures of outbreak representation, and leaves us to question the boundaries between the fictional and real life accounts of outbreaks.

This slippage between fiction and reality has repeatedly been argued in comparisons between documentary film and found footage horror. Scholars have argued that found footage transports us into the world, breaks down the boundaries between our world and the film, or even questions the very ways in which we see and represent the world.[73] Indeed, Grant claims the found footage horror film is a symptom of our "postmodern sensibility that, in the digital age, places the ontological status of every image in doubt."[74] By employing the aesthetics and experience of evidence, found footage horror films lead us to question the status of the image today. While Grant's symptomatic reading points toward the way found footage horror forces the reflection upon the perception of the real, his analysis relies too heavily on narrative. For we do not walk out of these films doubting the status of an image, we doubt its *contents*. Rather, as I have argued, the very fact of recording within the mechanical objectivity paradigm is what upholds the representational and affective project of EID found footage horror. What these films cast doubt in or make us realize is that many of the strategies of representation often produce anxiety. That our fear of an emergent infection is coexistent with its representation; or we might say, understanding and anxiety are perhaps two sides of the same coin.

Indeed, previous chapters have shown similar couplings, where attempts to represent emergent outbreaks lead to gaps, anxieties, and uncertainty in how we have come to know and understand

[73] Benson-Allott's account of found footage horror offers the most sustained allegorical reading of the genre. However traces of this logic can be found in: Benson-Allott, *Killer Tapes;* Grant, "Digital Anxiety;" Wetmore, *Post 9/11 Horror.*

[74] Grant, "Digtial Anxiety," 154.

EIDs, which can be used to create affects and draw connections across networks. EID found footage horror films participate by combining the aesthetics of evidence and the affect of the horror genre to explore the relationship between the spectatorial engagement with evidence and the affect of outbreak omnipresence. It reveals how the very structures with which we represent, track, and control diseases function to produce the sense that the disease remains ever-present, and expansive: how the tools and aesthetics we have to see and understand outbreaks, lead to an anxious feeling of contamination.[75] Thus reflecting on these aesthetic and affective structures allows insight into the relationship between the epistemological structures of knowledge and the impressions and perception of networked phenomena: the way epistemologies of scientific vision and evidentiary forms not only help make sense of networks, but allow us to sense their complex structures.

[75] In this sense, the film operates through a logic similar to biosecurity highlighted in Chapter One.

CODA,

OR SENSING SCIENTIFIC TRUTH(INESS)

Perfect Contagion Machine shows how popular media combine the formal structures of science and media to make an outbreak sensible. Complicated networked phenomena, like EIDs cannot be understood through facts, or represented as visual clear wholes; rather, as I have shown, they require a multifaceted approach that often involves an array of evidentiary forms, aesthetic codes, and clear logical pathways to help create a sense of coherence and organization. Microscopic images, maps, sound mixing techniques, and genre all help create the sense of the causal transmission pathways, geographic distribution, and viral presence that are central to how we understand the contemporary networked pandemic. However, as all chapters have shown, the perception of the pathogen's presence, scientific authority, or epidemiological control are not empirical facts but impressions produced through media forms and scientific epistemologies. By drawing on scholarship from Science and Technology Studies, Geography, and Sound Studies, and aligning it with formal analysis, I have sough to trace rhetorical structures and corresponding effects in popular media texts to understand how the *sense of science* may lead to sensing an outbreak. Each of the representational strategies traced therefore offers an account of how we sense evidentiary forms, medical and scientific expertise, and logic: that is, how we sense scientific truths. In other words, this dissertation describes what we might call the "truthiness" of outbreaks on screen.

The term "truthiness," born out of contemporary popular cultural parody to describe the "quality of seeming or being felt to be true, even if not necessarily true," has become emblematic of the contemporary moment.[1] Indeed, as I write this coda the Western socio-political sphere is

[1] Oxford Dictionaries. "The Word of the Year 2016 is…Post-Truth," *Oxford Dictionaries,* 16 November 2016, https://www.oxforddictionaries.com/press/news/2016/12/11/WOTY-16.

undergoing a crisis of truth.[2] Marked by the Brexit vote, election of Donald Trump, and the proliferation of alternative facts and fake news, 2016 has been deemed the year of "Post-Truth." The Oxford Dictionary's defines post-truth as the "circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief."[3] This contemporary sociopolitical information crisis is indebted, in part, to the persuasive powers of truthiness, which has increasingly made its way into academic, political, and journalistic practice. As an *effect*, truthiness attests to the role of sensation in determining the value or authority of particular statements, sources, or information. But more importantly, it helps describe a relationship between the presentation of information and its perceptual impression—a relationship between particular rhetorical forms and *sensation* of truth.

Thus truthiness is often not entirely divorced from logic or evidence, but produced through careful rhetorical structures that transgress scientific, social, and cultural forms of communication. The anti-vaccination movement, for example, which has grown in popularity in the last twenty years, produces its persuasive truthiness by combining scientifically and emotionally supported rhetoric, including citations from academic and popular sources and affectively charged "victim" profiles. This combination helps produce impressions that manage to feel both grounded in authority of science and personal experience. For example, the recent documentary produced by the Alliance for Natural Health, *Manufactured Crisis: HPV Hype and Horror* (2018) attempts to persuade its audience by drawing upon the rhetorical strategies of mainstream documentary. The film begins with a persuasive voiceover narrating the dangerous of anxiety of cancer today, juxtaposing it with a montage of medicalized imagery, including imaging machines, test tubes, doctors, and fear-stricken

[2] Fields, Suzanne. "Telling the post-truth with alternative facts," *The Washington Post.,*25 January 2017, http://www.washingtontimes.com/news/2017/jan/25/telling-the-post-truth-with-alternative-facts/

[3] Oxford English Dictionary, "Word of the Year 2016."

patients. Through interviews, the filmcombines accounts from "experts," including scholars, former pharmaceutical executives, and scientists to support their skepticism of HPV vaccination. The "aesthetics" of popular science documentary is juxtaposed with victim narratives that account the tragedies befallen to themselves and loved ones.[4] One scientific study argued the rhetorical strategies used by anti-vaccination materials produces a persuasive argument by "[making] the argument that the scientific record is inaccurate because it omits vaccine injury…[assuming] the viewer will place personal narratives on equal footing with scientific case studies."[5] As the increase of vaccine skepticism attests, these truthy materials have helped shift the public's perception of vaccine information and indeed, truth.[6] *Manufactured Crisis* and many anti-vaccination websites transgresses scientific and subjective boundaries, revealing truthiness not as a naive reaction, but an impression produced through the subtle blend of fact and fiction not entirely divorced from the logical structures or evidentiary forms of science.

While scientific studies illustrate the rhetorical complexity of truthiness and post-truths, the majority of the post-truth criticism emerging in 2017 has remained concerned with a broader problem—crisis—of journalistic, political, and information sharing practices.[7] These editorials, published across popular and academic journals, aim to target a broader sociopolitical condition by

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[4] The Alliance for Natural Health. *Manufactured Crisis: HPV Hype and Horror,* 2018, http://hpvvaxfilm.com/

[5] In their discussion of the vaccine education site, SANE Vax, Grant and Lenny et al claim the postmodern understanding of scientific truth enables it to construct a broad digital ecology where personal truths, clinical truths, and scientific truths coexist. Although the website privileges vaccine-skeptical information, it provides a space where information can be produced and consumed in a fluid, nonhierarchical manner that, in turn, creates a more capacious understanding of vaccine and vaccine-related practices. Grant, Lenny, et al. "Vaccination persuasion online: a qualitative study of two provaccine and two vaccine-skeptical websites," *Journal Of Medical Internet Research* 17, no. 5 (May 29, 2015).

[6] Kodish E. "The ethical negligence of parents who refuse to vaccinate their children," *The Washington Post.* 2014 Jun 26.

[7] Major news sources including New York Times, The Guardian, and the Washington Post have published extensive articles on the crisis of truth and post-truth. Moreover, many major journals across the sciences, social sciences, and humanities have published editorials addressing citation strategies, peer-review, and integrity in publishing. Perhaps the most cited indication of the problem of truth in the sciences is the Journal of Nature's piece on the crisis of reproducibility in the sciences, which indicates a mounting problem with the scientific method of reproducibility as a standard for scientific truths. This article spurred a responses across major scientific journals. Baker, Monya. "Is there a reproducibility crisis?" *Nature* 521, no. 7552 (May 21, 2015): 274-276.

casting radical oppositions between true and false, fact and fiction, science and post-truth. This dissertation's focus on particular representational strategies, however, offers accounts of acute iterations of truthiness—the impression of scientific truths, proofs, and evidence that resonate across fiction and nonfiction texts. It seems obvious that fictional media, from blockbusters to mobile games, would employ emotionally and affectively charged representational strategies, but *Perfect Contagion Machine* seeks to show how this rhetoric draws upon "official" or authoritative epistemological systems and paradigms of knowledge production, complicating clear divisions between the scientific and the sensational.[8] The feeling of truth, evidence, or knowledge experienced in these aesthetic encounters with popular media are grounded in the scientific methods used to analyze and understand the world around us. Thus the "truthiness" described here attests to a much more subtle version of this rhetoric, one that complicates the radical opposition between fact and falsehood emerging in the post-truth debate.

The sciences have become a central source of resistance to the rhetoric of "truthiness" and post-truth politics, providing the ideological counterpoint to the alternative facts, fake news, and destructive and manipulative effects of post-truth falsehoods.[9] In 2017 alone the there has been incredible backlash to anti-environment, anti-science politics of the Trump administration, including critical debates in the academy about publication and fact checking protocol, and massive public demonstrations including the Earth Day March for Science. On April 22, 2017, tens of thousands marched in cities across the U.S. and abroad, holding up signs protesting fake news, scientific

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[8] Indeed, Bruno Latour claims that when scientists present their materials, they produce "audio-visual spectacles" that effectively promote the perception of authority and facticity. Latour, Bruno. *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Mass.: Harvard University Press, 1988), 72.

[9] Krief et al. "Science in the post-truth era," *Current Science* Vol. 112, No. 11 (10 June 2017); Kercherr, Julian; Perkins, Anne. "Scientists are Armed with Truth But it Won't Win Them the Culture War," *The Guardian.* 23 April 2017; Vernon, Jamie L. "Science in the Post-Truth Era," American Scientist 105, no. 1 (January 2017): 2; Tsipursky, Gleb. "Toward a Post-Truth Lies Society: Fighting "Alternative Facts" AND "Post-Truth" Politics," *Humanist* 77, no. 2 (March 2017): 12.

research defunding, and celebrated the authenticity and facticity of science [Fig.5.1].[10] In many instances, protestors offered science as the direct counterpoint to Trump's post-truth era: give us facts, give us peer-review, give us science. These demands point to an ideology guiding much of the post-truth criticism and debate: science is the symbol of what we have lost in the post-truth era. Moreover, it is through science we might reclaim what we have loss in the face of flagrant disregard for the structures and systems that support the production of truth. Marked by the rigor of measurement, experiment, repetition, and reproducibility, science is capable offering us the evidence, objectivity, and truth lost in the contemporary sociopolitical climate. While scientists acknowledge the way truth claims and evidentiary paradigms shift over time, the scientific method, or what one even calls the "scientific temper," stands as the guiding light back to truth: "Objective facts' based on scientific methods can be interpreted variously but they are secular and their integrity is verifiable and fortifiable…The time has come for all who support and respect the validity of the scientific method to step forward and take action to defend and promote it as a *core value of society* (emphasis mine)."[11]

Fig 5.1: Photos from the Chicago March for Science, April 22, 2017 (credit author).

[10] Smith-Spark, Laura. "March for Science: Protesters gather worldwide to support 'evidence," *CNN* 22 April 2017. http://www.cnn.com/2017/04/22/health/global-march-for-science/index.html..

[11] Krief et al, "Science in the Post-Truth era."

These "core values" are most often expressed through polemical binaries, staging emotion and affect against the hard facts and methods of science. Popular and academic editorials in the sciences, humanities, social sciences, law, and education have all helped reinforce this hierarchical portrait of truth by advocating for truths produced using established methods of academic research and publication, citations, reproducible data collection protocol, and peer review.[12] In the anti-vaccination debate, for example, scientific and popular criticisms of the movement often focus on the two polar ends of the debate: the hard facts of science and medicine versus the anti-vaccination influencers.[13] Starting from the position of these "core values," their criticism emerges from the juxtaposition of scientific research against the manipulative gospel of anti-vaxers. But as recent qualitative studies have shown, the perception of vaccinations is highly varied; indeed, most of those who choose not to vaccinate their children tend to not be radical vaccine deniers, but skeptical or hesitant based on a range of personal, environmental, and social factors.[14] Critics of the anti-vaccination movement, like critics of post-truth, tend to foreground how affectively driven arguments and unsupported statements fail to fall within the standards of scientific or medical evidence.[15] These accounts valorize careful, detached—scientific— methods of research and publication that can save us from the subjective traps of affect and emotion.[16] But this value system

[12] Many major journals have published post-truth editorials in 2016-17. Some examples include Griffiths, Johnson. "Information Literacy Is Dead: The Role of Libraries in a Post-Truth World," *Computers in Libraries* (March 2017); Sismondo, Sergio. "Post-truth?" *Social Studies of Science*, Sage Publications, Ltd (February 2017): 3.

[13] Grant, Lenny et al. "Vaccination Persuasion Online."

[14] Smith, Tara. "Vaccine rejection and hesitancy: a review and call to action," *Infectious Disease Society of America,* 2017, Open Access, http://creativecommons.org/licenses/by-nc-nd/4.0/

[15] A study conducted in 2005 warns of the dangers of peer review processes in the sciences and advocates for a increasingly "scientific" approach to the journal review. Ioannidis, John P. A. "Why Most Published Research Findings Are False," *PLoS Medicine* 2.8 (2005): e124.

[16] Make no mistake: the sciences are absolutely under attack. The threats to defund national endowments, research institutions, and disband the EPA are incredibly harmful and dangerous acts. *However,* in this upheaval of the scientific funding structures and institutions in a climate saturated by post truth debates, we also cannot risk losing our critical eye toward the sciences and the scientific method. Both the defense of the science and the truth by the academy are

implicitly claims a right and wrong: relegating sensation to the position beneath that of disconnected, empirical claims to truth offered by the sciences.

The call for the return to the scientific method risks slipping back to the hierarchical models of research that once stifled the humanities and social science's critical eye to the methods and protocol that produce scientific truths. By revering the scientific method, these accounts are in danger of rebuilding what Roger Cooter and Stephen Pumfrey call the "hegemony of the sciences." Nearly twenty years ago, in response to the growth of Science and Technology Studies, Cooter and Pumfrey warned the social sciences of the dangers of the anthropological and sociological methods guiding the study of science.[17] Even though scientists and academics are increasingly concerned with how science fits within broader social and cultural structures of influence, Cooter and Pumfrey claim they still treat the field of science as an autonomous epistemological sphere.[18] Examining, science's relationship to popular culture, they argue that the current social scientific methods of analysis are incapable of navigating a dialogue between the popular and scientific. Rather, research continues to frame science as a purity that can either "trickle down" into popular culture—as "dumbed down" iterations or falsehoods—or be contaminated by the subjective influences of culture.[19] The hegemony of the sciences, in other words, is upheld by staging the sciences *against* these other

saturated with dichotomous language, and logic that resembles the hierarchical models that privilege a scientific disposition—temperament— to research.

[17] Some scholars have blamed STS methods and the concern for democratizing science for the emergence of post-truth. See: Fuller S. "Embrace the inner fox: Post-truth as the STS symmetry principle universalized," *Social Epistemology Review & Reply Collective,* 2016, https://social-epistemology.com/2016/12/25/embrace-the-inner-fox-post-truth-as-the-sts-symmetry-principle-universalized-steve-fuller/#comments; Collins HM, Evans R, Weinel M. "STS as science or politics?"*Social Studies of Science* 47, 4 (2017): 580–586.

[18] Roger Cooter and Stephen Pumfrey. "Separate Spheres and Public Places: Reflections on the History of Science Popularization and Science in Popular Culture," *History of Science* 32 (2014): 241.

[19] Cooter and Pumfrey's argument about popular culture is filtered through their discussion of popular science and popularization. They claim that the academy has been incapable of properly examining popular science because it falls in murky area somewhere in between science and mass culture. As such it offers the ideal site to actually explore a dialogue between the two seemingly distinct spheres. Cooter and Pumfrey, "Separate Spheres and Public Places," 247.

spheres— culture, society, and popular culture—rather than accounting for a mutual dialogue between them.[20]

Since Cooter and Pumfrey's article, the social sciences and the humanities have made considerable strides toward disrupting the hegemonic approach to the analysis of sciences and popular culture. In the field of Film and Media Studies alone, there has been significant work to counteract hierarchical interpretations of science: from Oliver Gaycken's history of early popular science films to Jose VanDyjck's cultural analysis of scientific and medical imaging technologies, media has become a useful ways to think through a dialogue between the science and popular culture. Indeed, today science and popular culture appear increasingly inextricable in our contemporary media-saturated environment. From personal computers, to smartphones, and wearable devices, the sciences are increasingly turning to the popular for expanding data sets or using existing platforms to disseminate scientific or medical information. As individuals progressively integrate measurement technologies and smart devices into their ordinary lives and turn to the internet as the primary source of scientific and medical information, media must engage

[20] In the field of film studies, cognitive approaches facilitate this kind of divided logic. Using scientific modes of analysis, cognitive film theory draws upon the authority and methods of science to offer "good" film theory. But as D.N Rodowick reminds us in his discussion of philosophy and critique of cognitivism in film studies: "To claim to know is always to value certain ways of knowing, and to value is to project a world commensurate with the forms of reason one aspires to define and develop in conceptual expression. Here the role of philosophy is to examine and critique the conceptual structures that frame and inform human expressiveness and action. And these concepts inform everyday discourse and thinking no less than more exotic activities and interpretation." Indeed, Rodowick's reading of philosophy closely resembles a Latourian understanding of scientific reality. What both Latour and Rodowick suggest is the movement away from empiricism in favor of acknowledging the way modes of thought—be that science or philosophy—construct a world and produce commensurate ways of understanding that world. Rodowick, David Norman. *Philosophy's Artful Conversation* (Cambridge, Massachusetts: Harvard University Press, 2015), 40-41

in dialogues with science.[21] Consequently, scholars across the sciences and humanities have shifted toward examining the intersection of media and scientific research.[22]

However in the wake of the post-truth, this connected media culture has become the site of condemnation.[23] The internet, in particular, is repeatedly cited as the origin of our contemporary crisis: "Now one just types key words into Google Scholar and a deluge of information descends. But like some literary Trojan Horse, this information hides a mix of knowledge, some outstanding and some alternative truth."[24] Across criticisms of the anti-vaccination movement, for example, the internet is cited as the central site for alternative facts and fake news to be consumed and shared, spreading "like a virus" or operating as "the Pandora's box of misinformation."[25] The sheer scale and speed at which information travels online has created an information economy that enables post-truth constituents like vaccination deniers and influencers the means to circulate false facts, emotionally charged accounts of personal health problems or tragic stories related to immunizations or medical treatment.[26] Responses to anti-vaccination and indeed, post-truth rhetoric at large,

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[21] According to Pew Research's Health Online 2013 poll, 72% of Internet users surveyed looked for health information online and 35% opted to self-diagnose with Web-based information rather than visit a clinician. Fox S, Duggan M. *Health Online*, Washington, DC: Pew Internet & American Life Project, 15 Janurary 2013, http://www.pewinternet.org/files/old-media//Files/Reports/PIP%5FHealthOnline.pdf

[22] Some additional recent accounts of the intersection of film, science and medicine include: Ostherr, Kristin. *Medical Visions: Producing the Patient through Film, Television, and Imaging Technologies*, New York: Oxford University Press, 2013; Dijck, Jose van. *The Transparent Body: A Cultural Analysis of Medical Imaging*, Seattle: University of Washington Press, 2005; This intersection is perhaps best demonstrated by the rise of Citizen Science projects, which use various media platforms, including apps, games, and websites to allow civilians to participate in scientific research projects, from sorting data to solving protein folding puzzles. Curtis, Vickie. "Online Citizen Science Games," *Applied and Translational Genomics*, 16 June 2014.

[23] One Newsweek article tries to trace the origins of post-truth back further to academic theories of post-modernism which began to chip away at the authority of categories like truth and objectivity. Calcutt, Andrew. "The Truth About Post-Truth," *Newsweek,* 21 November 2016, http://www.newsweek.com/truth-post-truth-politics-donald-trump-liberals-tony-blair-523198

[24] Boxall Simon, author. "Learning Science in a Post-Truth World," *Oceanography* no. 1 (2017): 108.

[25] Mayer M, Till JE. "The Internet: a modern Pandora's box?" *Qual Life* Res 6 (1996 Dec 5):568-571.

[26] Grant et al. Lenny notes two critical studies by Nasir and Davies et al that specifically focus on the role of Web 2.0 and the rise of anti-vaccination movements. Both point to the internet as the source of the movement's success.

consequently warns of the dangers of online information sharing habits and reception, admonishing the internet for weakening principles of journalistic and scholarly integrity.[27]

However the logical extension of this media determinism risks a return to the hegemony of science by villainizing popular media and technology and deifying the scientific method. As the historians and sociologists of science cited throughout this dissertation assert: scientific categories and methods, from objectivity to knowledge and truth shift over time, and are part of a broader sociocultural discourse. This isn't to say that science isn't real or untruthful; rather it is an acknowledgment that science cannot be understood in essential terms or purities.[28] Thus a scientific truth itself cannot be empirical or pure; but nor can it be simply be reduced to social construction. As Latour claims, "scientific facts are indeed constructed, but they cannot be reduced to the social dimension," because the social, like the scientific, is not a stable or pure category.[29] This is to say that attending to social construction does not deny the truth claims of science, but rather it offers an account that can consider science's place within a complex network of discourses.[30] Following Latour's dismissal of the autonomy of science in favor of discourse, I offer a counter question the

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[27] Social media and sharing practices have become a favorite site of blame. For example, Cooke claims, "The instant gratification associated with sharing online stories, liking something first, and collecting friends' reactions also encourages the dissemination of fake news." (214) A scientific study of anti-vaccination websites by Wolfe et al focuses primarily on the failure to provide proper citations or peer reviewed articles. Wolfe RM, Sharp LK, Lipsky MS. "Content and design attributes of antivaccination web sites," *JAMA* 287:24 (26 June 2002): 3245-3248; Cooke, Nichole A. "Posttruth, Truthiness, and Alternative Facts: Information Behavior and Critical Information Consumption for a New Age," *Library Quarterly: Information, Community, Policy* vol. 87, no. 3 (July 2017): 211–221.

[28] Indeed, in their historical work on the scientific method, Joseph Hilgard and Kathleen Hall Jamieson claim that science is "self-correcting," or adapts to paradigm shifts, technological developments, and other sociopolitical conditions. They claim that peer review processes and major contestations to the dominant scientific paradigm are capable of shifting the methods and values of science. Therefore these emerging debates in peer review processes and truth-making systems have the power to impact the future of scientific standards of research. Hilgard, Joseph & Jamieson, Kathleen Hall. "Science as 'broken' versus science as 'self-correcting:' How Reactions and Peer Review Problems are Exploited to Attack Science," *The Oxford Handbook of the Science of Science Communication* (New York, NY: Oxford University Press, 2017), 85-92.

[29] Latour, Bruno. *We Have Never Been Modern* (Cambridge, Mass.: Harvard University Press, 1993), 4.

[30] Sergio Susimoto defends scholars from STS like Latour in the post-truth debate, claiming that sociological accounts of science cannot be blamed for the emergence of skepticism around objectivity, facts, and evidence. Sismondo, "Post Truth?" 3-6.

problem of truth as construction or effect: if truth is indeed a product of construction, what can science and media forms teach us about how we construct truth?

Rather than dismissing the sensationalist or reactionary information practices of the post-truth era, it is worth looking closely at why the flagrant disregard for facts, evidence, and logic is so effective. Truthiness' attention to the feeling, or sensation of truth helps situate the contemporary moment in lineage of affectively driven understandings of the world. In many ways truthiness suggests an intuitive response to the appearance of truth: these "gut reactions" are powerful because "truthiness feels good, because it provides a quick, thought-free source of certainty."[31] Instead of chastising truthiness' easy satisfaction and dismissing the content or sharing platforms and practices of these affective or emotional representations of truth, it is worth considering what prompts these immediate intuitions and reactions. Numerous scientific studies criticizing anti-vaccination rhetoric focus on the types of arguments made against vaccination—"toxic poison," "natural immunities are better," "overwhelmed immune system," "no long-term studies of side effects" etc—or the circulation of anti-vaccination information online through YouTube and social media platforms like Twitter or Facebook.[32] While they acknowledge the persuasive power of rhetoric, these studies never account for the epistemological paradigms and values embedded in the websites, words, or images.

What if instead we used the methods offered by this dissertation to consider the what is going on between the rhetoric—form—and the feeling or impression of truth: what if, rather than dismissing the subjectivity of emotion and affect, we examine *how* these articles, speeches, or

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[31] Payette, Patty & Barnes, Brian. "Combating the "truthiness' tendencies," *The National Teaching and Learning Forum*, Vol. 26, No. 4 (2017): 8.

[32] Kata, Anne et al. "Anti-vaccine activists, Web 2.0, and the postmodern paradigm--an overview of tactics and tropes used online by the anti-vaccination movement," *Vaccine* 30:25 (28 May 2012): 3778-3789; Yaqub O, Castle-Clarke S, Sevdalis N, Chataway J. "Attitudes to vaccination: a critical review," *Soc Sci Med* 12:1-1 (1 Jul 2014); Larson HJ, Smith DM, Paterson P, Cumming M, Eckersberger E, Freifeld CC, et al. "Measuring vaccine confidence: analysis of data obtained by a media surveillance system used to analyze public concerns about vaccines," *Lancet Infect Dis* (7) (13 July

headlines prompt these responses?[33] What if we use those responses to examine the epistemological and aesthetic systems that may underlie these false impressions? Indeed, vaccination education that focuses on conveying accurate scientific information has not shown to be the most effective means of persuading skeptical publics. Rather, recent efforts have shifted toward embedding this information in less didactic forms through web platforms and sharing practices.[34] In line with this attention to the habits and the systems of online information sharing, *Perfect Contagion Machine* advances this shift by attending to the relationship between communication systems and experiences, impressions, and sensations of science and medicine on screen.[35] Rather than dismissing its set of popular texts for its outlandish content, including zombie narratives, highly stylized horror stories, or sensationalist medical drama, this dissertation accounts for how scientific and medical principles are communicated in spite of its fiction. *Perfect Contagion Machine* offers an account of how acute encounters with scientific and medical truths persist these fiction films, television, and games. Thus it offers an account of the "truthiness" of outbreaks on screen that attends to *how* media produce these affective and emotional encounters.

Perfect Contagion Machine demonstrates how "truthiness" is embedded in media texts through iconic imagery—the microscopic image or map—and aesthetic conventions—sound mixing strategies or visual style. Scholars and popular critics of post-truth call for a return to the careful

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2013): 606-613*;* Hausman et al. "Poisonous,Filthy, Loathsome, Damnable stuff: The Rhetorical Ecology of Vaccination Concern," *Yale Journal of Biology and Medicine* 87 (2014):403-416.

[33] In response to the Trump administration's use of alternative facts and the media, media critic Jay Rosen suggests that these rhetorical tools are effective because they employ the "deep grammar of media." Rosen, Jay. "The Last Word with Lawrence O'Donnell." Transcript, *MSNBC,* 6 February 2017, http://www.msnbc.com/transcripts/the-last-word/2017-02-06

[34] Smith advocates for a range of approaches including person-to-person sharing, news editorials, blog posts, and most importantly, articles that can be "stumbled upon" online. While she acknowledges the difficulty to control the nature of this information, these strategies are more in line with everyday information sharing and consumption habits. Smith.

[35] Cooter and Pumfrey call for us to attend to the "communicative production" and experiences of popular science. They ask scholars not to overlook the basic elements of scientific communication and the power of perception, even if it result in misconception. Cooter and Pumfrey, "Separate Spheres and Public Places," 254.

demonstration of citation sources, logical and experimental protocol, and review processes: to explicitly display truth-making protocol. But as I have demonstrated, method and the persuasive powers of scientific reason and evidence are not always so explicit: they are related to the impression of particular aesthetic codes, logic, and language.[36] From the representational reinforcements that surround the microscopic image, to the aesthetic codes of evidence in found fiction horror, this dissertation shows how protocol, evidence, and logic operate through the intersection of science and media forms that collectively produce the impression—sensation—of an emergent outbreak. As such it offers both a method and set of tools examine the post-truth era: one that seeks to find where science and media forms intersect to shape the impression of knowledge. In order to grapple with the post-truth moment, it is critical to consider what how texts communicate or capitalize on the "core values" of empirical or scientific truth.[37] It's not simply that anti-vaccination movements mimic the structures of academic citation without proper sources, or link to articles published in scientific journals: it is a much more complex weave of scientific paradigms and media experiences that shape their impression of truth. Therefore another way to examine post-truth might be to ask whether these articles are calling upon the paradigms and rhetorical structures articulated by this dissertation: to use this interdisciplinary approach to focus less on the content of the falsehoods and examine why they feel truthful in their immediacy.[38]

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[36] In a recent, well-publicized episode of the podcast, Radio Lab, interviews with computer learning data scientists showed that there is little consideration of the role of media, images, and technology in the development of these emerging machine learning projects. Adler, Simon. "Breaking News." *Radio Lab.* 27 July 2017.

[37] Michael Lynch, through an assessment of the post-truth debates in STS, argues that a richer account of the emergence of post-truth is needed. Lynch, Michael. "STS, Symmetry, Post-Truth," *Social Studies of Science.* Vol 47:4 (9 August 2017): 593-99.

[38] One study by Kata et al on the rhetoric of anti-vaccination websites offers a step toward this interdisciplinary approach. Using the method of "thick description" born out of anthropological research, they attempt to track the persuasive rhetoric of two major anti-vaccination websites. However, in an effort to maintain the standards of scientific qualitative analysis they are deconstruct rhetoric into media forms using Aristotle's definition of rhetoric as ethos, pathos, and logos. Logos is located in the website's content, the website's ownership and hyperlinks demonstrate ethos, and the social interactivity of the user is pathos. This admirable combination of humanities, social science, and scientific

This dissertation tracks the way truth is subtly woven into the ordinary encounters with print, digital, and moving images texts, the "basic material products of cultural life."[39] Rather than beginning from the place of outbreak, *Perfect Contagion Machine* attends to the acute evidentiary forms, rational structures, and logic of the media text, to see how media help us navigate the scalar and networked representational challenges by producing the perception of epidemiological "truth." As such, it reveals how the truthiness of an outbreak is embedded in the everyday encounters with aesthetic and representational conventions. But more importantly the structures supporting this impression are not divorced from scientific logic or evidence, but intimately bound up and produced through them. Truthiness, in this sense, is not divorced from or opposed to science and medicine, but actively produced *through it.*[40]

While EIDs provide the context for this dissertation, *Perfect Contagion Machine's* exploration of science and media in popular films, television, and games provides a methodology and set of analytical tools to interrogate the epistemological impressions we face in the post-truth era. In this sense, this dissertation furthers the conversations around "media literacy" advocated by scholars across the sciences and humanities. In response to the sheer scale and speed at which information travels in our networked society, many turn to education to combat the spread of fake news and alternative facts.[41] While media literacy typically refers to the careful examination of citations and

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research is a fascinating one, though it risks a false generalization of user behavior, interactivity, and reception. However combining this logic with the methodological tools of formal analysis and phenomenology could provide a less media-deterministic reading anti-vaccination rhetoric. Kata et al. "Anti-vaccine advocates."

[39]Cooter & Pumfrey, "Separate Spheres and Public Places," 248.

[40] In her account of fake news and online habits, Cooke offers "counter information" as an alternative way of thinking through truthiness. Counter information is not divorced from facts and evidence, rather it is "persuasion by association." The structures articulated in this dissertation, in a sense, articulate how media articulate an outbreak by association. Cooke, Nichole A. "Posttruth, Truthiness, and Alternative Facts."

[41] Though most disciplines advocate for literacy, a number of educational journal have explicitly addressed the problem of media literacy in the era of post-truth. Some include: Peters, Michael A. "Education in a post-truth world," *Educational Philosophy & Theory* 49, no. 6 (June 2017): 563-566; Horsthemke, Kai1. "'#FactsMustFall'? – education

sources, Nichole Cooke, more broadly defines it as a mode of "critical thinking."[42] I offer a way to critically examine *how* outbreaks are sensed through contemporary popular media. Moreover, by locating the relationship between the impressions of scientific and medical truths in the epistemological structures and methods, this dissertation offers a mode of reading that extends beyond popular media texts. Understanding the relationship between evidentiary forms like the microscopic image and disease map, and the sense scientific truth requires not only attending to the presentation of the epidemiological methods, but how those are communicated. Thus the literacy offered here is not only limited to media forms, but the scientific paradigms and epistemologies that help shape the perception of categories like truth that extend beyond the boundaries of a particular medium, and thus allows us to consider an expanded understanding of truth that attends to rhetoric of scientific facts, proof, and evidence that pervades fiction and nonfiction media alike. I want to suggest that in the popular, we might find the origins of a truthiness that doesn't actively contradict scientific truths, but weaves their persuasive grammar into everyday encounters with popular media. Using these methods we then might be able to track a more nuanced and subtle emergence of the post-truth era, one that perhaps acknowledges the role of scientific rhetoric, and doesn't villainize the affects of media forms, but instead turns a critical eye to their powerful intersection.

in a post-truth, post-truthful world," *Ethics & Education* 12, no. 3 (November 2017): 273-288; Lindenberg, Eric. "Professors in a Post-Truth Era," *Chronicle of Higher Education*, November 25, 2016, B3.

[42] Cooke, "Posttruth, Truthiness, and Alternative Facts."

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