

Mixing Oil and Water: An Examination of the Media Propaganda Model in News Coverage of
the Gulf of Mexico Oil Disaster

by

Kristine Mattis

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This dissertation is approved by the following members of the Final Oral Committee:

Sharon Dunwoody, Professor, Journalism and Mass Communication

Marty Kanarek, Professor, Population Health Sciences/Nelson Institute for Environmental
Studies

William Karasov, Professor, Forest and Wildlife Ecology

Elizabeth Kramer, Professor, Social Work

Laura Senier, Assistant Professor, Sociology and Anthropology/Health Sciences (Northeastern
University)

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Abstract

Information about the environmental and health repercussions of an environmental disaster is crucial for successful remediation, for obtaining due compensation, and for preventing future disasters. The public receives most of its information about science and environmental issues from the news media, so what the news media include in their stories and how they frame such disasters has implications for citizens and society, particularly as these high consequence events become more common. The 2010 Gulf oil spill provides a specific case to examine how different forms of news media may differ in their news coverage. Using the media propaganda model as a theoretical framework, this study hypothesized that corporate news media outlets would differ in both the quantity of sub-topics or domains (such as environment, health, economy, risk, uncertainty, and environmental justice) that they employed in their stories, and in the quality of the thematic framing of their stories. This research suggests that not only do corporate media outlets favor economic domains over environmental, health, and risk domains in their stories as compared to independent media outlets, but corporate media outlets also qualitatively frame these stories differently. While independent media outlets tend to stress the risks and effects to the environment and to public health using a precautionary perspective that is more in line with the public interest, corporate media outlets frame the environmental and health risks and effects from a more optimistic perspective, requiring more certitude before accepting the deleterious effects of the Gulf oil spill and employing a perspective in line with the profit model upon which their companies are based. Consequently, the public will tend to receive less news about the issues of particular value to them from the mainstream, more widely disseminated corporate media. This disparity between corporate and independent media systems in their coverage of a disaster such as the Gulf oil spill has implications for the news industry as a whole by suggesting

that independent media outlets may better serve the public interest and that reform may be needed within the corporate media so that they may better serve as the fourth estate.

Chapter 1 - Introduction

More than three years after the largest environmental disaster in United States history, BP (formerly British Petroleum), the operator of the Deepwater Horizon oil rig that exploded in the Gulf of Mexico on April 20, 2010, took out full-page advertisements in the *New York Times*, the *Washington Post*, and the *Wall Street Journal*, among other publications (see Callus, 2013; Weber, 2013). In them, the company portrayed itself as a victim of greedy trial lawyers and plaintiffs trying to take advantage of claims payments, legally mandated to those affected by the Gulf oil disaster as part of BP's plea of guilt. The print ads were headlined "Business Leaders Agree: What's Happening to BP is Bad for American Business" (Gara, 2013) and looked, in appearance, more like a news stories than advertisements. In addition to the print advertisements, BP spokespersons and public relations officials placed numerous op-ed pieces in newspapers and participated in television news interviews in order to spread their message of wrongdoing on the part of so-called fraudulent citizens and attorneys who filed compensation claims as Gulf Disaster victims (Gara, 2013). They also launched a new website to discredit the claims of citizens and promote their narrative about the recovery in the Gulf (Schleifstein, 2013).

In what could be deemed an audacious act, BP sponsored a segment called "To the Couch" on the CNN morning program "New Day." The segment involved the hosts arising from their seats at a table and moving across the studio to be seated at a couch, during which time a BP advertisement touting the company's success in the ecological restoration of the Gulf of Mexico aired in a split-screen *alongside the ongoing broadcast* rather than in the normal commercial time slot (O'Neill, 2013, November 5). This, all while news emerged that a new 4100-pound mass of tar linked to the 2010 oil spill was found on the shore of the Louisiana coast (RT, 2013).

The potentially troublesome aspect of these actions by BP, in terms of the function of the news media, is that the same media charged with reporting on the oil disaster are benefiting from the advertising revenue from a company deemed legally responsible for the disaster. This type of financial conflict of interest, known as the “funding effect” in academia, has proven to lead to biased accounts and conclusions – intentional or unintentional, consciously or unconsciously – when it occurs in scientific research (Bekelman, Li, & Gross, 2003; Gray, Cohen, Cunha, Hughes, & et al., 2004; Hayes, 2004; Krinsky, 2002, 2003; Lexchin, Bero, Djulbegovic, & Clark, 2003; Michaels, 2006; R. Smith, 2005). It would be unwise to assume that the same funding effect does not influence news media stories. Moreover, because corporations such as BP wield tremendous power through their wealth and connections, they are not only able to hire a full-time staff of experts to generate in-house research studies and press releases to promote their position across all platforms of news media but also able to gain access to broadcast airwaves and the op-ed pages of newspapers.

Much as it did in this more recent publicity effort, BP embarked upon an initial image-repair strategy right after the spill first occurred (Goosen-Botes & Samkin, 2013; Harlow, Brantley, & Harlow, 2011). One of the goals of both BP and Transocean (the owner of the drilling rig) was to rename the catastrophe for the media, in an effort to keep their own company names (or the name of the rig itself, i.e. Deepwater Horizon) from being permanently tied to the disaster (Soraghan, 2010). BP sought to control the terminology and word choices of public discussions of the disaster and also embarked upon an effort to minimize the corporate repercussions from the disaster by accentuating the responsibility it was taking in the cleanup efforts (Alexander, 2013). Indeed, these maneuvers are precisely why publicists and the public relations (PR) industry exist. But unlike large corporations and governments, most citizens do

not have elaborate research, analysis, and PR teams to support their own interests. Thus, corporate influences may be better able to fashion supportive evidence and frame news stories through both direct and indirect means. This situation begs the question of whether a news media culture that benefits financially from and fosters close relationships with the very entities it is assigned to cover can act in an objective manner with regard to its reporting of such entities. Though this is not a new question, it becomes more imperative to find the answer when companies, governments, or other agents who may be responsible for large-scale environmental and social harm, such as the disaster in the Gulf, may not undergo the normal scrutiny that the news media are charged with providing to the public. This paper seeks to examine how the news media covered the Gulf oil disaster, particularly with regard to its environmental, human health, and social ramifications. In addition, it seeks to discover if corporate-controlled news media stories differed from independent news media stories in any consistent manner in accordance with a larger theoretical framework.

Background

Earth Day 2010 marked the beginning of the largest offshore oil rig disaster in the history of the United States (Farrington, 2013; Machlis & McNutt, 2010; Williams et al., 2011). Just 21 years after the Exxon-Valdez oil spill in Alaska, the Deepwater Horizon oil rig exploded, killing eleven workers and leaving a leaking pipe spewing at least 205 million gallons (4.9 million barrels) of liquid oil from the Macondo well into the Gulf of Mexico over the course of almost three full months (Paul et al., 2013; Valentine et al., 2010). Until the well was finally plugged on July 15, 2010, crude oil and methane gas seeped nearly unabated from the pipe, located 1.5 km (5000 feet) below the surface of the ocean, 50 miles from the nearest shoreline (Magner, 2011; Paul, et al., 2013; Reddy et al., 2012; Safina, 2011; Valentine, et al., 2010; Williams, et al., 2011).

The amount of oil gushing into the Gulf ecosystem was consistently underrepresented by both BP, the primary owner/operator of the drilling site (and lessee of the Deepwater Horizon rig), and by U.S. government officials (Freudenburg & Gramling, 2011; Juhasz, 2011), much as the amount of leakage was misrepresented by oil and government spokespeople during the 1969 spill off the Santa Barbara, CA, shoreline (Molotch, 1970). Initial news reports cited the official spill estimates that were established jointly by BP and the U.S. Coast Guard. It was not until an independent geologist with the nonprofit organization Sky Truth--using satellite imagery of the spill and blogging his results online--suggested that the official figures were significantly low that news organizations questioned the official sources (Neely, 2013). To be sure, underestimation of these types of oil spills occurs frequently and sometimes purposefully by those deemed responsible, as federal regulations base mandatory victim compensation payment figures on the quantity of oil released (Congress, 1990). In fact, in September of 2013, while on trial for offenses related to the oil disaster, BP officials finally admitted to lying about the amount of crude oil they estimated to have flowed into the Gulf of Mexico (Finn, 2013).

Substantial economic, ecological, and human health effects were also anticipated as a result of the spill. Indeed, the economic impacts on local fisheries (Afifi & Weiner, 2004), and on the citizens relying on them, were enormous (Juhasz, 2011). Oil-coated dead and dying marine wildlife began to wash up on shores in the immediate aftermath of the spill, and, more recently, deformed organisms, particularly shrimp, have been discovered in abundance in the Gulf waters (Dugan, 2013; Jamail, 2012). A recent study demonstrated that contamination of water, sediments, and seafood in the Gulf was greater than previously calculated by National Oceanic and Atmospheric Administration (NOAA) scientists because of their faulty sampling methods (Sammarco et al., 2013).

In addition to the toxic byproducts of the crude oil itself, almost two million gallons of oil dispersants (Corexit 9527A and Corexit 9500A) were utilized to dissipate oil droplets at the surface of the ocean, while 770,000 gallons of dispersants were dispatched to the sub-surface levels (Rico-Martínez, Snell, & Shearer, 2013; Subra, 2010). The latter application protocol was not pre-approved by the U.S. Environmental Protection Agency (EPA) (Subra, 2010). Toxicity information on the dispersants remains limited, primarily because most of the components of these substances are proprietary (Subra, 2010). However, dispersant studies continue to emerge from the spill event. Several studies showed that the synergistic effects from the dispersants may have resulted in more toxicity than that from the crude oil itself (Paul, et al., 2013; Rico-Martínez, et al., 2013). Furthermore, evidence suggests that exposure to the contaminated waters of the Gulf region could lead to DNA damage, mutations, and heritable alterations that will not be visible (especially in higher organism) for many years to come (Paul, et al., 2013).

Human health effects were and continue to be suffered by those living in the Gulf Coast region, especially among those working on the oil spill cleanup efforts (D'Andrea & Reddy, 2013; Juhasz, 2011; Pittman, 2013; University & Health, 2013). Nevertheless, Tony Hayward, the then-CEO of BP, while acknowledging the symptoms suffered by people, claimed that there was no link between the symptoms and either the crude oil or the dispersants used to clean up the spill (Juhasz, 2011). This denial meme, a common one used by industry when dealing with hazards it produces, comprises one aspect of what the Natural Resources Defense Council (NRDC) calls the “Four Dog Defense”¹ (Sass & Rosenberg, 2011). Hayward’s message denying

¹ Four Dog Defense: 1. Deny a substance is harmful. 2. Concede that substance is harmful but deny exposure. 3. Concede exposure to substance, but deny that the substance itself caused the particular harm/health effect. 4. Concede harm caused by substance, but deny responsibility (by claiming ignorance or lack of proper use of substance by others or the like).

a causal link between symptoms suffered and oil spill exposure was then promulgated throughout news media outlets (Juhasz, 2011, p. 123).

The prospect of a troublesome or disastrous event occurring at one of these offshore, deep-sea oil rigs should not have been a surprising one. Other incidents involving unethical, illegal, and duplicitous behavior have been uncovered in some recent endeavors of oil industry conglomerates. BP had historically demonstrated a lack of concern for the risks to its employees and to the environment it utilized. It has a long and storied history of neglect in the realm of safety, of taking short-cuts for economic benefit, of fines and citations from regulatory agencies, and of litigation involving its hazardous practices (Freudenburg & Gramling, 2011; Magner, 2011; Safina, 2011). Transocean, the rig's owner, was involved in 73 percent (24 of 33) of the accidents investigated by the Minerals Management Service (MMS) on Gulf of Mexico rigs in a three-year time span between 2007 and 2010, although it owned fewer than half of the rigs in operation there (Magner, 2011). Most strikingly, while these multinational corporations acquired increasingly complicated technologies enabling them to drill to greater depths beneath the surface of the ocean, they did not concurrently obtain the complementary technologies to deal with any potential catastrophe that might result from their ventures (Freudenburg & Gramling, 2011). Nonetheless, the president of the United States, in an ironically prescient address about the benefits of offshore drilling just eight days before the disaster, declared, "It turns out, by the way, that oil rigs today generally don't cause spills. They are technologically very advanced. Even during Katrina, the spills didn't come from the oil rigs; they came from the refineries onshore" (Obama, 2010, para 48). News media outlets, in turn, echoed the president's words.

The complexity of the oil disaster itself, the lack of precautionary preparations, the history of questionable corporate behaviors, as well as the impacts the catastrophe has had and

will continue to have on the people and biota of the Gulf Coast region, render the disaster a noteworthy (and still ongoing) news story. The media coverage of the oil spill had the potential to enhance attention to and discourse about the spill's environmental and public health effects. To offer an example, media coverage of Occupy Wall Street increased the national dialogue about income inequality and corporate greed, according to a study by Fairness and Accuracy in Reporting (Knefel, 2012). The phrase "income inequality" in stories from *The New York Times*, *Washington Post*, *Los Angeles Times*, and *USA Today* increased by more than 50 percent between June 2011 and November 2011 (Knefel, 2012). Similarly, the reporting of economic, ecological, environmental, and health consequences resulting from the Gulf oil spill had the potential to increase public dialogue about environmental risks associated with the modern technological society.

The manner in which the news media covered the Gulf oil spill has implications for the future public dialogue concerning energy, climate change, and their ecological risks, as information from news sources contributes to citizens' abilities to form their socio-political ideology (Goss, 2013). Moreover, media portrayals of the social and environmental issues that encompass this disaster (i.e., human health effects, loss of livelihoods, risks to ecosystems) could either augment or hamper political actions (Zehr, 2000). As Thomas Carlyle stated in describing media as the Fourth Estate, "Whoever can speak, speaking now to the whole nation, becomes a power, a branch of government, with inalienable weight in law-making, in all acts of authority" (Carlyle, Goldberg, Brattin, & Engel, 1993). Thus, the primary goal of this study is to examine if environmental and health risks from this disaster are topics of discussion in the news media and if so, how these topics are framed by the media. Another objective is to discover whether and how various news outlets differ in their presentation of those risks.

A number of possible explanations may exist to answer why news outlets frame the same story in different ways. One theory suggests that media outlets will act in accordance with common narratives that solidify the interests of the societal stakeholders that finance and sustain them. This theory argues that certain media outlets will identify (or fail to identify) certain issues and frame these issues in ways that benefit the news organizations' continued relationships with their stakeholders. Because framing always marginalizes certain discourses while entrenching others (Castree, 2004), it is important to distinguish potential differences in frames between media outlets that may strive to serve the interests of common people and those that serve powerful corporations and governments.

Consequently, framing arises as a crucial concept from which to derive empirical evidence. The media framing of the Deepwater Horizon oil spill and its consequences may have the potential, in turn, to affect audience perceptions of the issue (Entman, 1993; Gamson & Modigliani, 1989; Iyengar, 2005; Reese, Gandy, & Grant, 2001) and/or policy (Gamson & Modigliani, 1987; Iannantuono & Eyles, 2000). Thus, it is of interest to determine whether the contextual framing of the oil spill varies in different media outlets and whether those differences are reflective of a pattern in some media to highlight certain aspects of the disaster over other aspects.

Chapter 2 - Theoretical Framework

A number of scholarly theories exist to explain how and why media organizations choose certain topics and frames in their reporting of information. Some theories relate to the structure or size of the geographical location that the media outlet serves in relation to local power structures and the content that is produced in the corresponding media outlets. Others focus on hegemony, that is, how power structures maintain their authority (with use of news media), but do not specify geography. Here, I will describe a few theories that might serve to show how different media outlets could vary in their choice of topics and frames when covering the Gulf oil spill and I will return to the media propaganda model, which assumes that media organizations self-censor in order to maintain the status quo within the corporate capitalist paradigm of which they are a part. I will use the media propaganda model for this research study to see if it may illustrate why corporate media stories would contrast with independent media stories in the manner in which they describe the Deepwater Horizons oil disaster and its effects.

Structural Pluralism Model

One model that seeks to explain differences in media coverage of environmental issues is the structural pluralism theory. Originally conceived as a media effects model by Olien, Donohue, and Tichenor (1978), it has since been utilized more commonly as a theory by which to explain media content based upon the ways in which power is organized and carried out at the level of communities. Generally, the model states that as the media system becomes more pluralistic, usually in larger communities, the structure of power will be more diffuse, allowing media to focus more on conflict and diversity. More homogeneous communities, on the other hand, will have more centralized power structures that will expect local media to protect the existing power structure; a focus on conflict will not be welcomed in that configuration

(Donohue, Olien, & Tichenor, 1985). Thus, “conflict reporting by any given newspaper will depend upon the characteristics of the social structure in which that newspaper exists” (Donohue, et al., 1985, p. 489).

Scholarly work has provided much evidence for the theory. In addition, support for the model has arisen in research on news coverage of environmental issues and risks (Griffin & Dunwoody, 1997; Griffin, Dunwoody, & Gehrmann, 1995). On the surface, it would appear that the structural pluralism model directly contradicts the media propaganda model, in that, as Demers (1998, p. 572) states, “corporate newspapers are more critical because they are more likely to be located in pluralistic communities, which contain more social conflict and criticism of dominant groups and values systems, and because they are more insulated from local pressures.” However, much of the supportive studies of structural pluralism in news coverage appear to have been conducted in the 1990s. As Harry suggests in his 2001 article on reporting of an environmental controversy, the model may need re-examination as the social structures of small towns increasingly undergo change, becoming more suburban, less isolated, and thus more pluralistic (Harry, 2001). One can argue that, in the eleven years since Harry’s study, not only have small town communities undergone great change but so have the local, national, and global media systems. In fact, Klinenberg (2007) chronicles the new media landscape in the wake of corporate media consolidation, where many small towns and large cities are left with generic media outlets that disguise themselves as local but actually present identical content to their client communities. In light of the new normal in the media landscape and because this study looks at reporting from national news organizations rather than local/community news outlets, I would argue that the media propaganda model will likely be more accurate in predicting the national media coverage of the Gulf oil disaster than the structural pluralism model.

Gatekeeping Model

Another alternative to the media propaganda model that is somewhat similar in nature is the Gatekeeping model. Nahon (2008) claims that gatekeeping should be seen more as a common heuristic that has not yet acquired full status as a theoretic model. In any event, gatekeeping addresses individuals as acting in a gatekeeping capacity, whereby they will apply their own filters to media output. Gatekeeping addresses the social-psychological processes and decisions of individual journalists and editors, while the media propaganda model addresses the cumulative actions of media as a whole (Klaehn, 2003). In this way, the Gatekeeping model does not apply well to the context of this study.

Watchdog, Lapdog, and Guard Dog Theories

The normative ideal of the news media in much of the developed world is for media outlets to serve as the “fourth estate,” or watchdog for the public. Edmund Burke described this capacity of the media to act as a branch of government – the written word being a form of democratic action (Carlyle, et al., 1993). This theory assumes the autonomy of the media, as well as their concern for supporting the interests of the populace while challenging power. Numerous scholars support the watchdog theory of media (J. B. Abramson, 1990; Arterton, 1984; Cater, 1959; Linsky, 1986). Donohue, Tichenor, and Olien (1995) claim that, while many traditional newspapers derived their names from such a belief in the watchdog role of journalism (e.g., Sentinel, Observer, Monitor, Examiner), in reality the role of the news media in the United States more closely resembles that of a guard dog.

The theory of the media as guard dogs assumes that the press is not autonomous but, rather, serves powerful authority figures, particularly in government. The media “perform as a sentry not for the community as a whole, but for those particular groups who have the power and

influence to create and control their own security systems” (Donohue, et al., 1995, p. 116). In this capacity, the actions of the media depend upon the power structure being served and upon who threatens that power (Donohue, et al., 1995). Thus, local media will act to serve their local power structures, while national media made produce different content based upon the differing power structure that they serve.

The guard dog model suggests that the press protects the dominant local power structure by, among other things, minimizing the reporting of conflict within the local community. The role of the guard dog is to maintain stability and, thus, to preserve the power structure (Donohue, et al., 1995). In this way, the guard dog model is similar to the structural-pluralism model, in that it predicts that the news media will serve to help protect the local power structure. Donohue sees the media as suspicious of intruders and characterizes the relationship of the media to the powerful as one of deference rather than submissiveness. Others have posited that the media may in fact be simply a lap dog to government (Whitten-Woodring, 2009), obedient to authority and without any capacity for independence. But Donohue believes that the media as guard dogs do not necessarily collude with authority, but merely protect it and preserve the status quo (Donohue, et al., 1995).

Among other things, the guard dog theory hypothesizes that, as played out in news stories, marginalized individuals will receive little attention if they are not at the top of the social hierarchy, a pattern supported by Signorielli (1990), who found that television news over-represents professionals and under-represents others. In addition, when reporting about conflicts, only attacks on individuals will receive press coverage, not attacks on large power structures (Donohue, et al., 1995).

In the context of the Gulf oil disaster, while the guard dog model would suggest ways in which governmental or corporate interests may be protected by the media in their news coverage, the only explanation for the action of the media would be to maintain stability. Furthermore, the guard dog model would assume that every news organization would act in the same way, provided it served the same community. So, all national press coverage of the disaster would serve to guard national security. But are there instances in which certain national news organizations might not act in accordance with each other, and if so, what might be the factors that would influence differences in national media coverage of the event?

Media Propaganda Model

A media communication theory that seeks to explain topical and framing differences in media coverage of controversial environmental issues as a function of power is the media propaganda model (Herman & Chomsky, 1988). According to the media propaganda model, large media outlets with multiple market interests are likely to act in accord with state and corporate stakeholders by framing issues within the constraints of particular parameters. In the context of the BP/Deepwater Horizon oil disaster, one might expect to see media outlets with ties to political and commercial interests constructing a message about the spill in a very different manner than media outlets with fewer or no ties to these interests. If that expectation is correct, it is important to note that these disparate messages exist and that they could, in turn, affect the way the public and policy-makers perceive and make decisions about extremely sensitive environmental and public health issues.

The media propaganda model, proposed in 1988 in the text *Manufacturing Consent: The Political Economy of the Mass Media* (Herman & Chomsky, 1988), suggests that the structure of mainstream media is closely connected to state and corporate interests, which fosters the

promotion of certain perspectives in line with the interests of the corporate state. While this model shares similarities with the guard dog model, it does not assume that all media organizations will act in service to power. It proposes specific factors that might explain why a media organization would be aligned with state and corporate interests according to political economy. It also assumes that certain media organizations do not necessarily defer to power, even though they are part of the power structure. Other scholars promote similar views about how media organizations ally with the power structure, while not necessarily being in a deferential position to it (Cohen, 1983; Gans, 1979; Gitlin, 1995; Patterson, 1980).

According to Herman and Chomsky (Herman & Chomsky, 2002), because much of the media are controlled and financed by powerful interests, the media outlets will, by design, produce content that serves those interests. Journalists, reporters, broadcasters, and editors who conform to the desires of the interests at hand will be rewarded in their jobs and will remain within the organization. Thus, the agendas that the corporate interests want reinforced through the media will not be “accomplished by crude intervention but, more subtly, by the selection of right-thinking personnel and by the editors’ and working journalists’ internalization of priorities and definitions of news-worthiness that conform to the institution’s policy” (2002, p. xi). Employees who continually deviate from the norm will likely find themselves unemployed, so the constraints placed on their work may well be learned and acquired and become habit. Consequently, the propaganda model sees media that are not independently owned as operating structurally under the pressure of what may be subconscious but well-defined parameters in terms of discourse:

... the same underlying power sources that serve as primary definers of the news, and that produce flak and proper-thinking experts, also play a key role in fixing the basic principles and the dominant ideologies. We believe that what journalists do, what they see as newsworthy, and

what they take for granted as premises of their work are frequently well explained by the incentives, pressures, and constraints incorporated into such a structural analysis. (Herman & Chomsky, 2002, p. xi)

Herman and Chomsky do not blame individual journalists for promulgating what the two researchers term “propaganda” in the media, nor do they envision a system in American journalism that overtly coordinates authoritarian messages. They simply postulate that the pressures of the capitalist market almost inadvertently cause media with multiple corporate interests to adopt certain interpretive frameworks that continually support market interests.

A Marginalized Communication Theory

Since its inception nearly a quarter century ago, the media propaganda model has been heavily criticized and, as anticipated by its authors, has not received as much attention as other theories of media content in academic studies of communication (Herman, 1996, 2000; R. Jensen, 2010; Klaehn, 2003, 2009; Mullen & Klaehn, 2010; Robertson, 2010). While receiving both positive and negative criticism from scholars (see Pedro, 2011), for a long time, the theory remained largely neglected in academic literature (Robertson, 2010).

Edward Herman describes the model as conceptualizing a “decentralized and non-conspiratorial market system of control and processing” (Herman, 1996, p. 117). It theorizes that the behavior of the mainstream press is largely driven by market forces (Mullen & Klaehn, 2010). Thus, unless one sees the entire market system of economics as conspiratorial, then Herman envisions the propaganda model as merely describing business as usual in such a system.

Much of the criticism of the propaganda model is aimed at the authors themselves rather than the actual theory (Brahm, 2006; Herman, 1996, 2000; Klaehn, 2003; Pedro, 2011), mainly because the authors have become controversial figures in realms such as politics. Other critiques

do focus on the theory itself. One critic suggests that the theory only applies to the U.S. media (Corner, 2003). Some have ascribed ideas to the model that the authors themselves never actually asserted (Mullen & Klaehn, 2010). For example, critics have contended that the model simplifies media effects, yet the theory does not speak to media effects, only to media content (Herman, 1996, 2000; Klaehn, 2003). Herring and Robinson (2003) claim that misinterpretations of Herman and Chomsky's model abound and that these misconceptions "show a systematic pattern of being driven by the ideological frame of reference of those doing the misinterpreting" (p. 554). Perhaps most superficially, some accuse the model of being too pessimistic about the media, yet in their subjective disappointment that the model is not optimistic enough, they give no rigorous academic accounting of why it does not work (Herman, 1996, 2000; Klaehn, 2003).

Probably the most important reason that the model tends to arouse skepticism is in its nature as a structural/systemic theory. It does not purport to make assumptions about individual journalists or news editors or individual newspapers or news programs. It purposely sidesteps the personal intent and decisions of individuals working in media to, instead, try to predict media patterns in aggregate (Klaehn, 2003). As such, it offers a theory by which to examine news media practices and content on a macro level, and to explain differences among different news media structures. It explores the behavior of mainstream journalism, rather than of the individual actors. The theory postulates that the system itself is rigged by market-driven imperatives. Herman (1996) suggests that this idea is controversial to many in a postmodernist world where "global analyses and global solutions are rejected and derided; individual struggles and small victories are stressed" (p. 119). So, many critics do not like the idea that the self-censorship and actions of the system as a whole may supersede the work of the individuals within it (Lang &

Lang, 2004), even as they may acknowledge the habitual, institutionalized process of media production (Mullen & Klaehn, 2010).

In 1919, noted journalist and author Upton Sinclair published a screed about the media system in the United States called *The Brass Check: A Study of American Journalism*. Though not a model or theory of communication practices in journalism, Sinclair's book (1993) describes a print media system with close ties to the corporate state. Sinclair speaks of the influence that industrial interests had on what was published in the news media and on how certain issues were portrayed. He battled to find an outlet to print his stories of unsafe occupational conditions and unfair labor practices, as the same media tasked with publishing his investigative reports relied on advertising from the industries that the reports condemned. Thus, not only does Sinclair's experience of almost a century ago provide a retrospective case study in the propaganda model, it also points toward the applicability of the model in the reporting of environmental and public health issues.

Explication of Theory – The Five Filters

The propaganda model is premised on the idea that the dominant, mainstream media are “firmly embedded in the market system” (Herman, 2000, p. 102) and that this affects the content that they produce. Because the major media conglomerates are so intertwined with other major corporate institutions and government, the news that they produce will rarely counter the interests of the corporations or the state – i.e., the elite – otherwise, the news media's existence may be vulnerable (Good, 2008; Herman & Chomsky, 1988). Moreover, while there may be debates within the mainstream media about certain social, political, or environmental issues, these disputes are bounded by certain parameters. The assumptions underlying these debates remain restricted by the institutions to which the media are tied and beholden (Herman, 1996),

because while these powerful interests may have slightly different individual agendas, they share common political, economic, and social concerns (Klaehn, 2002) . Accordingly, it is a theory of media behavior that may explain and predict certain types of frames.

The media propaganda model lays out five specific factors that affect the presentation of stories in the media (Herman, 1996, 2000; Herman & Chomsky, 1988). These factors act as filters through which the mainstream media self-censor without coercion (Klaehn, 2003), and through which it is decided how the news may be framed, in addition to what ultimately becomes news at all (Mullen & Klaehn, 2010).

The five filters comprise the structural constraints under which mainstream media operate. They include:

1. Ownership: Most news outlets are under the ownership of national or multi-national corporations that own not only the newspaper and/or television news stations but also numerous other corporate holdings. The larger and more vast the holdings of the corporation, the more the news media must service the interests of their corporate ties. Given that public corporations are mandated to prioritize economic growth, if their media holdings compromise that growth by producing content that jeopardizes their overall corporate interest, they could be at risk for penalties from their stockholders.

2. Advertising: Newspapers and television news programs and, to a lesser extent, some Internet news sites, are reliant upon advertisers for revenue and thus may not want to compromise the interests of their advertisers.

3. Sources: News media are reliant upon institutional sources of information, by necessity. In order to maintain those sources of information, they often must conform to the interests of the sources or risk not being able to obtain information at all.

4. Flak: When a media statement runs contrary to the interests of corporate stakeholders – for example, when scientists state that global warming is anthropogenic and businesses need to change their practices to address carbon emissions – there exist powerful organizations devoted to public relations to negatively respond to such statements within media. These hostile and sometimes abusive criticisms of media statements are often churned out and strategically placed into the press by front organizations representing one or more threatened corporate or industrial interests (Rampton & Stauber, 2001; Stauber & Rampton, 1995).

5. Dominant (capitalist) ideology (originally anti-communist ideology): Originally, the fifth filter comprised the always assumed correctness of anti-communist ideology in addressing any story. This fifth filter is now considered a more variable ideological filter, but may generally be regarded as one that assumes the rightness of the dominant socio-political ideology - i.e., of capitalism and free-market ideology (Pedro, 2011). As David Cromwell (Cromwell, 2002, para 4) asks, given that the owners of media corporations are driven by free-market ideology, “how likely is it, then, that such owners would happily allow their own newspaper, radio, or television station to criticize systematically the ‘free market’ capitalism which is the source of his material wealth?” (Cromwell, 2002; Herman, 2000; Klaehn, 2009; Mullen & Klaehn, 2010; Pedro, 2011).

Below, I take a closer look at these five parameters:

Ownership

Media consolidation has become the norm over the past several decades, and fewer and fewer corporate owners control the vast majority of media outlets producing news content (Klinenberg, 2007). When news production is economically tied to conglomerates with financial stakes in countless other ventures, it follows that a critical appraisal of those other ventures by these same news organizations is unlikely, if not verboten. Corporate ownership has been shown

to violate the integrity of the newsroom. Gilens and Hertzman found that news organizations owned by companies that might lose money via the proposed 1996 telecommunications act in Congress covered the bill differently than other news outlets who would not be affected (Gilens & Hertzman, 2000). Furthermore, Curran et. al (2009) demonstrated that corporate news outlets, such as those in the United States., devote less time to public affairs and international news than do public service media outlets (such as those in Denmark and Finland). In turn, the U.S. public who consumes the news produced by corporate media knows less about public affairs than its counterparts in Denmark and Finland (J. Curran, et al., 2009). In addition, Han (1987) found that the vast majority of the major media corporations share members of their board of directors with numerous other non-media corporations, such as banks and law firms.

A couple of recent developments exemplify the role of ownership in the production of news media content. First, the CEO of AOL, when taking over the popular online media outlet the Huffington Post, stressed to his reporters and editors that profitability is the chief criterion upon which any potential news story should be evaluated (Rutten, 2011). In a similar episode, Time, Inc. decided to eliminate the editorial duties of its editor-in-chief and, instead, told the editors of its magazines that they should report directly to the business executives in charge of their publications (Kaufman, 2013). Though these decisions may not represent the state of media ownership in general, they demonstrate how corporate ownership could use the profit motive to alter considerations about what may become news and what may be covered in news stories.

Advertising

Advertisers want to sell their products, and the more money their audience has the more products they may sell. Thus, historically, news has catered to wealthier subsets of the audience (Bagdikian, 1997). Back in 1994, advertisements comprised 65 percent of newspaper space, and

75 percent of all newspaper revenue was generated from ads (Baker, 1994). Take a look at the New York Times on any given Sunday and you will see advertisements from high-end luxury stores along with wedding notices about people from elite universities with impeccable familial pedigrees, as well as party photos from the ultra-exclusive events of the very wealthy. The Wall Street Journal and the Washington Post are much the same. These are not newspapers that cater to the working class majority who inhabit their corresponding cities of publication.

The prestige publications and large media broadcasters are more bound to the financial interest of the investor class than are smaller, less prestigious publications (Hesmondhalgh, 2013). More importantly, large advertisers will rarely overtly support stories that criticize the potentially problematic activities of corporations, such as their collusion with tyrannical governments, their contributions to environmental degradation, or their support of the military industrial complex, (Herman & Chomsky, 1988). In 1985, the Gulf and Western company withdrew sponsorship from public television station WNET in New York after it aired a documentary called “Hungry for Profit,” which questioned the corporate exploitation of the Third World (Herman & Chomsky, 1988). More recently a documentary entitled “Citizen Koch” about the political and social influence of the Koch brothers, two of the wealthiest and most powerful CEOs in America, was prevented from airing on PBS as originally planned, apparently because of the very same influential power of the Koch brothers that the program documents (J. Mayer, 2013). The autonomy of the newsroom is being infiltrated by advertisers (Kovach, Rosenstiel, & Mitchell, 2004), much as it is under pressure by owners, and ultimately “the *advertiser’s* choices influence media prosperity and survival” (Herman & Chomsky, 1988, p. 14) .

Some scholarly literature supports the idea that advertising affects bias or slants in news stories (Altschull, 1994; Bagdikian, 1997; J Curran, 1981; Golding, Murdock, & Schlesinger, 1986). Rinallo and Basuroy (2009) found evidence that newspapers and magazines in both Europe and the U.S. slant their coverage to the benefit of their advertisers, especially when the news outlet depends on a specific industry for its advertising revenues. Similarly, Reuter and Zitzewitz (Reuter & Zitzewitz, 2006) showed that advertisements from financial firms resulted in biased news coverage of mutual fund recommendations in three financial newspapers but not in the New York Times nor the Wall Street Journal. This difference might be explained by Rinallo and Basuroy's study, as the national newspapers do not rely solely on advertising from financial firms as much as the financial press may. Gurwin and Butler (2012) found that local newspapers exhibited a more positive slant in their stories about local companies compared to stories about non-local companies. Ellman and Germano's (2009) findings are worth noting, as news media have become increasingly consolidated. They showed that the newspapers with monopolistic markets biased or under-reported stories that could be detrimental to their advertisers (Ellman & Germano, 2009). However, they also demonstrated that in markets in which two main newspapers competed, increases in advertising in one paper was accompanied by an increase in the accuracy and a reduction in bias in the competing newspaper (Ellman & Germano, 2009). Blasco and Sobrrio (2012) also found that the relationship between story bias and advertising could be reduced by increased competition among news outlets. The implications are that the potential effects of advertising on producing biased news stories could be diminished with more competition among news outlets. Nevertheless, the possibility exists that advertising can influence news stories, and research demonstrates the nuanced ways in which it may operate when it does.

Sources

Propaganda within media systems is furthered by the sources chosen for news stories. First, because media organizations have become more consolidated into large bureaucracies, they tend to gravitate toward other bureaucracies - such as large governments and big businesses - for information, in a process deemed bureaucratic affiliation (Goss, 2013; Herman & Chomsky, 1988). Only other bureaucracies have the capacity assist in satisfying the news production needs of these large news conglomerates through actions such as providing speeches, reports, press releases, and photo opportunities. These bureaucratic relationships then become reciprocal and dependent upon one another as recourses in newsrooms dwindle and reporters are placed under tighter constraints. Particularly within the current system of smaller budgets and fewer reporters, the available news provided by government officials and corporations becomes highly desirable (Herman & Chomsky, 1988). Indeed, Gans (1979) found that prominent or well-know people dominated news stories (71 percent of television stories and 76 percent of magazine stories). Moreover, Sigal (1974) found that, in 1967, government officials accounted for 75 percent of news sources in the New York Times and the Washington Post, while 60 percent of news stories emanated from official channels such as press conferences, press briefings, and press releases. This official source pattern continued in these newspapers in subsequent years as well (J. D. Brown, Bybee, Wearden, & Straughan, 1987).

In addition, this bureaucratic affinity leads to journalists' presumption of the accuracy of the statements given by these sources (Herman & Chomsky, 1988); these sources are highly recognizable and deemed credible by both the reporters and the public (Gandy, 1982; Goss, 2013; Hackett, 1985; Paletz & Entman, 1981). Established figures of authority always have access to the press. Sources are overwhelming drawn from elite sectors of society and reporters

are always more likely to consult governmental and business officials than representatives from labor or public advocacy organizations (Goss, 2001, 2013). During the reporting of the 1995 Chicago heat wave that resulted in a large number of deaths, the majority of information came from officials, while the perspectives of affected citizens and citizen advocates were buried in the back pages of newspapers, if included at all (Klinenberg, 2002). Even when official sources seemed to provide contradictory or disingenuous information, journalists were reluctant to criticize them (Klinenberg, 2002).

Furthermore, a cult of expertise has been cultivated over many years, such that expert opinions are of the utmost value, regardless of their merits (Goss, 2013). Oftentimes, the experts interviewed in news reports are highly paid consultants for industry, have their research funded by industry, or otherwise work for think tanks funded by industry (Herman & Chomsky, 1988). Regardless, their voices have become highly credible and influential despite their conflicts of interest (Herman & Chomsky, 1988).

One reason why the words of official and expert sources are not treated skeptically is that journalists rely on maintaining relationships with these powerful sources in order to ensure access over time (Goss, 2013; Herman & Chomsky, 1988; Klinenberg, 2002; Pedro, 2011). Consequently, not only do these elite sources have greater access to the media but also the veracity of their opinions is not questioned, as might be that of the citizen or activist, because the media outlets share a mutually beneficial relationship with the powerful sources that could be threatened if the sources were critiqued. Recently, the strength of this quid pro quo association has come under great scrutiny, as the Obama administration has sought to curb criticism and retaliate against whistleblowers and government sources who do not disseminate the official word, and journalists and media organizations who dare to include these dissenting voices

(Downie & Rafsky, 2013). The lack of transparency from the administration and the overt threat to journalists in this case seems to extend even beyond the normal, implicit self-censoring behavior that the propaganda model would predict. Rather, it promotes a chilling effect and explicit censorship.

Institutions increasingly seek to control the media agenda and promote particular viewpoints, often by expert members of think tanks and lobbying groups. In fact, think tanks were created to channel information and frame discourse (Goss, 2013; Herman & Chomsky, 1988). Indeed, not only do opinions from these organizations become ubiquitous as they inundate the media with their reports from so-called experts (Herman & Chomsky, 1988) but also the foundations of some news stories now stem from the reports established via these think tanks. Listen to the news and you will often find a whole story that emanates from a report generated by the Heritage Foundation, the Cato Institute, the American Enterprise Institute, the Heartland Institute, the Institute for Policy Studies, the Center for American Progress, or the Brookings Institution, to name a few. While publically funded think tanks with no economic conflicts of interest may well serve the public, more and more think tanks, like the news media themselves, receive their funding from powerful corporations with specific economic and political agendas.

Besides think tanks, public relations entities act as sources for many news stories. Publicists and public relations officials are commonly quoted in stories. Also, because of the centralization of the news media and the reduction of resources and staff, news organizations have become more reliant on canned news releases, produced wholly by public relations firms representing powerful corporate interests, which are disguised as genuinely researched and investigated reports (Goss, 2013; Herman & Chomsky, 1988; Rampton & Stauber, 2001; Stauber

& Rampton, 1995). To be sure, as of 2002, the number of public relations agents working to manipulate news stories outnumbered journalists by 20,000 to one (Herman & Chomsky, 1988, p. xvii).

Finally, there are sometimes seemingly third-party organizations purporting to represent the public interest that are quoted in news stories. While at times these non-profit organizations can be legitimate, there are also numerous industry front groups that have been established by cohorts of corporate entities and that employ names that belie or contradict their social and economic intentions (Goss, 2013; Rampton & Stauber, 2001; Stauber & Rampton, 1995).

Flak

The countermeasures that powerful organizations use or threaten to use to discipline media outlets that, in the view of these organizations, permit too much in the form of dissenting opinions is known as flak. The intention of flak is to shape media behavior (Goss, 2013; Herman & Chomsky, 1988; Pedro, 2011). Flak, according to Herman and Chomsky, “can take the form of letters, telegrams, phone calls, petitions, lawsuits, speeches and bills before Congress, and other modes of complaint, threat and punitive action” (1988, p. 26). Flak has the power to act as an intimidation measure, to prevent news from being produced in the first place because of the risk of a lawsuit or other retaliatory action. If information that could be problematic to the agendas of certain entities appears in news stories, flak may sometimes take the form of attacks against the news outlet(s), the press itself, or against the facts of the stories. (Goss, 2013; Herman & Chomsky, 1988; Pedro, 2011).

Flak is the term given for the retaliatory measures used by entities in order to combat negative publicity. The same public relations agents, industry front-groups, and industry or government spokespeople and experts often use their role to produce this kind of flak. The

repeated claim on television news that anyone who spoke negatively of the American attacks on Afghanistan or Iraq after 9/11 was “unpatriotic” would be considered flak. It was used to deter the openness of discussion and prevent alternate viewpoints, such as those of anti-war advocates. Another example within the media itself is the repetition by many conservative commentators that the news media have a “liberal” bias. The contention has the potential to lead media outlets to refrain from producing any content that might demonstrate signs of being “liberal.” The argument that environmental protections and regulations inevitably come with economic repercussions is also a recurring assertion that has no substantiation, but could be considered flak to neutralize discussion about the environment and support the dominant paradigm of industry.

Rarely can flak be found in the news stories themselves. The flak that occurs in the form of phone calls to journalists or editors, threatened lawsuits, or personal complaints to news outlets cannot be seen by the public. However, flak can also take the form of op-eds or quotations in news stories that exist to counter a narrative previously disseminated in the news. In this manner, flak may be noticeable when an op-ed from a prominent figure or from a prominent organization appears in a news outlet in order to challenge the ideas presented in a story.

Goss notes that, though flak and activism may appear similar and take similar forms, their differences should be duly noted. Activism, he says, “can be defined as actions performed in good faith toward pro-social ends, typically in confrontation with authority. Flak, by contrast, trades on bad faith, is malicious as needed, and is often utilized to thwart pro-social change in favor of the status quo or for reactionary purposes” (Goss, 2013, p. 143). Flak provides a buttress to the interests of the powerful.

Dominant Ideology

While Herman and Chomsky originally conceived of the fifth filter as one of anti-communist ideology (Herman & Chomsky, 1988), which they supported through their case studies, the end of the Cold War and crumbling of the Berlin Wall has left the propaganda model with a modified conception of this filter. Goss utilizes an “Us versus Them” mentality to describe an overarching filter that frames news stories (Goss, 2013). Pedro, on the other hand, describes the updated version of this filter as one that promotes the dominant ideology of the time or place (Pedro, 2011). Meanwhile, Herman himself is more specific. In the new forward to his book, he explains the fifth filter as one that does indeed reinforce the dominant ideology, which is free-market capitalism:

The triumph of capitalism and the increasing power of those with an interest in privatization and market rule have strengthened the grip of market ideology, at least among the elite, so that regardless of evidence, markets are assumed to be benevolent and even democratic (“market populism” in Thomas Frank’s phrase) and nonmarket mechanisms are suspect, although exceptions are allowed when private firms need subsidies, bailouts, and government help in doing business abroad. (Herman & Chomsky, 1988, pp. xvii-xviii)

Shoemaker and Reese (1996) concur that the pursuit of profit, free markets, self-interested entrepreneurs, private ownership, and the capitalist economic system are the values that comprise the dominant ideology in the United States (p. 222). The bolstering of free-market capitalism would also include the support of commercialism and consumerism. In fact, the capitalistic filter through which news may be produced could coincide with the “Us/Them” framework that Goss uses, in that ideas that are purported to be socialist or anti-capitalist are not

only not condoned, but people who express them might be deemed anti-American or pro-European.

As a result of the five filters, the media propaganda model provides a framework to demonstrate how and why dominant, mainstream news media are structurally predisposed to frame news in a manner that supports powerful and controlling interests (Klaehn, 2009). Thus, it can help explain why the more corporately controlled news outlets may differ in their framing of events than locally and/or privately owned producers of news. Journalists admit to the insular networks within the profession, the homogenization of the content, and the boundaries that limit the range of discourse and have served to reduce the viability of the news media as promoting the public sphere (Klinenberg, 2002).

Propaganda Model as Structural Theory

The propaganda model is a structural model defining causality at the level of large media systems as a whole. It does not purport to make assumptions about individual journalists or news editors or individual newspapers or news programs. It purposely ignores the personal intent and decisions of individuals working in media to, instead, try to predict media patterns in aggregate (Klaehn, 2003). It does so because it surmises that, though individual journalists may sometimes produce stories that deviate from what might be considered a proscribed norm, these deviations of content and/or frame will be minimal within the context of the overall patterns of news media content and frames. (Herman & Chomsky, 1988) This is a theory that promotes the examination of news media practices and content at a macro level in order to explain differences among difference news media structures.

Examples and Applications of the Media Propaganda Model

Not only have numerous scholars utilized the media propaganda model and provided evidence to support the theory (see Mullen & Klaehn, 2010, p. 218), but also many scholars argue that the media propaganda model is more relevant now than ever (Good, 2008; Herman, 2000; Klaehn, 2009; Robertson, 2010). The model has re-emerged in the past decade, with a number of studies demonstrating strong support for the theory. Kennis (2009) found that the propaganda model accurately predicted U.S. news coverage of the Ecuadorian uprising of January 2000, while Good (2008) showed that the propaganda model could be utilized to explain differing coverage and framing of climate change between U.S., Canadian, and other international newspapers. In her Masters thesis, Atkins (2003) utilized the propaganda model to demonstrate bias in media framing of mountaintop removal in West Virginia. And while not fully employing the model as theory, studies such as that of Gilens and Hertzman (2000) concluded that corporate ownership strongly influences news coverage, while Curran, Iyengar, Lund, & Salovaara-Moring (2009) illustrated that market-driven media, as in the United States, provide less information to the public than do the taxpayer-subsidized public service media that are dominant in Denmark and Finland.

Other studies not utilizing the propaganda model as a theoretical framework nevertheless support many of its propositions. McLeod (2009) found that in the 2003 approach to the Iraq War, large news media organizations uncritically reproduced the factually inaccurate justifications for engaging in the war, which were supplied to news media by official sources. Widener and Gunter (2007) as well as Daley and O'Neill (1997) both demonstrated a lack of native/indigenous Alaskan perspectives in the news media coverage of the Exxon Valdez oil spill. And while Boyd-Barrett (2004) criticizes the propaganda model for not always accounting for

the “non-routine” operations of the news media, he nonetheless found support for several of the five filters of the model in the context of the New York Times’ reporter Judith Miller’s coverage of the Bush administration’s claims (which served as their justification for war) that Iraq possessed weapons of mass destruction.

Scholar and journalist Chris Hedges, has discussed at length how restrictive the form of American corporate journalism can be. While not directly invoking the media propaganda model, his description of the conditions under which he worked corroborate the theory. As a former foreign correspondent with the New York Times, he had personal experience with the parameters that confine journalists. He says that there are narrow boundaries for what you may write, and that there is even a certain way of writing that one “ingests” when working for a place such as the New York Times (Hedges, 2013b). This fits with Shoemaker and Reese’s contention that media workers who learn their routines well are not only rated as more professional by their co-workers but also get more of their work into publication (Shoemaker & Reese, 1996). Hedges claims that there is a difference between news and truth, and those reporters that who try to report the truth, particularly about those in power, will encounter problems with management and will be cast aside by the organization. “You know within the institution what will advance you and what will not, and, you know, you don’t need a list of rules written on a wall so that the hierarchy of an institution like The New York Times is dominated by people who are careerists, whose loyalty is to their own advancement rather than to the truth” (Hedges, 2013a). In addition, because those who work at elite journalistic institutions are connected closely to the powerful members of government and corporations, they often have a quid pro quo relationship and offer an uncritical forum to the rich and powerful, rather than following the “traditional role of reporting, which should always begin with the assumption that those in power have an agenda

and are rarely bound to the truth” (Hedges, 2009, p. 174). He sees a profound and frightening crisis of American corporate journalism in which the commercial media have become a “tool of corporate propaganda” (Hedges, 2013a).

Brent Cunningham, journalist and deputy editor of the *Columbia Journalism Review*, which provides commentary and critical evaluation of journalism, has also written about the current state of journalism. His descriptions can easily be construed as describing the tenets of the media propaganda theory, although he does not specifically mention the theory by name. He claims that the media no longer envision their role as challengers to the narratives and paradigms of the powerful and that the media will only act in an adversarial role when those in power find themselves in weak and vulnerable positions (Cunningham, 2009). Cunningham states that the press no longer acts as an investigator but, instead, caters to a massive public relation apparatus, and that it does not act in the public interest but, instead, limits its range of discourse to the discourse dictated by the elite (Cunningham, 2009). Furthermore, the press rarely covers the poor and working class, nor the issues important to these disenfranchised members of society (Cunningham, 2009). Cunningham also questions whether the nineteenth century move toward “objectivity” in journalism has supplanted the quest for truth (Cunningham, 2003). He notes that there is a bias rarely discussed in journalism, which is one of class. Most journalists at large media outlets come from Ivy-League universities and upper-class upbringings. They relate more to the rich and powerful and they lack the perspective to cover stories about lower socioeconomic classes and their interest (Cunningham, 2003). Indeed, by the late 1800s, journalists had more in common with corporate elite than the working class (Hart, 1976). Lichter, Rothman, and Lichter found that journalists from the elite nation media organizations in the U.S. were themselves also elite (1986). Wilholt and Drew discovered that U.S. journalists on

the whole come from the most established and dominant cultural groups in the U.S. (1991). Shoemaker and Reese (1996) cite studies that demonstrate the socio-economic background of media professionals can affect their coverage (Farley, 1978; Goodrick, 1991). Moreover, journalists often do not question the validity of their official government and corporate sources, who also come from the same socioeconomic backgrounds (and the same social circles) as themselves.

While Hedges and Cunningham describe the propaganda model as it works within newsrooms, an extreme example of the media propaganda effect, dealing with an issue pertaining to health, can be seen within the lawsuit some years ago by Fox News against its local Tampa television-affiliate reporters who were working on an investigative report about the genetically modified dairy growth hormone, rBST. Because these reporters acted in an individual capacity against the dominant paradigms and agendas of their corporate owner and refused to alter the content and frames of their story, they were fired. According to the reporters, Steve Wilson and Jane Akre (Achbar & Abbott, 2003), after they compiled their investigation into rBST and its effects on dairy cows and on humans who drink the milk from these cows, they were told that the report would not air because Monsanto, the maker of rBST and a major advertiser, objected to the content of the story. When the reporters questioned this censorship, they were told that the report could air only if substantial changes were made, changes that were not all factually accurate. Journalist Steve Wilson claims that his manager told him, “If you refuse to present this story the way we think it should be presented, you will be fired for insubordination.” (Wilson in Achbar & Abbott, 2003). Thus, because Wilson would not honor the parameters to which his reporting was held, he was threatened with dismissal.

Herman (2000) suggested that increased media consolidation and globalization would enhance the application of the propaganda model as a research tool. Newspapers have less and less time and money to maintain the type of investigative journalism that might challenge the corporate power structures (Herman, 2000). In fact, one could suppose that as newspapers especially have lost tremendous amounts of revenue in the past decade because of movement of readers from paying a subscription for or purchasing a newspapers to accessing free news content from sites on the Internet, the force of the propaganda might be stronger still in explaining the content that is seen as a result.

Because environmental issues and the consequences of environmentally related problems are often intricately tied to industry and corporate practices, the propaganda model emerges as a particularly useful theory by which to explain media coverage of these matters. Good (2008, p. 234) asserts that it is the perfect theory to explain media framing of climate change, since climate change “fundamentally challenges the global elite neo-liberal order.” Similarly, the Deepwater Horizon Disaster in the Gulf involves many corporate interests that may have strong ties to media conglomerates such that the propaganda model might predict differences in framing in those media accounts versus other news accounts of the oil spill.

Operationalization of the Media Propaganda Model

Klaehn (2009) proposes that qualitative and quantitative analysis of media discourse is a perfect application of the propaganda model as a theory. Moreover, he suggests that studies of framing, sources, and boundaries of debate are exactly the types of research explorations to which the propaganda should be applied. Klaehn (2002, p. 306) states that the propaganda model predicts that news discourse in mainstream outlets will feature:

- 1) the promotion of ideologically serviceable themes and system supportive disinformation, 2) a low volume of news coverage devoted to reporting on “unworthy victims”, 3) dominance of

official discourse, and 4) a very tight, controlled range of “permitted opinion” and debate on central topics.

By examining different media outlets covering the Deepwater Horizon Disaster and comparing the types of frames used by differing news outlets, one may identify and predict commonalities among news frames stemming from large media conglomerates versus smaller, independently owned news outlets. Since the ownership and advertising practices of the media outlets (the first two filters) would already be known, the frames could be used to illustrate the filters referred to as flak and dominant ideology. For example, flak could be demonstrated if critical appraisals of the corporate responsibility for health effects of the oil spill are broached, but then counter-arguments to these analyses are included either within the stories or in future stories covering the disaster. Words of uncertainty about facts that might counter official sources would represent flak. The capitalist ideology might be evident in the lack of questioning of the need for deep-sea oil drilling and risky energy explorations, or in the declaration of the importance of domestic oil drilling for the American economy. In addition to examining the differences in dominant frames of the Deepwater Horizon Disaster, differences in sources used by the media (i.e., governmental experts, industry spokespeople, private citizens) could also indicate whether mainstream/corporate owned news media are supporting the dominant stakeholder interests.

Though corporate controlled news outlets may indeed sometimes possess conflicting interests with those of the other corporate-owned assets, the propaganda model can explain how this lack of congruence would play out. For example, the audience of a newspaper reporting on the Gulf oil spill might demand stories of human health effects. Thus, it might be in the interest of the news outlet to report on health issues associated with the oil spill in order to increase readership. At the same time, rather than frame the health effects as highly correlated with the

spill and thus very likely caused by the spill, the outlet may instead utilize a highly speculative uncertainty frame to explain that the health effects seen cannot be conclusively linked to the spill. Or rather than discuss the potential deleterious health outcomes, the outlet may minimize the severity of the health effects.

Therefore, the propaganda model and its five filters provide a good theoretical framework with which to examine in detail the potential differences in how corporate versus non-corporate news media outlets cover the Gulf oil disaster. And if the theory proves robust, it could demonstrate the negligence on the part of the corporate media to act democratically as members of the fourth estate in conferring important information to citizens and holding authority figures accountable for their misdeeds to society and to the environment

Chapter 3 - Health Risks and Effects

The potential effects on human and ecological health are likely to be among the topics included in news stories on the Gulf oil disaster. While some information is known about health risks from petroleum and oil dispersants (as used in the cleanup), a great deal of uncertainty exists about the long-term, chronic, intergenerational, and sublethal risks to humans, other organisms, and ecosystems. In fact, these types of uncertainty are endemic due to the amount of knowledge we currently have about toxicological effects of many chemicals, and due to the difficult nature of epidemiological studies. According to the media propaganda model, one would expect corporate media outlets to downplay health risks and effects of the disaster, so as to not promote narratives that could be detrimental to the oil industry. In contrast, independent media would be more likely to focus more on potential health and environmental effects and promote cautionary narratives. In this chapter, I will discuss why risks from chemicals, in general, are hard to quantify and qualify, what difficulty there is in determining exactly what health risks might be expected from this spill, and what risk and effects are known, as yet. In doing so, I will illustrate the complexity for scientists to reliably and assuredly establish the myriad health and environmental risks from and effects of the oil spill. Thus, reporting on these risks and effects should be equally complicated. Stories that make definitive conclusions about the scope or depth of ecological and health effects may not be as accurate as they could be. The amount of time focused on these topics and the manner in which media outlets choose to cover these issues may exemplify their adherence to the media propaganda model of reporting.

Toxicants Posing Risks

The petroleum that emerged from the blown pipe contains numerous constituent compounds that pose threats to both human health and the health of ecosystems in both the short

and long terms. In addition, the by-products from the decomposition of the crude oil and the dispersants applied to the spill are also hazardous to organisms. While some short-term health effects have been elucidated (D. Mayer, 2010; Solomon & Janssen, 2010; Woodward, 2010), little research has been conducted on long-term effects, so they remain largely unknown (Woodward, 2010; Zheng et al., 2014).. Because components of crude oil and dispersant can be immunotoxic (Barron, 2012), carcinogenic (Solomon & Janssen, 2010; Zheng, et al., 2014), mutagenic (Solomon & Janssen, 2010), and endocrine disrupting (Hewitt & Servos, 2001; Vandenberg et al., 2012), the uncertainty about long-term outcomes from exposures to crude oil is vast.

The petroleum that leaked from thousands of feet beneath the ocean is comprised of three main components: natural gas, condensate, and crude oil (Farrington, 2013). Methane is the primary constituent of natural gas, but other gaseous compounds such as ethane and propane may be included as well (Farrington, 2013). Condensate and crude oil are composed of thousands of types of hydrocarbon compounds, most of which are forms of aromatic hydrocarbons like benzene, toluene, and xylene, all volatile organic compounds(VOCs) (Solomon & Janssen, 2010), and polycyclic aromatic hydrocarbons (PAHs). Crude oil also consists of other organic compounds, such as alkanes, and traces of heavy metals, such as nickel and cadmium (Bosch, 2003; Farrington, 2013; Zheng, et al., 2014). Additionally, crude oil can emit hydrogen sulfide gas (Solomon & Janssen, 2010). All of these compounds have the potential for immunotoxic (Barron, 2012), neurotoxic, carcinogenic, mutagenic, and endocrine disrupting effects on organisms (Hewitt & Servos, 2001; Solomon & Janssen, 2010). Nevertheless, the ability to discern which effects have occurred to which organism(s), species, or the ecosystem as whole at any given time is fraught with uncertainty.

Toxicological/Ecological Health

Many are familiar with the aphoristic quotation from Paracelsus, “the dose makes the poison,” a modification of his actual statement, "All things are poison, and nothing is without poison; only the dose permits something not to be poisonous" (Deichmann, Henschler, Holmstedt, & Keil, 1986). A simple example that illustrates his rule is demonstrated with essential vitamins, which are needed by humans in certain doses but can be poisonous and harmful at other doses. Indeed, the monitoring and assessment of dose of and response to a substance in organisms composes the paradigm from which toxic risk assessments follow. Though dose certainly plays a role in toxicological effects, one must first acknowledge that dose-response interactions do not necessarily follow simple linear or even exponential curves, wherein a higher dose means a more detrimental effect. In fact, the response of humans to vitamins at different doses does not demonstrate this typical monotonic effect (Vandenberg, et al., 2012). Moreover, dose is not the only critical factor in determining the toxicity of a substance. The measure of the toxicity - the biological endpoint, i.e., the effect of the substance on the organism – is one important feature in toxic assessment that must be considered, as toxicity may not be found if the correct endpoints are not contemplated at various doses of exposure. The time of exposure and the time at which endpoints are assessed may also affect the determination of toxicity. Furthermore, one may not assume that similar doses or similar endpoints may be generalizable to all species. Finally, the type of endpoint observed from exposure to a substance, and its indirect effect on other organisms, species and/or ecosystems as a whole can be lost in toxicological assessments. Thus, attempting to assess the full spectrum of toxicity of any substance becomes much more complex than a simple dose-response curve would suppose, and

conveying that complexity to the public at large can be a difficult but vital aspect of toxicological risk assessment.

When examining the toxicity of a contaminant, the choice of endpoints being studied can determine whether or not toxicity is found. The first problem with examining a particular endpoint is the traditional assumption in toxicological studies that the higher the dose, the greater the effect, and that at a small enough dose the effect will disappear. This supposition is almost universally utilized in environmental risk assessment and in determining safe levels of substances (Vandenberg, et al., 2012). With regard to endpoints such as cancer or death, common policy is to find the lowest observed adverse effect level (LOAEL) and then to extrapolate to predict the no observed adverse effect level (NOAEL). But evidence of endocrine disrupting effects of contaminants over the past few decades has completely altered the landscape in terms of how endpoints should be examined. Substances found to be endocrine disruptors, and, in fact, other compounds as well, such as heavy metals, demonstrate nonmonotonicity in their dose-response relationship (Colborn & Thayer, 2000; Hayes et al., 2011; Vandenberg, et al., 2012); that is, the response in terms of positive or negative outcome changes sign along the dose-response curve, sometimes more than once. This effect results in dose-response relationships that can appear U-shaped, inverted U-shaped, sigmoid, inverted sigmoid, or a variety of other shapes (Vandenberg, et al., 2012). Cavieres, Jaeger, and Porter (2002) observed this inverted U-shaped effect with a commercial herbicide mixture containing 2,4-dichlorophenoxyacetic acid (2,4-D), in which a decrease in litter size of mice was associated with high and low dose exposures, but not with doses in the mid-range. Consequently, if a researcher simply examines the endpoint at higher doses, finds what he determines to be the LOAEL, then extrapolates to lower doses to find the no observed adverse effect level (NOAEL)

based on a linear or exponential model, the researcher might miss adverse effects that actually do occur at the lower doses not tested.

Another problem with the monotonic assumption of dose-response curves in terms of endpoints is that different endpoints may be observed at different points along the curve (Hicken et al., 2011; Vandenberg, et al., 2012). In other words, a contaminant may demonstrate a linear dose-response curve in terms of the endpoint of cancer (increased cancer at higher doses), and may also demonstrate the opposite linear curve in terms of an endpoint of reduced reproductive ability (increased reproductive impairment at lower doses). Therefore, in examining adverse effects of the contaminant, the overall dose-response curve for these multiple endpoints would be U-shaped and it can be concluded that the contaminant is toxic at both high and low doses, but it is imperative that both endpoints be studied to observe this effect.

An additional consideration in toxicity assessment is the time of the exposure, both in the life of the contaminant as well as in the life of the organism. Ji et al. (2011) found the potential for both genotoxicity and endocrine-disrupting effects on organisms exposed to sediment near a crude oil spill two years after the spill occurred. Partially because chemical and biological processes such as evaporation, photo-oxidation, emulsification, microbial degradation, and sedimentation (weathering) break down the crude oil from its original constituents, different components may be more or less present and more or less toxic at different times (Ji, et al., 2011). Low molecular weight components of oil such as volatile organic compounds (VOCs) like benzene toluene and xylene, which tend to dissipate earlier, are genotoxic and carcinogenic (Ji, et al., 2011). It follows that the endpoint of cancer may be a higher concern for organisms exposed to oil at the early stages of the spill. High molecular weight substances such as polycyclic aromatic hydrocarbons (PAHs), which have endocrine disrupting effects, make up a

large amount of weathered oil. So, the endpoint of reproductive-related anomalies or problems with offspring might be one to scrutinize more closely in organisms exposed to oil at a time more distant from when the spill occurred.

Indeed, Hicken, et al. (2011) concur that not only the dose but also the time point at which the exposure occurs play a significant role in determining and evaluating endpoints. They showed that embryonic fish exposed to low-dose PAHs exhibited subtle changes in heart shape as well as reduced swimming speed as adults, both indicative of reduced cardiac output. It was already known that heart failure occurs in embryonic fish exposed to high doses of crude oil, but Hicken et al (2011) demonstrated that the longer lasting compounds resulting from crude oils spill (i.e., PAHs) produce different adverse cardiac endpoints in fish embryos at lower doses than expected, and at a time when the contaminant may have been remaining in the environment over a long period.

The study by Hicken et al, (2011) also speaks to the importance of examining the time of exposure and the time of assessment within the life of the organism when evaluating physiological endpoints. In their study, fish were exposed to PAHs at the significant stages of embryonic development. At all levels of contaminant exposure that were utilized in the study, increased rates of death were observed (Hicken, et al., 2011). However, if death was the only endpoint examined, then the subtle cardiac effects of PAH exposure would never have been elucidated. Additionally, if the fish were not examined as adults (i.e., at a different time point in their lives) then the sublethal effects of PAHs would also have not been observed. So, it is crucial to see that prenatal exposure in embryonic development may produce different endpoints than exposure in adults. A substance may not be toxic to the organism exposed to it, but mainly to the organism's offspring, whether or not the offspring itself was exposed to the contaminant

(Colborn & Thayer, 2000; Vandenberg, et al., 2012). Sometimes a contaminant may have no adverse effect on adults but may only act adversely when exposure occurs at critical stages of development, either in an embryo or a developing child (a quite common occurrence in exposure to endocrine disrupting chemicals) (Colborn & Thayer, 2000; Vandenberg, et al., 2012). With the emergence of information about epigenetic inheritance, we know that environmental toxicants may not only alter DNA sequences, but they can also alter how genes are expressed through processes such as DNA methylation. These epigenetic traits can be passed down through many generations, affecting gene expression and causing illness and disease. So, the monitoring of potential endpoints in adults who were exposed to a contaminant as embryos, infants, or children, as well as the monitoring of offspring of exposed individuals is essential, because effects may not be observable until a time point far from the exposure (or lack of exposure, in the case of inherited epigenetic effects) (Colborn & Thayer, 2000). Obviously, this type of monitoring or evaluation can prove to be extremely difficult, if not nearly impossible.

Kenow et al. (2003) also demonstrated the importance of time of exposure to a contaminant in terms of biological endpoints. In a study combining lab and field components, the effects of methyl mercury (MeHg) exposure on the growth of loon chicks was analyzed. Chicks taken from nests in the lakes of northern Wisconsin were reared in a laboratory setting and fed a diet containing MeHg. At all treatment levels, no effects of MeHg exposure on loon growth or survival were discernable. Nevertheless, evidence existed of lake source effects on chick growth, as chicks from more acidic (low pH) lakes tended to be smaller than chicks from neutral pH lakes. Since the chicks were taken from the lakes while still in their eggs, it appears that the exposure to MeHg *in ovo* might produce more adverse outcomes than exposure after birth. Moreover, with the knowledge of the subtle effects of MeHg in humans, primarily in terms of

cognition – decreased memory function, attention deficits, and decreased intelligence quotient – the endpoint of growth rate examined by Kenow et al. (2003) might not be the most appropriate for mercury. Devising a method of examining subtle cognitive endpoints in the loons might show more significant results from MeHg exposure.

Investigating the temporal aspects of and/or correct endpoints for particular doses of potential toxicants encompasses one facet of ecotoxicological assessment of substances. Another facet is the specificity of effect of substances on different organisms, species, and sometimes even specific animals within a species. In his research of the endocrine disrupting effects of the common U.S. herbicide atrazine, Dr. Tyrone Hayes and his colleagues have demonstrated reproductive effects such as gonadal abnormalities, demasculinization, feminization, and chemical castration in male African clawed frogs (*Xenopus laevis*) (Hayes, Collins, et al., 2002; Hayes et al., 2010), and in male American leopard frogs (*Rana pipiens*) (Hayes et al., 2003; Hayes, Haston, et al., 2002) at low ecologically relevant doses. Consistent with the molecular mechanism of aromatase induction and the conversion of androgens into estrogens, similar effects have been found in fish, reptiles, and mammals as well (Hayes, et al., 2011).

Nonetheless, though similar effects of atrazine exposure have been demonstrated across vertebrate classes and within a number of species, that does not mean that these effects are exactly the same at the same doses within species or across species, nor does it mean that all species, classes, or particular individuals will be affected at all by a particular contaminant such as atrazine (Hayes, et al., 2011; Vandenberg, et al., 2012). Considerable differences in effects between species can occur from the same contaminant; understandably so, considering differences in endocrine pathways between different species and between different genders of the same species. Thus, endocrine disrupting hormones can produce different endpoints depending

on the metabolic pathway they affect and depending upon exactly how they affect that pathway, because the concentrations at which hormones are active vary between and within species, and because endocrine disrupting chemicals may act via multiple mechanisms, all of which can differ between and among species (Hayes, et al., 2011; Vandenberg, et al., 2012). Most obviously, endocrine disrupting chemicals can often have sex-specific effects (Colborn & Thayer, 2000), as demonstrated by the reproductive effects of atrazine in frogs, which were apparent in males but not females (Hayes, et al., 2003). Furthermore, different effects among species, classes, or individuals may occur because of specific physiological characteristics of particular organisms. For example, while it seems that atrazine consistently affects embryonic gonadal development across vertebrate classes, the barrier of an egg shell in reptiles as opposed to the other classes may result decreased exposures at similar environmental concentrations, and thus different effects or no effects observed (Hayes, et al., 2011). Consequently, the supposition that effects of contaminant exposure are quantitatively and qualitatively identical between and among species is erroneous, but the lack of an effect in one organism at one particular dose does not negate the possibility of adverse or detrimental effects in other organisms and at other doses.

Thus far, the discussion of biological endpoints relevant to toxicological studies has focused mainly on endpoints seen at the individual or organismal level, yet many effects of toxic exposures, particularly those that manifest themselves as subtle or sublethal to an organism, may also appear at a population and/or ecosystem level. Moreover, not only may direct effects occur to one organism or one population, but indirect effect may appear in another organism or population (Colborn & Thayer, 2000). The first example of an indirect effect is one that can occur in the offspring of exposed individuals. Even if the offspring is conceived long after the toxic exposure, genetic and/or epigenetic effects of the exposure may produce a toxicological

endpoint in the offspring, which could be lethal or subtle (Colborn & Thayer, 2000; Vandenberg, et al., 2012). The subtle effects of lead exposure in human children can serve as a hypothetical illustration. Often the mild cognitive impairments from lead exposures in individual children may go relatively unnoticed by parents and peers. But if an entire cohort population of children were to be subtly affected and intellectually impaired, not only could it be more noticeable at the population level but also it might then affect other aspects of society as this cohort ages. A more concrete example is exhibited in the results of the Hicken et al. (2011) study revealing decreased cardiac output and swimming ability of zebrafish after embryonic exposure to PAHs. If a whole population of fish were to lose their swimming capabilities, they might be more apt to be preyed upon, and/or less able to obtain prey. Consequently, their population could be affected as well as the populations of many or all of the organisms in their food web, resulting in ecosystem level changes. To be sure, such subtle effects as functional and behavioral impairments are of great ecological concern (Hayes, et al., 2011). Similarly, the reproductive impairments such as the altered gonadal development, feminization, and hermaphroditism in male frogs could affect population size and constituency, and consequently effect whole ecosystems.

Most startlingly, Hayes et al. (2010) crossed two types of genetically male frogs (ZZ genotype), those that had been unexposed to atrazine and those that were feminized by atrazine exposure. These frogs then produced viable offspring who were subsequently also exposed to atrazine during larval stages of development. The second generation of frogs (F1) was followed for three years into adulthood to assess the effects of long-term exposure to atrazine on adult, genetically male frogs. Because the parental generation (P1) was genetically all male (ZZ), any females or hermaphrodites in the offspring population (F1) were also genetically male (ZZ). Ten percent of atrazine-exposed offspring (F1) were feminized by the exposure; though it is not clear

why the other 90% remained male, they did suffer from demasculinization and displayed altered behavioral patterns. This study demonstrates the possibility that frog populations continually exposed to atrazine could become more and more skewed in proportion of males to females over multiple generations. And indeed, given the ubiquity of atrazine in U.S. waterways, exposure does seem to be perpetual (Hayes, et al., 2003). Moreover, demasculinized male frogs may be less inclined to seek females and copulate, which might result in a decline in frog populations. Therefore, while frogs in the wild may appear to be female and male phenotypically, genotypically their populations could be skewing toward more male, and could be declining overall because of atrazine exposure. Though feminized genetic male frogs can copulate with “normal” males, the existence of increasing numbers of genetic males may have unknown effects on the population as a whole, as well as on the ecosystem within which they exist.

It might appear that, given the myriad of endpoints to examine as well the differing types of dose-response curves and species to consider, every substance may be poisonous in some way at some level. Yet, such an appraisal would be overly fatalistic. The situation suggests that toxicology should remain apprised of, and incorporate the growing bodies of knowledge related to the more complex direct and indirect biological and ecological pathways of chemical effects on organisms, populations, and ecosystem. The traditional risk assessment paradigm supporting ecotoxicological evaluation of a substance on one organism, for one endpoint, through dose-response testing based on archaic assumption of monotonicity of effects, is a notion of which all researchers, and more importantly regulators, must be disabused. Consequently, when speaking of potential toxicological effects of the Gulf oil disaster (particularly the long-term outcomes) it might be more prudent for scientists to stress the tremendous uncertainties inherent in their assessments and to emphasize the need for more cautious rather than conservative assessments of

ecological risks. It would follow that we should see these cautious estimations about the short and long-term ecological effects of the Gulf oil disaster in media reports of the spill, as opposed to suppositions that the effects have been mild or non-existent.

Ecological Effects

While uncertainty abounds about the impacts of the Gulf oil disaster, a variety of ecological effects of have already been demonstrated in a number of studies. Dead and deformed foraminifera (a type of protist) were found in heavily oiled marshes, which suggest that the marsh food web has been or will be disturbed (Brunner et al., 2013). Indeed, damage to the wetlands appeared to be extensive (Inkley, Gonzalez-Rothi Kronenthal, & McCormick, 2013). White et al. (2012) found extreme stress, including bleaching, to coral communities within 20 km of the spill and concluded that these effects demonstrated the unprecedented magnitude of the impact to the marine ecosystem. Certain fish species displayed decreased lymphocyte counts following the spill, which speak to the immunotoxic effects of the crude oil (Ali et al., 2014). Bluefin tuna, yellowfin tuna, and amberjack embryos exposed to PAHs from the spill were shown to have decreased cardiac function, which not only has implications on the individual level, but has wider implications for the mortality of the population and ecosystem in which they reside (Incardona et al., 2014). Crude oil exposure may have been responsible for the reduction by 20% of the number of juvenile bluefin tuna in the Gulf in 2010 (Inkley, et al., 2013). Crude oil exposure in early stages of life also seems to have reduced swimming performance in juvenile mahi-mahi (Mager et al., 2014), which may have future implications at the population and ecosystem level. Finally, crude oil from the Gulf spill has the potential to disrupt developmental processes and produce a number of novel deformations in the embryos of zebrafish (de Soysa et

al., 2012), demonstrating the possible sublethal, intergenerational, and endocrine disrupting effects that the spill may have on organisms.

Higher up on the food chain, the once endangered brown pelican suffered greatly from oiling. As of May 2011, almost 70% of the more than 800 pelicans collected in the oil spill area had died or were dying (Inkley, et al., 2013). In fact, the mortality rate of many tetrapod vertebrates increased exponentially after the spill (Antonio, Mendes, & Thomaz, 2011). Fifty-three percent of sea turtle species captured in the spill area through February 2011 and 89% of cetacean species were dead following exposure to the oil spill pollutants (NOAA, 2013a, 2013b). More specifically, the health of bottlenose dolphins in Barataria Bay, an area of heavy crude oil exposures, has declined drastically (Schwacke et al., 2013). These dolphins continue to show signs of sublethal health effects, specifically adrenal toxicity and severe lung disease, both consistent with petroleum hydrocarbon exposure (Schwacke, et al., 2013). In many of these cases, the increased mortality and morbidity rates cannot be definitively attributed to the spill (Antonio, et al., 2011; Schwacke, et al., 2013). Nevertheless, one study states that of all cetacean deaths after the spill, only about 2% of carcasses are recovered and actual mortality from the event could be 50 times higher than estimated (Williams, et al., 2011). These researchers further declare that, though a number of media reports claimed only modest environmental effects from the spill, these moderate estimates were highly unreliable (Williams, et al., 2011).

As far as specific effects from the dispersant Corexit 9500A that was administered throughout the Gulf marine ecosystem, it appears that this dispersant produces problematic effects on microorganisms. Hamdan and Fulmer (2011) found decreased production and viability of certain types of hydro-carbon bacteria in the presence of Corexit. Consequently, Corexit could have inhibited the natural bioremediation effects of bacteria in the marine environment. In

addition, Corexit has the ability to alter the activity of certain types of viruses, potentially leading to an increase in harmful marine pathogens and, consequently, to possible changes in the entire aquatic biosphere (Pham, Huang, Chen, & Bols, 2013).

Thus, while some ecological effects from the oil spill are acute, others are chronic and portend larger and more lasting impacts on both species and ecosystems. Paul et al. (2013) suggest that DNA damage and heritable alterations to exposed individuals and species may be ongoing and “might not become apparent in higher organisms for years” (p. 9651). Montagna et al. (2013) reported deleterious effects on benthic invertebrates including microfauna and microflora and propose that recovery rates for these organisms will take decades or longer. Rico-Martinez, Snell, and Shearer (2013) demonstrated that Corexit could have synergistic toxicological effects with crude oil, and these synergistic effects on organisms have been underestimated. Dispersants were recently found to be cytotoxic and genotoxic to sperm whales, which suggest potential similar toxicity in other marine mammals (Wise et al., 2014). Goodbody-Gringley et al. (2013) uncovered that dispersants were toxic to coral reefs and thus pose a large threat to marine ecosystems. Finally, Soto and Vazquez-Botello (2013) declared that with our current knowledge about the deep sea – including circulation patterns and biodiversity – it is nearly impossible to predict either the degree of damage or the duration that these ecological effects may have.

Environmental (Human) Health

When environmental disasters of great magnitude occur that have the ability to produce numerous health effects, the complexity and uniqueness of the event, the aftermath, and the inherent uncertainties involved coalesce to render health risk assessments quite difficult. In order to fully comprehend the health risks emanating from such an event, a single initial risk

assessment will not suffice. Risk assessment must be an iterative process that examines a multitude of factors. Health monitoring in the wake of the event and interdisciplinary research involving hazards and exposures will all contribute to a more accurate understanding of the risks. The Gulf oil spill of April 2010 provides an on-going example of the complicated variables and difficult practices entailed in explicating the myriad of health risks that may ensue from the disaster. To be sure, very little is currently known about the long-term human health risks from exposure to crude oil (Woodward, 2010; Zheng, et al., 2014), partially because governmental bodies charged with monitoring public health failed to conduct health impact research on exposed citizens and clean-up workers following the Exxon-Valdez spill in 1989 (Mascarelli, 2010; R. Moore & Burns, 2011; Reardon, 2011). In short, there are many obstacles in the various risk assessment processes to be able to fully elucidate the short and long term health risks stemming from an environmental disaster of such scope as the Gulf oil spill.

Risk assessment is ill defined and may not mean the same thing to different people in different disciplines. Consequently, a risk assessment can take a variety of forms that arise from the different data amassed, resources available, scope of, and purpose of the endeavor (Patton, 1993). In general, a risk assessment may be defined as “the process by which scientific data are analyzed to describe the form, dimension, and characteristics of risk – that is, the likelihood of harm to humans or the environment” (Patton, 1993, p. 11). Most commonly, risk is said to be the sum of hazard plus exposure, hazard often being characterized via dose-response data and exposure being characterized through other evaluative methods and disciplines. Risk assessment may be prospective, seeking to predict future harm, or retrospective, examining the harmful effects after they appear (Patton, 1993). In the case of the Gulf oil spill, a prospective examination of risks in addition to a retrospective evaluation will likely be the only means to

wholly encapsulate the plethora of health risks associated with the disaster. Unlike during the Exxon Valdez disaster, the National Institutes of Environmental Health Sciences (NIEHS) embarked upon a large, longitudinal, epidemiological study of health effects from the Gulf oil disaster, but the work has not yet generated any peer-reviewed results or reports (D. Mayer, 2010; NIEHS, 2014). It may take years or decades to generate results pertaining to long-term and chronic health consequences of the disaster (D. Mayer, 2010).

Risk characterization stems from many different disciplines such as chemistry, biology, geology, toxicology, and epidemiology, whose combined research helps to identify and evaluate hazards and exposures (Patton, 1993). However, uncertainties lie in each field utilized and in each step of the risk characterization process (i.e., hazard identification, dose-response evaluation of hazard, and exposure evaluation). Typical uncertainties include holes in data and measurement uncertainties (Patton, 1993), but a host of other uncertainties regarding toxicology and health outcomes abound, making reliable and comprehensive risk assessment of an environmental health situation complex. Thus, variability, misunderstanding, and controversy may be implicit within the context of assessing health risks from a disaster like the Gulf oil spill (Patton, 1993).

Among the first uncertainties in risk assessment of an environmental disaster is the identification of the potential hazards. In certain situations, the specific hazardous substances may be much less identifiable than in others. For example, in the derailment of a train transporting one particular compound that spills, it would be much easier to identify this one hazardous substance than in a violent storm during which various forms of liquid and solid debris or runoff could seep into water bodies used for drinking water. In the case of the Gulf oil disaster, it appears that the health hazards emanate mainly from two specific substances: the

crude oil spilled and the dispersants used to separate the oil particles. While there exists much information about the components and degradation products of crude oil (see Ji, et al., 2011; Rotkin-Ellman, Wong, & Solomon, 2011; Solomon & Janssen, 2010), many of the ingredients comprising the dispersants Corexit 9500 and Corexit 9527 are still unknown because of the manufacturer's claim of proprietary information (Juhasz, 2011; Subra, 2010; Toxipedia, 2011). Thus, even when the chemical compounds of concern are themselves identified, their components and byproducts, which can also be hazardous, may not be elucidated.

Assuming hazards have been identified, they then need to be evaluated, which itself can be fraught with uncertainty. A large number of chemicals, particularly synthetic ones, have not undergone toxicological evaluation. Of the more than 80,000 chemicals in use today, only several hundred have been tested for safety (Christiani, 2011; Effio et al., 2012). As a result, little toxicological evidence exists to illustrate the hazards posed by many, if not most, of these chemicals. Nevertheless, many common chemicals such as the constituents of crude oil have been investigated, and their toxicological effects are somewhat recognized (Rotkin-Ellman, et al., 2011; Vandenberg, et al., 2012). Additionally, at least some toxicological information is known about detergents and surfactants, the general categories under which the Corexit oil dispersants fall (Vandenberg, et al., 2012). Indeed, sometimes chemical safety is inferred about a particular substance via data derived from studies of a structural similar compound (Patlewicz, Chen, & Bellin, 2011). However, herein lies another area of uncertainty; sometimes these inferences based on chemical classes can be highly useful and valid, while other times they can be erroneous.

Evaluating precisely what types of health threats the potential hazards pose is yet another area of uncertainty. The standard practice for determining safety of a chemical is dose-response

testing in animals (Patton, 1993; Vandenberg, et al., 2012) through which compounds are tested for adverse effects at high doses. A lowest observed adverse effect level of the chemical (LOAEL) is determined, as is a no-observed adverse effect level (NOAEL), based upon a series of calculations factoring in uncertainty variables such as age differences, species differences, etc. (Vandenberg, et al., 2012). From there a reference dose is calculated (often ten times less than the NOAEL), presumably the safe level of that chemical in terms of human exposure to it (Vandenberg, et al., 2012). A number of problems arise with utilizing dose-response animal testing. First, not all chemicals affect all animals in the same manner, so while that inference of effects may be reliable with certain chemicals and organisms, it may be deeply flawed for other chemicals and organisms. More significant, though, is the fallibility of the underlying assumption of the dose-response paradigm, which assumes a monotonic, linear or exponential relationship between dose and effect. Over the past couple of decades, this expectation has been proven false, especially in the case of endocrine disrupting chemicals (EDCs) (Colborn & Thayer, 2000; Vandenberg, et al., 2012).

Endocrine disrupting chemicals exhibit nonmonotonic dose-response curves (NMDRCs), in which the sign (positive or negative) of the response can change throughout the measurement of the dosages, and the curves can be observed graphically as U-shaped (health effects at low and high doses but not intermediate), inverted U-shaped (health effects at intermediate doses only), or various other curve forms (Vandenberg, et al., 2012). In these cases, which apply to a wide variety of chemicals found to affect the endocrine system and also apply to a number of heavy metals, the health effects of certain chemicals at low doses can be more pronounced than at high doses, or the endpoints can be completely different at low doses relative to high doses (Colborn & Thayer, 2000). For example, one chemical may produce genotoxic/carcinogenic effects at high

doses, while at low doses it may demonstrate subtle or sublethal effect related to reproductive ability. Or, as in the case of the breast cancer drug tamoxifen, initially low concentrations circulating in the bloodstream of patients produce a “flare” or growth of their tumor until higher therapeutic levels of the drug are established, which reduce their tumor size; then, at very high doses, tamoxifen is lethal to patients (Vandenberg, et al., 2012). Polycyclic aromatic hydrocarbons(e.g., naphthalene) and heavy metals, which constitute some of the chemical constituents of crude oil, and classes of detergents and surfactant (which may be akin to the dispersants used in the Gulf oil spill) are endocrine disruptors and possess non-monotonic dose-response curves. (Hewitt & Servos, 2001; Ji, et al., 2011; Vandenberg, et al., 2012). Consequently, toxicological assessment of the hazardous chemicals associated with the Gulf oil disaster may be insufficient unless all doses have data for multiple possible endpoints (not simply common endpoints such as cancer and death) and the assumptions of monotonicity, LOAEL, and NOAEL are discarded.

Beyond the uncertainties with toxicological identification and evaluation come the uncertainties with exposure assessments. First, the person exposed to the chemical must know when he was exposed, for how long, and through what mode. Exposure to the hazards of the Gulf oil disaster, as with most hazards, can occur through three routes: inhalation, ingestion, and dermal contact (Solomon & Janssen, 2010). The many aforementioned variables – temporal, special, manner of exposure – may all act to change the possible health risk. These variables can impact the toxicological assessments of the hazards of these chemicals as well. Consequently, epidemiological data that elucidates the health outcomes of such exposures is another essential element of the health risk assessment. Furthermore, these data may be derived from past similar circumstances, such as from the Exxon Valdez Oil Spill for use in the Gulf oil disaster, or from

the current situation, in which case the health risk assessment would inevitably be retrospective in nature. In any event, epidemiological monitoring and evaluation based upon the complex variables is another essential aspect of the health risk assessment process which is marked by a great deal of uncertainty.

The temporal facet to hazard exposures plays an important role in risk assessment. Though increasing amounts of studies have been conducted in recent years, the outcomes of different exposures at different times in pre-natal and childhood development is an area in need of much more research (Kanarek & Anderson, 2007). In assessing risk endpoints such as cancer, or adverse developmental and reproductive outcomes, the time in a person's life at which the exposure occurs – particularly during critical periods of development – can affect whether or not a chemical harms an organism and what kind of harm may result (Colborn & Thayer, 2000; Malecki et al., 2006; Vandenberg, et al., 2012). In addition to the time of the exposure in the person's life, the length of the exposure may alter health risks (Vandenberg, et al., 2012). Hazardous chemicals from disasters like the Gulf oil spill can be both persistent and bioaccumulative (Ji, et al., 2011; Rotkin-Ellman, et al., 2011), so not only can the exposures be chronic rather than acute, but also they can occur well after the initial event - e.g., in someone who eats contaminated fish years after the spill.

Spatial aspects of exposure may also render health risk assessment difficult. Considering that some compounds may be more potent or differently hazardous at low doses versus high doses, it follows that people farther from an environmentally hazardous exposure (and, thus receiving low dose exposure) could hypothetically have more cause for concern than people closer to the exposure. Also, weather conditions as well as geological conditions must be factored into the spatial considerations of exposures. In the case of an environmental disaster

such as the Gulf oil spill, products of crude oil such as volatile organic compounds (VOCs) (benzene, toluene, xylene) can be conveyed through the air, while other components such as PAHs and dispersants move through waterways, into sediment, and onto land (Ji, et al., 2011). Weather could affect the transportation of dissolved particles, aerosols, and gaseous compounds through the air as well as through aquatic systems. Topographical and geological conditions could alter the transport of and, thus, exposure to hazardous substances as well. All of these factors could alter where dermal and inhalation exposures occur. Furthermore, as in the case of the Gulf oil spill, contaminated seafood can potentially be transported to areas outside of the “affected zone,” thus producing an exposure by ingestion far from where it would be expected and altering the spatial area in which health risk assessment might take place.

Unless a short-term effect from a hazardous exposure results in a unique health outcome or in immediate death, it can be exceedingly difficult to link cause and effect. For example, the VOCs and dispersants inhaled or touched after the Gulf oil disaster generate acute, short-term symptoms such as headaches, throat irritation, and sore or itchy eyes (Solomon & Janssen, 2010). Additional acute symptoms can include diarrhea, nausea, vomiting, abdominal pain, wheezing, cough, chest congestion, and rashes (Solomon & Janssen, 2010). These symptoms are common complaints that arise from a whole host of potential causes and may be neither easily nor definitively linked to toxicants from the spill. Moreover, most medical doctors examining patients complaining of these symptoms have little or no training in environmental health (P. Brown & Kirwan Kelley, 2000) and would consequently be less inclined to correlate the patients’ complaints with environmental exposures.

Long-term health effects of environmental exposures are perhaps even more challenging to assess. First, the patients’ diagnoses in these cases are certainly temporally distant from the

exposure but may be spatially as well, since people may migrate, making causal analysis difficult (Malecki, et al., 2006). Cancer, infertility, and many neurological or immunological syndromes are effects that may emerge years or decades after the exposure. “How serious the potential health effects that manifest long after the problem exposure was unleashed is yet to be determined” (Kanarek & Anderson, 2007, p. 911). Second, physicians and medical professionals may be unaware of potential environmental causes of these diseases (P. Brown & Kirwan Kelley, 2000). Third, health outcomes resulting from mutagenic effects of chemical exposures, from epigenetic effects, and from differential effects caused by genetic polymorphisms or gene-environment interactions are quite new areas of study and are extremely problematic if not impossible to sort out (Kanarek & Anderson, 2007). Finally, even if these long- or short-term effects were correctly connected to environmental exposures, the lack of well-maintained, consistent administrative databases (Kanarek & Anderson, 2007) and accessibility to them make public health tracking cumbersome. As McGeehin, Qualters, & Niskar (2004) note, the current public health administrative records systems are inadequate to deal with environmental threats, and few data are being tracked.

Epidemiological studies that could contribute to health risk assessments are further hampered by the fact that some environmental hazards may not even produce trigger health effects in the person exposed but, instead, may affect her offspring (Kanarek & Anderson, 2007; Vandenberg, et al., 2012). Prenatal exposure to chemicals, EDCs in particular, pose significant threats to the offspring of exposed individuals, especially at crucial stages in the developmental process (Vandenberg, et al., 2012). Furthermore, if a chemical hazard— such as substances in crude oil (Solomon & Janssen, 2010) – damages DNA or produces epigenetic abnormalities,

these may be inherited by the offspring of an exposed individual, even though his or her children were never themselves exposed to the hazard prenatally.

Clearly, the task of assessing health risks from environmental disasters under the most ideal circumstances is one replete with uncertainty and complexity. Though the National Institutes of Environmental Health Sciences launched a large scale study in early 2011 specifically to track health effects from the Gulf oil disaster (NIEHS, 2011), it may still be hindered by many of the aforementioned toxicological, epidemiological, and administrative impediments that could inhibit the construction of a comprehensive health risk assessment. And as if the many obstacles already outlined were not enough, other areas of dispute and confusion in risk assessment could stem from the vast lack of knowledge about the synergistic health effects of chemical exposures, as well as the invalid assumptions utilized within the risk assessments. For example, NIEHS utilized biomarkers of VOCs in the bloodstreams of Gulf Coast residents as a proxy for exposures to these carcinogenic compounds (Alexander-Block, 2014), but unless those blood tests were obtained within hours of exposure, they would not necessarily render reliable results (CDC, 2010). Also, as evidenced by the U.S. Food and Drug Administration's (FDA) risk assessment of seafood contamination emanating from the Gulf oil spill, risks must account for people of many different ages and sizes as well as particular Gulf Coast residents who happen to be unusually high consumers of seafood (Rotkin-Ellman, et al., 2011). Consequently, there are innumerable uncertainties inherent in the health risk assessments for a disaster of the magnitude of the Gulf oil spill. Moreover, flawed methodological approaches, such as the two aforementioned, can impede the acquisition of meaningful results about environmental health consequences from the disaster.

Specific Environmental Health Risks

Based upon previous studies of oil spills as well as laboratory studies on organisms and cells, some of the clinical effects in humans from exposure to crude oil and to dispersants are predictable. Among the likely acute symptoms are respiratory and dermal irritation, eye irritation, headaches, dizziness, cough, chest pain, nausea and vomiting (Bosch, 2003; Goldstein, Osofsky, & Lichtveld, 2011; Merhi, 2010; Solomon & Janssen, 2010). Though VOCs (e.g., benzene, toluene, xylene) evaporate within hours, the steady, months-long discharge of oil in the Gulf likely concurrently allowed for a steady release of VOCs, so exposure of clean-up workers was likely at some point. Inhalation of these carcinogenic substances causes acute respiratory and central nervous system problems (Solomon & Janssen, 2010). Hydrogen sulfide gas, released as a by-product of the spill, is neurotoxic and produces both acute and chronic central nervous system abnormalities (Solomon & Janssen, 2010) when inhaled. The potential short-term effects of Corexit exposure include eye and skin irritation, difficulty breathing, cardiovascular difficulties, increased immune response, gastrointestinal illnesses, red blood cell injury, and short-term memory loss (Anderson, Franko, Lukomska, & Meade, 2011; Krajnak et al., 2011; McCauley, 2010; Roberts et al., 2011; Subra, 2010). Zheng et al. (2014) have also shown that Corexit alters mitochondrial function in cells leading to increased cell death, a finding that implies potential deleterious effects for all organ systems in the body. Exposure to PAHs and heavy metals from the spill is not likely to cause acute symptoms, but many possible chronic effects exist from these and other compounds associated with the spill and the cleanup efforts.

Given that the substances emanating from the spill, as well as the dispersants, are implicated as carcinogens, mutagens, immunologic suppressors, neurotoxins, and endocrine disruptors (Barron, 2012; Bosch, 2003; Goldstein, et al., 2011; Solomon & Janssen, 2010), the

potential chronic effects in humans are vast. A study of workers who assisted with clean-up after the 2002 Prestige oil spill off the coast of Spain revealed persistent respiratory symptoms five years after exposure (Zock et al., 2012). DNA damage was also discovered in these volunteers (McCauley, 2010). Residents near oil fields in the Amazon basin in Ecuador have demonstrated increased incidence of and deaths from cancer (Sebastián, Armstrong, Córdoba, & Stephens, 2001). Though no research studies were conducted, surveys of Exxon Valdez clean-up workers reveal complaints of chronic respiratory disease, neurological impairment and multiple chemical sensitivity as recently as 2009 (R. Moore & Burns, 2011; Solomon & Janssen, 2010), twenty years after the spill in Prince William Sound. Mehri (2010) also suggests that chromosomal aberrations and subsequent reproductive troubles are likely outcomes in exposed populations.

Observed Environmental Health Effects

Few research articles have yet emerged documenting the human health effects of the Gulf oil disaster. Most of what is known stems from a few governmental reports, independent research reports of non-governmental organizations, and from indirect toxicological studies of air, water, and blood-chemical levels. Based upon complaints logged at various governmental facilities, residents of the Gulf Coast region reported headaches, coughing, choking, shortness of breath, throat irritation, dermal irritation, rash, dizziness, pain in joints, diarrhea, nausea, and vomiting (D. Abramson et al., 2013; D'Andrea & Reddy, 2013; Law, Martin, Wolkin, & Bronstein, 2011; Rangel et al., 2011; Solomon & Janssen, 2010) in the immediate aftermath of the disaster. Middlebrook et al. (2012) showed the presence of increased levels of aromatic hydrocarbons in the atmosphere around the spill, which could explain some of these symptoms in citizens who inhaled such substances. D'Andrea and Reddy (2013) found blood and liver toxicity when evaluating levels of various substances in routine blood tests of exposed individuals.

A report by the non-profit Government Accountability Project (Devine & Devine, 2013) documented some of the effects of the gallons of Corexit dispersants sprayed upon the region. The report surveyed 21 “whistleblowers” who worked and lived in the region. It concluded that the synergistic effects of dispersant and oil were more harmful to humans than was oil exposure alone. Residents in dispersant spray areas experienced “abdominal pain; blood in urine; heart palpitations; hyper-allergic reactions to processed food and common household cleaning or petroleum based products; hypertension; inability to withstand exposure to sun; kidney damage; liver damage; migraines; multiple chemical sensitivity; neurological damage resulting in memory loss and in some cases IQ drop; rapid weight loss; respiratory system and nervous system damage; seizures; skin irritation, burning and lesions; sudden inability to move or speak for sustained periods; temporary paralysis; and vomiting episodes” (Devine & Devine, 2013, p. 2). Fifteen of the interviewees took blood tests that demonstrated high levels of chemicals contained in Corexit, and which correlated with the health effects reported. Nevertheless, the majority of subjects in the report were told by their health-care professionals that there was no relationship between the symptoms experienced and the exposure to chemicals from the oil spill.

King and Gibbins (2011) conducted an investigation at the request of BP and produced a document under the direction of the Centers for Disease Control and Prevention (CDC) and the National Institute for Occupational Safety and Health (NIOSH) in August 2011. Their first evaluation was of seven fishermen working on oil spill clean-up who experienced headache, nausea, and respiratory congestion and who were hospitalized. These fishermen had not been exposed to dispersants, only to the oil itself. The report also indicates that, within two months of the disaster, another ten response workers were hospitalized after exposure to both oil by-products and dispersants, but King and Gibbins do not describe any other symptoms in these

workers other than heat exhaustion, although there is an indication that heat stress was not their only malady. Finally, the researchers checked logs at local infirmaries and sent voluntary surveys to clean-up workers in June and July of 2010. Among the symptoms they found were headaches, dizziness, nausea, upper respiratory distress, skin rash, and heat stress.

In addition to evaluating health symptoms, King and Gibbins (2011) sampled the air for constituents of both the oil and the dispersants. They found all of these chemicals to be non-detectable or below individual occupational exposure limits (OELs), but they also indicated that the high volatility of VOCs could impede their ability to measure these substances at a moment when they are present in high volume (King & Gibbins, 2011). Of note, King and Gibbins stressed the need to ensure that health care professionals treating individuals working in the gulf take an occupational exposure history to assist with health effect surveillance. Occupational health histories are not commonly used in medical practice, which is one major epidemiological limitation and why the sorts of generalized acute symptoms seen in response workers may not ever be definitively tied to a specific cause. Moreover, simply because the chemicals measured were within the regulated occupational exposure limits, does not mean that these chemical exposures did not (or will not) produce harm, as it is known that endocrine disrupting chemicals do not act in a simple monotonic dose-response manner. But, it seems that this outdated linear dose-response curve is still assumed by many researchers as well as by the media who report on health effects.

One of the only peer-reviewed research articles about health effects from the Gulf Disaster found that acute effects reported by both cleanup workers and by residents of affected regions mirrored the effects found in these same populations during previous oil spills (Diaz, 2010). Moreover, Diaz (2010) concluded that long-term surveillance would be required to

monitor for cancers and liver and kidney diseases, particularly in sub-populations of residents and workers who have specific genetic polymorphisms that might impede their bodies' detoxification ability.

In January 2014, scientists gathered in Mobile, Alabama, for the Gulf of Mexico Oil Spill and Ecosystem Science Conference. One of the major reports from the conference concerned preliminary findings from the long-term epidemiological survey by the National Institute of Environmental Health Sciences. Dale Sandler and her colleagues found that median blood levels of VOCs among the non-smoking cohort of 1148 study participants were within the same ranges as the rest of the U.S. population (Sander et al., 2014). Sandler spoke to the press about her results and concluded that residents' fear of health effects from the spill were exaggerated as a result of media reports, lawyers, and advocates (Alexander-Block, 2014). However, missing from Sandler et al.'s conference abstract is any information on how and when levels of VOCs were measured in participants' blood. Given that these chemicals can evaporate within days or even hours, it is possible that participants could have been exposed to high levels of the compounds but that these levels were not detected because of temporal issues. Moreover, the result stating that non-smoking participants demonstrated blood-VOC levels akin to that of the regular U.S. population is an erroneous comparison. One non-smoking population should be compared to another; otherwise the results are biased toward not finding elevated VOC levels in the non-control group. Furthermore, it should be noted that one of the major conference sponsors was the American Petroleum Institute, the foremost trade association for the oil and gas industry.

Hence, due to the uncertainty factors and other methodological issues, there are numerous impediments in the way of arriving at precise facts about ecological and environmental risks from and effects of the Gulf oil disaster. Correspondingly, media reports about risks and effects

can vary widely, not depending on science necessarily, but depending on other non-scientific facets related to news organizations and/or the newsmaking process.

Chapter 4 - Environmental Sociology

Sociology and Risk Assessment

Indeed, there are other obstacles to arriving at and reporting on the risks associated with the Gulf oil disaster. While the inherent uncertainties in risk assessment were discussed in the previous chapter, this chapter will focus on difficulties related to sociological factors in how risk assessments are generated and to who has the power and the forum to speak about risk to the public. Risk assessments can have underlying epistemological and methodological assumptions of which the public may be unaware. In addition, in terms of media reporting of risks, different sources can provide different insights; however, the accuracy of different voices can sometimes be weighed depending upon their scientific or academic expertise, which may not always be the best measure of reliability. This chapter will outline some of the issues with epistemology, power, and social factors involved in risk assessment. In doing so, it will explain how ecological risks and effects from the spill could be addressed differently in the news media, depending upon the sources of information in stories and depending upon who is given a voice in the media. Finally, this chapter will discuss the commonly overlooked psychosocial effects that disasters such as the Gulf oil spill can generate, and suggest how coverage of these types of effects might differ in news media stories.

Technological innovations and socioeconomic globalization over the past several decades or perhaps even the past century have created an atmosphere of increasing risk to the environment and public health. Beck (1996, 2006) termed the result of these risks the “world risk society” in which civilization is responsible for both generating the vast majority of risks and then also assessing and managing the very same risks that it created. Albert Einstein so presciently noted, “You cannot solve a problem from the same consciousness that created it. You

must learn to see the world anew.” Yet, in assessing risks from the products and conditions created through the natural and physical or “hard” science disciplines, those same fields use their standard tools and practices in their analyses. Though risk assessment by the same institutional actors who produce risks might appear at best a contradictory endeavor and at worst a tremendous irony (Beck, 2006) and conflict of interest, it remains common. For this and other reasons, a number of different actors have asserted that the traditional quantitative risk assessment process is insufficient and in need of re-evaluation. Social scientists have illuminated numerous deficiencies in the risk assessment framework and procedures, but they too operate under the same overarching institutional paradigm as academics in the hard sciences, which might leave some of their arguments lacking in that new way of thinking that Einstein envisioned. Members of the general public, on the other hand, critique risk assessments in several different ways than do other academics, but are faced with limited amounts of access or authority. Consequently, within the context of the world risk society, important and potentially consequential changes to how risk is assessed and addressed are difficult to implement, if they are even given consideration at all.

Though the social and natural sciences function within the context of the same overarching paradigm of academic standards, their epistemologies can differ, which accounts for one of the general critiques that some social scientists have with risk assessment. The hard sciences view risk from a positivist/realist viewpoint in which risk is conceived as an objective reality, whereas many (but not all) social scientists view risk as a social construction (Beck, 2006; Marshall & Picou, 2008; Rosa & Clarke, 2012). It follows that risk assessment produced by the hard sciences rarely if ever accounts for social factors that could contribute to or affect the

assessment. This broad category of criticism represents most of the problems that social scientists express with regard to quantitative risk assessment.

Freudenburg (1988) outlines the majority of risk assessment critiques raised by social scientists. First, there are factors neglected in probability estimates of risk. Traditional risk assessments quantify probabilities of hazards, threats, or harmful events; exposures or outcomes of these; and their interactions with each other. In other words, risk assessments seek to quantify the likelihood of harm from substances, products, events, and technologies (Myers & Raffensperger, 2006). They avoid dealing with possibilities of human errors (Freudenburg, 1988). So, for example, as the probability of a nuclear meltdown at a power plant is assessed, it is assumed as an estimate of something going wrong with the plant equipment, not of someone erring in operation of that equipment. Moreover, organizational errors are ignored (Freudenburg, 1988), such as with the space shuttle Challenger explosion in 1986, where problems with NASA operations as a whole contributed to the calamity. Finally, in probability estimates, external social factors might add to risk when people involved in working with a piece of technology either feel a moral responsibility to act on the threat, feel their voice or position has been stifled, or act to purposefully alter public perception of the technological risk (Freudenburg, 1988).

Other inaccuracies with probability estimates and statistical calculations can occur in risk assessment as well. Freudenburg (1988) notes that scientists are subject to the same human shortcomings as any other citizens, such as errors in calibration. They hold unintended biases, particularly overconfidence and underestimation of uncertainty. Some of these sources of miscalculation include failing to examine the risk holistically, to see interactions or synergistic effects, to account for aspects of the risk outside of their field of expertise, to construct comprehensive assumptions and analyses, and to recognize the importance of low-probability

events (Freudenburg, 1988). The problem of low probability/high stakes consequences is one often missed in risk assessment. A statistical vulnerability exists in these cases because, while actual experience can correct many errors that influence estimations in high probability outcomes (since these outcomes often do occur), low probability outcomes are so rare that they cannot be utilized in calculations (Freudenburg, 1988). But even when such low probability events occur, such as with three major nuclear plant accidents within thirty years (i.e., Three Mile Island in 1979, Chernobyl in 1986, and Fukushima in 2011), risk assessments for occurrences such as nuclear reactor accidents are often still based upon probability estimates that do not take into account actual historical reality. A commonly mentioned example of such failure is with the probability assessment of space shuttle malfunction. Quantitative risk assessments do not incorporate the actual experience of the loss of two shuttles (the *Challenger* and the *Columbia*) in 113 flights, and their probabilities do not reflect what has occurred (Apostolakis, 2004). Furthermore, as Beck (2006) and Freudenburg (1988) both contend, these low probability/high stakes consequences (and others as well) can prove incalculable in terms of the actual severity of their effects, and can be irreversible rather than remediable. Those outcomes are left out of risk assessment.

On a similar note, social scientists recognize the scientific bias toward avoiding Type I statistical errors rather than Type II errors. In risk assessment, conversely, scientists strongly err on the side of “Type II conservatism” with their statistical probabilities (Edelstein, 1988; Marshall & Picou, 2008). That is, they favor committing Type II error, wherein they fail to see a risk that may actually exist and erroneously declare a potential environmental hazard as safe, rather than committing a Type I error, wherein they declare a potential risk as unsafe, even if it is not, i.e., erring on the side of caution (Edelstein, 1988, p. 131; Marshall & Picou, 2008). The

latter decision, which could be termed the “better safe than sorry” method, is not favored in statistical/scientific methodologies yet is preferred by citizens.

Ozonoff and Boden (1987) further explain this statistical bias in the context of environmental health risk assessment and epidemiology. They claim that scientists err on the side of accepting risk (false negatives) rather than preventing risk (false positives) (also P. Brown, 2000), which is the opposite of what the public seeks to do in most cases. This bias is particularly problematic when erroneous data misrepresent the boundaries of affected and control populations in epidemiological environmental health studies and when there are multiple environmental stressors or agents of exposure. Also, too small a sample size, which is common in populations affected by environmental toxins, can easily lead to statistical insignificance when, in fact, there may be a correlation, even a causal relationship, between toxic exposure and health effect. Ozonoff and Boden (1987) warn, “One must first distinguish (as many health official do not) between public health significance and statistical significance. And increased disease rate can, if true, be of enormous public health significance but not statistical significance ... in a given study” (Ozonoff & Boden, 1987, p. 74). As other scholars have noted, this statistical and scientific bias against precaution in terms of environmental health risk is one that invites a new risk assessment paradigm, perhaps one based on increased precaution such as the precautionary principle.

A great source of miscalculation in risk assessment stems from uncertainty. While some forms of uncertainty in science can be a product of indeterminacy—that is, hazards or threats and their effects are known but specific values for them cannot be determined, to which many of the aforementioned points allude—other uncertainties can be caused by ignorance. As Frickel (2010) explores in studying the realms of “undone science,” there are components of risk assessment

that are unknown because scientists have not studied them because they cannot (because of insufficient equipment or techniques), because of institutional pressures not to do so (discussed in forthcoming paragraphs), or because these risks are simply not yet apparent. Ignorance refers to these “unknown unknowns” or “radical uncertainties” (Beck, 2006; Frickel, et al., 2010), i.e., the risks that we do not yet even know about and cannot predict until they happen. These constitute perhaps the biggest problem in risk assessment. Closely related is the idea of worst-case analysis. Marshall and Picou (2008, p. 243) explain that the effects of a hazard can be “unimaginable or inconceivable until they occur.” Risk assessment bases its analyses on events that have occurred or are known to occur, but it neglects hypothetical consequences that *could* occur (Marshall & Picou, 2008). So, contemplating the worst-case effect, which can be viewed as part of the ignorance component of the uncertainty in risk assessment, is a variable that scientists should attempt to include according to social scientists. The Gulf oil disaster can be viewed as one of these events that were inconceivable; therefore, the risks associated with the event were and still are highly uncertain.

Another area of concern in risk assessment is with the person performing the assessment. Upton Sinclair thoughtfully declared almost eighty years ago that “it is difficult to get a man to understand something, when his salary depends upon his not understanding it!” (Sinclair, 1935, p. 109). Indeed, Freudenburg (1988) addresses political, monetary, and societal pressures that could lead scientists to alter risk assessment for reasons of career advancement, ego gratification, or financial gain. Examples of this phenomenon are demonstrated in social science research. Daniels (1969) may have been one of the first to speak of “captive professionals,” employees who conform to the pressures of their employers despite the employees’ ethical, moral, or intellectual reservations about their actions. Brown (2007) notes that some physicians cannot

accept the environmental risks and causes of disease because it might compromise their careers. In fact, entire agencies can be “captured,” such as those responsible for the risk assessment of industrial technologies. Wynne (1996) maintains that expert institutions often conceal their own responsibility for and contributions to risks. Some might argue that the U.S. Environmental Protection Agency (EPA) and the U.S. Food and Drug Administration (FDA) suffer from this affliction; in light of the recent news that the FDA has been monitoring whistleblowers who are speaking out against the falsified risk assessments pertaining to radiological medical devices (Lichtblau, Shane, & Lehren, 2012), it would appear that these arguments have merit. Marshall and Picou (2008) also mention a related phenomenon well documented in science known as the “funding effect,” in which scientific research is more likely to support results that are aligned with the agendas of its sponsors. And as research, such as that focusing on risk assessment, is increasingly subsidized by private, corporate benefactors rather than by public funds, this funding effect becomes an ever-escalating process and a sociological variable that requires consideration in risk assessment. This fact arises when one considers that the American Petroleum Institute was among the sponsors of the 2014 Gulf of Mexico Oil Spill and Ecosystem Science Conference.

The work of social scientists who examine social, emotional, and psychological effects of disasters points toward another area of risk not always addressed by hard science assessments. Erikson (1976), Edelstein (Edelstein, 1988), Gill and Picou (1991), and Kroll-Smith and Couch (1991) all speak of the variety of social and mental health effects of environmental risks and disasters, which can include troubles with interpersonal relationships, loss of community and friendships, stress from job loss, increased fear and anxiety, and many other psycho-social

problems. These are rarely included in quantitative risk assessment, and when these effects are considered, they are nearly impossible to quantify accurately.

Finally, social scientists recognize that quantitative risk assessments do not incorporate lay knowledge. The knowledge that citizens possess about their own health, environments, local conditions, and experiences is known by a number of names. Some call this experiential, non-academically generated information, anecdotal evidence (A. Moore & Stilgoe, 2009), situated knowledge (Allen, 2003; A. Moore & Stilgoe, 2009), tangible evidence (Scammell, Senior, Darrah-Okike, Brown, & Santos, 2009), indigenous knowledge, or simply lay knowledge (Wynne, 1996). Wynne (1996) recounts the story of the vast miscalculations in the risk analyses conducted by UK scientists after the Chernobyl disaster. In attempting to assess the risk to sheep (and thus, sheep farmers) in Cumbria, England, from the contamination by radiation from the nuclear catastrophe, scientists failed to ask the sheep farmers about the conditions of their fields and about their farming practices. Both areas of lay knowledge would have contributed to a more fully realized risk assessment; as it turned out, because scientists neglected the experience of the farmers, their assessment fell short of predicting the actual contamination, and it needed to be continuously re-evaluated. Wynne (1996) also explains how in the 1970s lay complaints of excess childhood leukemia near the Sellafield nuclear reprocessing plant led to the re-examination of risks there. Though the childhood cancers could not be causally attributed to the plant, cancer clusters and correlations were subsequently found. In these cases, lay knowledge was imperative in deriving meaningful analyses. In fact, in situations such as Sellafield, where health effects from environmental contaminations are occurring, it is often the community knowledge about these outcomes that first alerts public health authorities to the risk (P. Brown, 2007).

Indeed, many social scientists lament that lay knowledge is not included in risk assessment. A number of these scholars who study embodied health movements, contested illnesses, popular epidemiology, and environmental justice call for the inclusion of lay knowledge in risk assessment (Allen, 2003; P. Brown, 2000, 2007; P. Brown et al., 2006; P. Brown et al., 2004; Corburn, 2002, 2005; Wing, 2000). Some scholars suggest embodied knowledge can help highlight individual susceptibilities to hazards that are lost in population-level analyses (A. Moore & Stilgoe, 2009). Moreover, though laypersons' views of risks are thought to be irrational and born of self-interest (Krauss, 1993), many scholars have shown that the irrationality of the citizenry is vastly overstated in most cases, and that the involvement of the public in environmental risk decision-making is vital to democracy as well as to the protection of public health and ecosystems. Freudenberg (1988) describes the delineation of "real" risks as justified by science and "perceived" risks as "irrationally" viewed by citizens as being less clear-cut than many would imagine. He suggests that, in cases of low stakes, consensus, and already highly experienced risks (i.e., risks that many people have already encountered commonly), scientific biases and inadequacies may not affect risk assessment, whereas in cases of risks where the stakes are high, consensus is absent, and there is little experience, the biases, miscalculations, and omissions in quantitative risk assessment may affect the validity of the assessment. Consequently, Freudenberg argues, scientific estimates of environmental risk should not be revered while public perceptions of risk are treated with contempt. In fact, the public may be essential in playing a role as an moral compass in the oversight of environmental risk assessment and management, particularly with regard to new and controversial technologies that could affect them (Freudenburg, 1988).

Social scientists propose that, by contributing to the knowledge gaps in quantitative risk assessment, they can be of great value to the process. Not only can they highlight the numerous areas of deficiency but they also can improve quantitative risk assessment via their understanding of the human components of technological systems (Freudenburg, 1988). Picou (2008) declares that environmental risk assessment and management needs input from sociologists. These applied environmental sociologists can act on behalf of the public, and serve to enlighten the technological assessors and scientists who normally conduct these risk estimates. As demonstrated in numerous scholarly publications for decades, the strictly scientific and statistical methodology of risk assessment is insufficient in the modern risk society. Applied sociologists are needed to inform others of the “moral and social challenges that ecological risks pose for future social policy” (Picou, 2008, p. 523).

The critiques of quantitative risk assessment by laypeople overlap with many of the critiques by social scientists, though their focus tends to be less technical. Research by Scammell et al. (2009) on public perception of environmental health risk assessments within communities summarizes these critiques. First and foremost, like social scientists, lay persons question the omission of their own experiences from quantitative risk assessments. Oftentimes their tangible evidence of disease outcomes, which the public sees as caused by health risks in their neighborhoods, and their situated knowledge contradict the assessment of scientists (P. Brown, 2000, 2007; P. Brown, et al., 2006; P. Brown, et al., 2004). Second, again like social scientists, lay persons express concern that political and financial interests compromise scientific findings – i.e., funding effects and effects of captive professionals. They express distrust in systems such as government and business, probably because of past experience of quarrels with or a lack of a voice within these systems.

However, different members of the public critique quantitative risk assessments in somewhat different ways. As Scammell et al. (2009) show, those belonging to higher socioeconomic (SES) groups tend to not question conflicts of interest in science or differences between their own experiences and scientific findings, likely because they have more say and a greater stake in the systems that produce risk assessments. Their critiques are more about the lack of common sense of some studies, and they question whether methodologies used were correct in the analyses. However, they do not distrust the institutions or actors, likely because such judgments might reflect upon themselves and their own political or financial compromises or conflicts of interest within these same systems.

The environmental justice movement comprises a large majority of the public that is critical of quantitative risk assessment. These individuals claim that hazards faced by people of color and of low socioeconomic status are unique and often ignored in risk assessment, along with their situated knowledge of those hazards (Corburn, 2002). In addition, they assert that cumulative and synergistic exposures, as faced by people living in corridors of industrial pollution, are not accounted for in the risk assessment process (Allen, 2003; Corburn, 2002). Of course, people of color and of lower SES tend to be those living in the most polluted areas of cities with the highest exposures to environmental hazards (Scammell, et al., 2009). Scammell et al. (2009) concur that these groups of people are not represented in studies when they mention that the Massachusetts State Department of Public Health left out the residents of the poorest neighborhoods in their study of cancer related to pollution exposure.

So, the implications of such criticisms are that scientific knowledge – i.e., quantitative risk assessment - is produced without the consideration of and input from those most affected by risks. By not recognizing the tangible evidence and embodied knowledge of the people

experiencing risks first hand, particularly those who disproportionately experience risks, scientific assessments fall short. According to some members of the public, scientific knowledge needs to incorporate the experience of culturally and ethnically diverse individuals, and these same considerations need to be addressed by scientists when communicating their studies to the public (Scammell, et al., 2009). An example of the lack of consideration of certain communities was demonstrated in the mainstream press coverage of the Exxon-Valdez oil disaster, in which the Alaskan Native perspective of the environmental risk was all but left out of the media discourse (Daley & O'Neill, 1997). In other words, other voices and experiences need to be considered and represented in not just the construction of the scientific knowledge, but the dissemination of the information.

Ironically, the lay critiques of quantitative risk assessment recounted here have been expressed indirectly through social science mediators. Indeed, the requirements of academic writing itself (i.e., finding peer-reviewed academic sources of information for this paper) exemplify the main differences between social science criticism and lay criticism of risk assessment, which have to do with how knowledge is generated. Just as scientific quantitative risk assessment is academically derived, grounded in theory and scientific methods, so is social science research. Thus, while social scientists feel that important types of data are missing from quantitative risk assessment, they propose utilizing those same scientific tools to access and incorporate the missing data. Some call this hybrid form of generating risk information “strong objectivity,” in which local knowledge, minority perspectives, and tangible evidence influence the design of studies (Allen, 2003). Yet, these are still risk assessment studies within a traditional framework. Laypeople view anecdotal, situated knowledge as multi-dimensional, representing undone science, scientific uncertainty, and scientific inaccuracy due to the omission of alternate

socioeconomic and/or political information (A. Moore & Stilgoe, 2009). They would rather either throw out scientific studies that contradict their experiences or at least allow their experiences to have weight in the overall assessment, not necessarily quantitatively but qualitatively. “What is questioned is the status of science as the only legitimate problem-solving strategy and as a strategy that must reside in expert systems” (Marshall & Picou, 2008, p. 238). They critique the boundary between statistical, scientific evidence and anecdotal, tangible evidence that renders only the former valid (A. Moore & Stilgoe, 2009).

The citizen-science and community-based participatory research (CBPR) movements epitomize the way in which lay knowledge can only be legitimized when it conforms to the rules of institutions. In order for citizens’ claims of risk to be heard by scientific and political actors, they must conform to the standards and practices of “real” science to gather evidence for their accusations about risks (Ottinger, 2010). So, the ways in which citizens might have a voice, such as with the “bucket brigades” monitoring air quality in Louisiana and elsewhere, is only by producing their own scientifically based evidence of risk through the methods of science. Ottinger (2010) reveals that activists in the bucket brigade challenged regulatory mechanisms of assessment because the standard regulatory practice measures average air quality over long periods of time, while the citizen scientists measured air pollution at shorter time frames and identified toxic peaks in concentrations of pollutants as risks not represented by the in the regulatory framework (Ottinger, 2010). Despite the work of these citizen scientists, however, the framework for air quality assessment did not change, as boundary issues over regulatory authority remained in place (Ottinger, 2010). So, even when utilizing the tools of science, oftentimes citizens are still unable to influence the risk assessment and regulation of the contaminants that affect them.

Issues of power and authority pervade the construction and dissemination of risk information. Those in positions of power, such as scientists and academics, can view lay knowledge as a challenge to their expert power (A. Moore & Stilgoe, 2009). In their boundary work to keep their status and authority secure, they try to maintain the border between their expert knowledge and lay knowledge. They can often suppress, dismiss, and disregard other forms of knowledge (Wynne, 1996), and/or marginalize those attempt to produce or report it (Mix, Cable, & Shriver, 2009).

But it is not simply just academics themselves who utilize the scientific paradigm to reject other knowledge. In addition, as Brown (2007, p. 19) summarizes so pointedly:

“Scientization” is a logical outcome of professional authority and medical dominance. It refers to the variety of ways that science and technocratic decision-making have become an increasingly dominant force in shaping public attitudes, media coverage, and most particularly social policy and regulation... Through this scientization of decision making, industry exerts considerable control over debates regarding the costs, benefits, and potential risks of new technologies and industrial productions by deploying scientific experts who work to ensure that battles over policymaking remain scientific, “objective,” and effectively separate from their social context.

Thus, by utilizing this boundary work of science, industry itself also diminishes the voices of citizens and others concerned with risks. And again, that science, industry, and government are the voices of authority on risks is ironic, because as Beck (2006) points out, at this point in the world risk society, risks are either directly or indirectly caused by science, industry, and government themselves (Beck, 2006).

As a result of boundary work and the use of authority, not only are lay voices left out of the discourse on risk but also so are voices that do not support a dominant social paradigm. Freudenburg (2005) declares that we need to question taken-for-granted assumptions in terms of

risks such as pollution, as these assumptions stem from privileged access to media. As he notes, the power of certain voices in the discourse on risk establishes an environment in which any question of the economic necessity of technological risks is not allowed or is discounted (Freudenburg, 1988). Spencer (2009) observes a case that supports Freudenburg's argument. In analyzing media accounts of breast cancer, she finds that environmental risks are mostly discounted, and, in fact, higher standards of quantitative scientific proof are required for research findings that implicate chemicals in the etiology of the disease than for research that denies the implication of environmental pollutants in cancer risk. Other scholars further support these allegations of corporate and industrial control of media information. Historically, numerous industries such as tobacco, lead, asbestos, and other chemical manufacturers questioned uncertainties in scientific risk assessments and utilized the public relations-manufactured term "junk science" to wage large scale attacks on dissenters and refute any risk claims contrary to their interests (Michaels, 2008; Michaels & Monforton, 2005). In fact, junk science is a term that has no empirical meaning and has been used by the PR machine to denounce risk studies that implicate their clients. This type of denigration of dissenting voices in science occurred even to pioneers in the realm of environmental risks such as Rachel Carson, and it continues to this day. Both soft (demonization, alienation, ostracization, stigmatization) and hard (threat of violence) social control tactics are used on whistleblowers who dare question risks from industrial technology (Mix, et al., 2009). Thus, it is not only the citizens whose voices remain unheard or dismissed in risk discourse because of their lack of authority; it is scientists themselves who, while utilizing the correct assessment tools, draw "incorrect" conclusions.

Traditional quantitative risk assessment as performed by the hard sciences has no doubt been insufficient in reliably evaluating and preventing harm (Harremoës & EEA, 2001). While

social scientists recognize the need to incorporate social, cultural, local, historical, and even ethical information into risk assessment, laypeople go further to question the use of assessments designed by the same institutions culpable in causing the risk in question. Moreover, while the use of reductionist scientific methods, by design, neglects far too many variables in risk, “it is only by excluding the context and focusing on particular factors considered independently of historical conditions that science can produce objective knowledge that has greater claim to authority than other knowledge” (Wing, 2000, p. 40). More often than not, vested interest groups exploit that scientific authority to generate risk assessments that benefit their financial and political interest (i.e., minimize risk evaluations pertaining to their products and technologies). “The term scientific sometimes serves little more than a rhetorical device designed to give certain political preferences the mantle of rational superiority to alternatives” (Whiteside, 2006, p. 59). So while scientific knowledge is used for power, lay persons lacking that authority find their voices muted and their concerns overlooked.

Each group that is critical of traditional risk assessment, social scientists and citizens, offers ideas toward advancing our understanding of risk, and recognizes the need to incorporate lay knowledge into the risk assessment paradigm. But how that situated knowledge and tangible evidence is integrated to affect outcomes and policies is still up for debate. Most commonly, situated knowledge serves as initial signal; it is quite often the people who themselves suffer the effects of risks who notice the potential threats and initiate the scientific research into these risks (P. Brown, 2007). In this manner, laypeople perhaps have a limited influence. But something overlooked in a great deal of risk assessment is the fact that certain risks are permitted at all. Technologies, products, and substances are assumed to be necessary, so their level of risk is assessed and “acceptable limits” of harm are allowed, regardless of the inequitable distribution of

that harm and the fact that the excess acceptable deaths sometimes allocated in risk assessments translate into people's fathers, mothers, siblings, and children.

In this globalized risk society, where risks are omnipresent and cosmopolitan, Beck (2006) suggests that the three possible reactions to these risks are denial, apathy, and transformation. Given that we now occupy a world where it appears that highly improbable, high-stakes risk outcomes are coming to fruition – such as the case with the Gulf Oil disaster - these changes to what constitutes risk assessment may be necessary. Moreover, the media coverage of these risk assessments could be more comprehensive by including more voices – those of laypeople as well as experts.

Disasters and Psychosocial effects

Studies of disasters, especially chronic technological disasters like the Gulf oil spill, have demonstrated that individuals and communities risk suffering from more than just physical health effects; psychological, behavioral, and social effects may linger for years to come (Couch & Krollsmith, 1985; Edelstein, 2004; Gill & Picou, 1991, 1998; Palinkas, Downs, Petterson, & Russell, 1993). Among these effects can be loss of community structure, decline in social relations, increase in substance abuse and domestic violence, chronic stress and depression, and increased anxiety about illness (Couch & Krollsmith, 1985; Gill & Picou, 1991; Palinkas, et al., 1993). While health effects and future risks to physical health have been more difficult to characterize following the Gulf oil disaster, many psychosocial effects have already been observed.

Because the fishing industry is one of primary sources of income for many Gulf residents, a major result of the Gulf oil spill was a loss of livelihood for these citizens. Werner and Locke (2012) documented chronic stress from the economic losses. Ngo et al. (Ngo, Gibbons, Scire, &

Le, 2014) found increased anxiety and stress because of loss of income, loss of employment, and inability to pay bills among the Vietnamese fishing community. Grattan et al. (Grattan et al., 2011) concluded that the loss of income may have had more of a deleterious psychological effect on residents than the presence of oil on their shorelines.

Other researchers have shown psychosocial effects not necessarily related to income and employment. One study found that rates of anxiety, depression, and post-traumatic stress increased in direct relation to the disruption experienced in citizens' lives (H. J. Osofsky, Osofsky, & Hansel, 2011). Lee and Blanchard (2012) correlated the amount of community attachment residents felt to the amount of negative affect (e.g., sadness, depression, anxiety) they experienced; however, their attachment to their community also increased their resilience. Overall, researchers still highlight the need to monitor residents and provide care for their emerging social and mental health needs. They expect to continue to find increased and persistent mental health disorders such as stress, anxiety, depression, and post-traumatic stress symptoms with associated impacts such as substance abuse, loss of interpersonal relationships (e.g., divorce), and domestic violence (Diaz, 2010; Palinkas, 2014; Palinkas, et al., 1993; Yun, Lurie, & Hyde, 2010), and possibly even increased rates of fetal-alcohol syndrome in the future (Diaz, 2010).

Because these psychosocial risks are prevalent (Health, 1992; Norris & Elrod, 2006) and have the potential to greatly influence communities affected by the Gulf oil spill, one would expect to see media coverage of these risks and effects. Much like with environmental health and ecological risks, however, the media propaganda model would predict that psychosocial and behavioral effects of the disaster would be less frequently covered by corporate media outlets in

order to prevent the negative connotations associated with the oil industry and its potentially harmful practices.

By including coverage of the behavioral, psychological, and social risks along with those associated with environmental and health, and by including the voices of those affected by risks in addition to the voices of experts, media outlets would be more accurate in characterizing risks and effects from disasters such as the gulf spill. Whereas a variety of sources identifying risks and a more comprehensive assessment of types of risks might be warranted, the media propaganda model would assume that neither a variety of voices nor topics such as sociological risks would be as prevalent in stories in corporate-owned media outlets as they might be in independent media outlets.

Chapter 6 - Communicating Environmental Information

This next chapter will address the interplay of various forms of uncertainty – be they scientific or on the part of the public – with risk. The chapter will also define the concept of framing and explain uncertain, risk, and framing in the context of communication. It will discuss theories on how citizens gain and use risk information under degrees of uncertainty. It will focus on how uncertainty is created and communicated and, in turn, how environmental and health risks are conveyed through the media in light of the uncertainty inherent in these risks. It will discuss issues of sources – that is, who conveys information about risk and uncertainty. It will explain how uncertainty rhetoric is used as a tool by certain sources to amplify or attenuate the notion of risk, and how this uncertainty rhetoric about risks pertains to media coverage of environmental and public health issues, such as the Gulf oil spill. Finally, it will address media framing of such environmental events.

Uncertainty and Risk Communication

Rarely are we able to amass complete information to wholly characterize a threat when evaluating and understanding risks, whether at the scientific level or at the personal level. Risk assessment is characteristically fraught with uncertainty stemming from multiple sources for many reasons. In addition, that uncertainty may mean different things to scientists studying risk than it does to the people faced with risks. Moreover, it may be interpreted or translated differently by different scientists themselves. Additionally, members of the public exposed to risks may have different manners of judging uncertainty from their own cognitive and motivational standpoints. And when scientists, journalists, or others charged with communicating risk information explain uncertainty to lay audiences, their framing of uncertainty can be marked by motives of their own. These communicators possess the power to

influence the perceptions that people have concerning uncertainties and risks. Perhaps nowhere do we see that more today than in the communication of risks associated with climate change. Consequently, the manner in which people perceive risks and the associated uncertainties therein emanates from a variety of influences, which can result in drastically differing perceptions of the same risk phenomena.

Defining uncertainty is a tricky endeavor, since its meaning is derived from different variables in different contexts. As Powell et al. (2007) explain, all types of uncertainty are mainly based upon a state of “not knowing” or the absence of knowledge in some realm. In addition, many scholars agree that two main components comprise the definition of uncertainty: indeterminacy and ignorance (Myers & Raffensperger, 2006; Wynne, 1992; Zehr, 1999).

Indeterminacy, as the name implies, refers to the uncertainty in precisely determining aspects of causality, or in precisely predicting outcomes. These may be conceived of as “known unknowns.” In science, the sources of such uncertainty can be many. Miles and Frewer (2003) outline nine of them pertaining to hazard assessment: 1. measurement, 2. temporality (uncertainty about past/future states), 3. Structural factors (complexity of the situation being evaluated/modeled), 4. translation (uncertainty in explaining uncertain results), 5. expert disagreement, 6. field data limitations, 7. exposure estimates, 8. extrapolations to humans, and 9. safety margins. Other scholars identify similar types of or sources of uncertainty using their own lexicon, including projection and monitoring uncertainties (Wardekker, van der Sluijs, Janssen, Klopogge, & Petersen, 2008), parameter, model, and methodological uncertainties (Myers & Raffensperger, 2006), and uncertainties derived from assumptions, methods, and/or conclusions of scientific research (Heazle, 2004). Patt and Dessai (2005) identify three other

unique forms of scientific uncertainty particular to the case of climate change, but which can be applied to other such situations or risks:

Epistemic uncertainty originates from incomplete knowledge of processes that influence events, e.g., unknown values for climate sensitivity. *Natural stochastic uncertainty* relates to the chaotic nature of the climate system, which can be quantified (with limits) using multiple runs of the model with slightly different initial conditions. *Human reflexive uncertainty* exists in the case of climate change because society is part of the problem (through emission of greenhouse gases) and also part of the solution (through adaptation and mitigation).

The majority of these sources of uncertainty tend to be more quantitative than qualitative in nature, as they apply to scientific research. The last of the three uncertainties elucidated by Patt and Dessai (2005) can be thought of as a quantitative scientific uncertainty that applies to predictive climate change modeling, yet it can also be construed as a qualitative uncertainty that lay persons may experience when contemplating the risks associated with climate change. In any case, all of the scientific uncertainties involving indeterminacy arise from what cannot be resolved conclusively due to scientific processes.

Ignorance, on the other hand, is a more problematic type of uncertainty, particularly in science. Ignorance refers to the areas in which we do not even know what we do not know – i.e., realities that exist but of which we are not yet aware. These may also be expressed as “unknown unknowns” (Wynne, 1992). Montague (in Rampton & Stauber, 2001, p. 113) describes these as “true uncertainties” and maintains that most environmental risks fall into this category. Clearly, ignorance may be the more dangerous type of scientific uncertainty pertaining to risks, because, unlike indeterminacies that may be somewhat characterized or evaluated, uncertainties from ignorance will not be realized until their results emerge for the first time.

Uncertainty as conceived of by the public at large can also include indeterminacy and ignorance, though the basis for those two forms of uncertainty differ from their incarnations in science. For example, indeterminacy to the public in the case of an environmental risk may be not knowing information about contaminants that they may be told exist in their communities, and/or not knowing what the health effects of these contaminants are, as determined by science (Powell, et al., 2007), whereas ignorance, to a lay person, may mean not knowing what a potential hazard such as a nanoparticle is at all.

To members of the public, uncertainty is more qualitative in nature. It can be tied to personal and/or social beliefs and values; in other words, it is “a social relation regarding what is known and what is important” (Mansfield & Haas, 2006, p. 81). It also involves emotional elements in addition to cognitive ones, because to lay persons uncertainty may be a feeling of not knowing information (Powell, et al., 2007) or a self-perception (Brashers, 2001). It is partially this feeling that distinguishes two types of uncertainty as defined by members of the public: external, which is the “absolute” uncertainty of the scientific knowledge concerning a particular risk, and internal, which is the perception of individuals about what they don’t know about a particular subject (Powell, et al., 2007). For some members of the public, their definition of uncertainty may encompass their own internal probability estimates, but these estimates may be less quantitative and more qualitative than the kinds of probability calculations conducted by scientists (Babrow, 2001). Thus, for both scientists and the public, uncertainty may be defined as a state of not knowing that can include agreement about what is not known, disagreement about what is known, or disparity in interpretation (Mansfield & Haas, 2006). But epistemological differences exist about what it means to know (Babrow, 2001), which further complicates matters. Some people may be more or less confident in the same knowledge, even as the

information they each have might seem objectively equivalent. Furthermore, uncertainty definitions can “vary substantially within and across individuals, cultures, and historical contexts” (Babrow, 2001, p. 559). Nevertheless, as a whole, uncertainty may best be construed as the quality of not knowing, whether or not the feeling, experience, or context of knowing is the same, or the nature of the lack of knowledge is quantitative or qualitative.

There is little doubt that information about uncertainty influences risk perceptions (Miles & Frewer, 2003). A number of theories have been postulated about how people handle uncertainty in constructing their perception of risk. The initial theory by Berger and Calabrese (Berger & Calabrese, 1975), known as uncertainty reduction theory, began with an exploration of people’s use of uncertainty within the context of initiating new relationships (which involves the risk of rejection) and was used to explain the role of uncertainty in interpersonal relationships (Goldsmith, 2001). Although creating and maintaining relationships was the focus of research on uncertainty reduction theory, it has been applied to other risk situations, including judging illness risks in doctor-patient interactions (Sheer & Cline, 1995). Uncertainty reduction theory posits that a person will seek information to reduce his/her uncertainty about a person or situation and, as a result, to reduce the subsequent risk of becoming involved with that new person or situation (Berger & Calabrese, 1975; Bradac, 2001; Goldsmith, 2001; Sheer & Cline, 1995). Uncertainty reduction theory relies on the supposition that uncertainty is primarily a cognitive state and that increasing the availability of information will resultantly reduce uncertainty and risk (Bradac, 2001). The means of gathering information can be passive, active, or interactive through verbal and non-verbal communications (Berger & Calabrese, 1975; Bradac, 2001), but by whatever the method, increased information is the outcome sought. Yet as previously explained, uncertainty as defined by those outside of the scientific realm of research includes not just cognitive states but

also emotional ones. In addition, it has become clear that a reduction of uncertainty is not always the primary goal of people faced with judging risky situations. Thus, theories have emerged to incorporate the complexity of how people contend with uncertainty in assessing risks.

Problematic integration theory, developed by Austin Babrow (1992), offers a more comprehensive perspective on uncertainty in the risk context (Bradac, 2001; Goldsmith, 2001). First, it does not presume that there is one simple meaning of uncertainty but, rather, that meanings may be multiple and conflicting (Goldsmith, 2001). It acknowledges that uncertainty cannot always be resolved through information seeking, in part because more information may not be available (Babrow, 2001). Moreover, it demonstrates that uncertainties may not stem only from a deficiency of information but also from information overload (Babrow, 2001). Most importantly, perhaps, it recognizes that reduction of uncertainty may not be the only goal when judging risks; the maintenance or expansion of uncertainty may actually be more desirable for those facing risks (Babrow, 1992, 2001; Bradac, 2001; Goldsmith, 2001; Hines, 2001; McPhee & Zaug, 2001).

Problematic integration theory proposes that people utilize both probability and evaluation when assessing risk situations (Babrow, 1992, 2001; Bradac, 2001) and, further, that “a problematic relationship between probability and evaluation is one that produces cognitive conflict or tension, an uncomfortable state that is similar to the state of subjective uncertainty in uncertainty reduction theory” (Bradac, 2001, p. 461). Probabilities and evaluations can be weighted more or less heavily in the assessment of risks. Moreover, people are often uncertain about how to integrate one belief or value with other beliefs or values, which can amplify uncertainty (Babrow, 2001). Problems emerge in four different ways when integrating probability with evaluation in judging risk outcomes:

1. Divergence – when the evaluation of the outcome is positive, i.e., desirable, but the probability assessed is low (or vice versa);
2. Ambiguity – when both the outcome probability and the evaluation of the outcome (positive or negative) are uncertain, i.e., either undetermined or totally unknown;
3. Ambivalence – when evaluations conflict because outcomes can be either similar or mutually exclusive; and
4. Impossibility – when an outcome evaluated as positive is impossible (or reversely stated, an outcome evaluated as negative is inevitable) (Babrow, 1992; Bradac, 2001; McPhee & Zaug, 2001).

Problematic integration theory has been utilized in attempts to explain how people manage uncertainties when coping with illness. Hines (2001) showed that when people believed that a positive outcome to their health issue was probable, they sought to reduce their uncertainty about the situation, whereas when they perceived a negative outcome, they often maintained or increased their uncertainty to try to leave open the possibility for a better prognosis, in other words, to maintain hope.

Uncertainty management theory (or anxiety/uncertainty management) in its original form is a complex theory incorporating over two dozen axioms to explain and predict how people manage uncertainty in judging risks (Gudykunst, 1988). In its essence, it states that uncertainty may produce anxiety in certain situations but may induce hope or optimism in other situations; thus, the reduction of uncertainty is not always desirable (Bradac, 2001; Brashers, 2001; Gudykunst, 1988). It incorporates more nuanced ideas about uncertainty within the context of risks. For one, it recognizes that uncertainty can be multilayered, that uncertainties can be interconnected, and that there are temporal dimensions to uncertainty (Brashers, 2001).

A good example of these ideas comes within the context of a patient faced with judging the risk associated with disease. Uncertainty envelops many levels such as symptoms, diagnosis, treatment options, efficacy of treatment(s), prognosis, and recovery (Brashers, 2001). Also, as a patient's disease progresses, the management of uncertainty may change. Information gathering could be the first response of a patient diagnosed with a degenerative or terminal illness, in order to best understand her disease and decrease uncertainty. Conversely, avoidance and denial might be pursued to maintain uncertainty if it seems that nothing can be done, so that the patient can maintain a sense of hope. Finally, uncertainty may be simply maintained through acceptance of the view that many variables about the disease are unknown and life must go on (Brashers, 2001).

Uncertainty management theory also holds that, for people dealing with risk, uncertainty varies in experience and definition. For example, different cultures and religions experience uncertainty in different ways (Eisenberg, 2001). The appraisal of and emotional experience within a situation affects uncertainty, and there may be a range of behavioral and psychological responses to uncertainty (Brashers, 2001). So, the way a person manages uncertainty can unconsciously or purposefully affect her risk judgments.

A final theory consistent with elements of uncertainty management theory and probabilistic integration theory was proposed more recently by Afifi and Weiner (2004). Termed the theory of motivated information management (TMIM), it states that information processing begins with "untangling" uncertainty, interpreting uncertainty, evaluating uncertainty, then coming to a final decision about the (risk) situation (Afifi & Weiner, 2004). TMIM, too, emphasizes that uncertainty is not intrinsically negative; it may be a positive, motivational force, such as in generating hope and optimism for patients risking death (Afifi & Weiner, 2004). The interpretation phase revolves around the awareness of the uncertainty. The evaluation phase

centers on expectations about the potential outcomes of a situation and one's own sense of agency with respect to the outcome possibility (Afifi & Weiner, 2004).

Afifi and Weiner (2004) distinguish among assessments of outcomes relative to the information seeking process: outcome expectancy, outcome importance, and outcome probability. Outcome expectation is similar to evaluation in the problematic integration model. Outcome importance, meaning the "importance of the expected benefits and costs associated with the particular information strategy in question," (p. 174) affects information seeking such that people will be less concerned with their uncertainty when the importance of an outcome is low (Afifi & Weiner, 2004). In terms of outcome prediction, Afifi and Weiner declare that "uncertainty about an issue is likely to be strongly associated with uncertainty about a specific outcome" (2004, p. 177). This variable corresponds to probabilistic assessment in the problematic integration model.

TMIM also explicates three phases of decision making under uncertainty: seeking relevant information, avoiding relevant information, and cognitive reappraisal. In addition, Afifi and Weiner suggest that there is an important interplay between those making decisions and the person who may provide them information to assist with decisions. Nevertheless, though they acknowledge the important role of the "information provider" (Afifi & Weiner, 2004), they do not go on to fully explicate that role. In any case, TMIM integrates a number of components of existing uncertainty management and problematic integration theories. It concurs with all previously discussed theories, which all see communication as a cause of and response to uncertainty (Hurley, Kosenko, & Brashers, 2011), but it also adds one new component not mentioned by other theories: the importance of the information provider, who may alter a person's conception of uncertainty and judgment of risk.

Indeed, the source communicating uncertainty information greatly affects perception about uncertainty and risk. Where there is complete information about a risk, risk communication is merely translational (Miles & Frewer, 2003), so the entity relaying the risk information should have no bearing on risk perception. But rarely, if ever, are risks completely understood. Consequently, uncertainty perception can shape risk judgments.

Mass media are the primary avenue for conveying scientific and risk information to the public (Dearing, 1995; Dudo, Dunwoody, & Scheufele, 2011; Dunwoody, 2005; Friedman & Egolf, 2011). In fact, scientists themselves learn about scientific information existing outside of their own realm of expertise from news media sources more than from academics ones (Dunwoody, 1999; Powell, 2007). Scientific risk information pertaining to environmental, health, and technological threats, and the inevitable uncertainty that accompanies this information, is mainly transmitted to the public through mass media sources. As of 2012, the Internet is the “main source of information for learning about specific scientific issues such as global climate change and biotechnology” (NSB, 2014) which both contain vast amounts of uncertainty information. Since 2012, the Internet has supplanted television as the primary source of science information for the general public in the United States (NSB, 2014). Previously, the public relied on television as its primary source of such scientific information (NSB, 2010). Regardless of the change, there seems to be no clear evidence that traditional sources of news information (i.e., newspapers, and television news) have been overtaken by more idiosyncratic news sources available on the Internet (e.g., social media sites, alternative media sites) (Gaskins & Jerit, 2012). The majority of citizens who gather science and technology information from internet sources report that they use online editions of traditional newspapers (NSB, 2014). Indeed, of the fifteen most visited internet news websites, nine of them are websites from traditional television and

print media in the U.S. (CNN, MSNBC, *The New York Times*, Fox News, *The Washington Post*, *The Los Angeles Times*, Reuters, ABC News, and USA Today) and in the U.K (The Daily Mail and BBC News) (eBizMBA, 2012)..

Despite the complex and indirect channels through which uncertainty information travels along the links of the Internet, messages about the uncertainty of science and technological risks will, in reality, be dominated by four main informants: journalists; scientists; public service spokespeople from such groups as governmental agencies and environmental, public health groups, or other non-profit groups; and spokespeople from industry or for-profit corporations – often from public relations, advertising, and marketing. The latter three informants will often transmit their information indirectly via journalists. These classes of individuals comprise the “who” of communicating uncertainty information to the public. Their persuasive campaigns and public service messages quite often reach the public via traditional news media channels (Rampton & Stauber, 2001). How they each emphasize, attenuate, and neglect uncertainty information they provide to the public can help to generate very different uncertainty and risk perceptions in the people who hear their messages.

Journalists follow professional standards in constructing their news stories. One of the main standards is that of objectivity, which includes the concept of balance (Boykoff, 2008; Boykoff & Boykoff, 2004, 2007; Dearing, 1995; Dunwoody, 1999, 2005; Stocking & Holstein, 2009). When journalists convey scientific information to the public they could first critically appraise or verify the scientific information/research studies they receive, a task which they often do not have the time or ability to accomplish (Dearing, 1995; Dunwoody, 2005; Dunwoody & Peters, 1992). They could also utilize weight-of-evidence reporting² in which they determine

² Though problems in the weight-or-evidence approach arise when the bulk of evidence about a certain risk is produced by industry-funded scientists rather than independent scientists. The funding effect and the inherent

where the majority of the evidence lies and explain the probability amounts of or likelihood of uncertainty of that evidence, depending upon its proportional weight within scientific research studies (Stocking & Holstein, 2009). Instead, most journalists “balance” opinions on scientific topics by seeking reactions from individuals with conflicting perspectives, which can generate tremendous confusion about uncertainty. So, while the near-scientific consensus about climate change reflects extremely low uncertainty about cause and effect, many news stories about the topic continue to balance the scientific viewpoint with the viewpoint of industry or organized climate skeptics that the uncertainties are too great to confidently assert climate change is a serious risk (Antilla, 2005; Boykoff, 2007, 2008; Boykoff & Boykoff, 2004). Consequently, a bias in the level of uncertainty is created through the news media. As a result, the public may be left with a sense of amplified uncertainty and may be confounded about judging the uncertainty, or may judge the risk as less because of the amplified uncertainty. Kaspersen et al. (1988) acknowledged this type of phenomenon, which they called the “social amplification of risk.” They posited that risk perception by the public is mediated through psychological, social, institutional, and cultural processes (such as the news media) which can amplify or attenuate the public’s perception of the risk (Kaspersen, et al., 1988).

Sometimes journalists purposefully make a risk seem more uncertain than it is to generate excitement about a story because controversy tends to spark audience interest (Dearing, 1995; Stocking & Holstein, 1993). Dearing (1995) describes a case in which the news media covered a so-called maverick scientist’s prediction of an earthquake risk. Though the work of this scientist was considered invalid and unreliable by the preponderance of other experts in his field, the journalists balanced the maverick opinion with the opinion of most major scientists balanced

conflict of interest of the corporate-funded scientific studies produces far different results than independent studies (Kohlbacher, 2006), and thus can lead to a large bias in the weight-of-evidence.

reporting is the standard practice in journalism to purportedly eliminate bias and promote objectivity. In this case, the balanced reporting increased the level of certainty of the earthquake threat, thus potentially leading the public to view the earthquake risk as greater than it was.

Journalists do not always artificially alter uncertainty due to their use of the norm of balance in accounts of science, however. Often, journalists use fewer caveats and make scientific studies of topics such as risk seem less uncertain than they are (Stocking, 1999). In addition, journalists often rely on one source of scientific information (i.e., one scientist or one research study) rather than many, and do not put the information into broader social or historical context as is necessary to fully express the certainty or uncertainty of the information (Stocking & Holstein, 2009). A potent example of such a case can be examined in the reporting of the research study first published in the British medical journal, the *Lancet*. In it, Dr. Andrew Wakefield suggested a connection between the measles, mumps, and rubella (MMR) vaccine and autism in children (Wakefield et al., 1998). If journalists merely reported this study as valid and did not include opposing scientific viewpoints that questioned the research, the public at large might have viewed the research as certain and the risk of autism from MMR vaccines as high. Indeed, it appears that scenario is what occurred, as public fervor over the risks of vaccines increased dramatically in the wake of the *Lancet* article. In fact, Smith et al. (2008) found that selective nonreceipt of (i.e., the decision of parents to opt-out of having their children receive) MMR vaccines increased after the initial reporting of the MMR-autism link, and they attributed the decrease in vaccinations with the influence of the mainstream media in the U.S. Therefore, it seems that the lack of uncertainty communicated in the case of the vaccine-autism research could have greatly contributed to the public perception of certainty and thus, of risk.

Scientists have their own role to play in communicating uncertainty to the public.

Scientists are commonly used as sources of scientific information in the media, and how they characterize uncertainty can alter uncertainty and corresponding risk perceptions. Journalists often defer to scientists as the authorities in scientific stories because of the latter's power and status; American science journalists are rarely skeptical of science's truth claims (Dunwoody, 1999). Consequently, scientists can influence public risk judgments by increasing or decreasing the amount of uncertainty they themselves communicate.

Some scientists who subscribe to the deficit model of information believe that too much detailed information about scientific uncertainty would result in decreased public trust of science. As a result, even as they may acknowledge uncertainties in their own research as part of the standard practice of recognizing limitations, they may downplay that uncertainty to the public (Zehr, 1999). Interestingly, Frewer et al. (2003) showed that, in cases of risk communication, the assumption that the public trust of science would decrease with increased uncertainty information is unwarranted. Perhaps this apparent contradiction may be due to the fact that the public knows and accepts that uncertainty is inherent in risks, so to not hear it from the scientists would make her appear disingenuous. To be sure, Jensen et al. (2008; 2011) demonstrated in multiple instances that addressing uncertainty in cancer research information – i.e., including hedging, caveats, and other limitations of research that indicate uncertainty – increases public views of trustworthiness of the scientists who conducted the research (and the journalists who reported it as well). Uncertainty claims also help to support the appearance of objectivity of scientists (Zehr, 1999). The decision of scientists to either accurately communicate uncertainty (as they know it) to the public, or to decrease their uncertainty rhetoric may lead to varied perceptions of uncertainty in the public.

Another aspect of the communication of uncertainty by scientists involves precisely how the uncertainty is communicated. As mentioned earlier, scientists tend to quantify uncertainty, and probabilities are central to that quantification. Recent studies of the United Nations Intergovernmental Panel on Climate Change (IPCC) reports examined how uncertainties were portrayed in the reports and how these portrayals affected public risk perception. Giles (2002) recommends that more quantification and standardization of uncertainties is needed, as the lack of a consistent representation of uncertainty leads to confusion for the readers of the IPCC report. However, while consistent numerical uncertainty information may seem important to scientists who communicate the uncertainty, Patt and Dessai (2005) and Wardekker et al. (2008) conclude that words and graphics are the most important features that help the public access and comprehend uncertainty. Yet, because people use heuristics to interpret uncertainty and to evaluate their interpretations, and because the language used to depict uncertainty can be ambiguous and varies in interpretation across populations, “predictable errors in judgment” of uncertainty follow (Wardekker, et al., 2008). Accordingly, the kind of presentation of uncertainty information by scientists can also influence how the public views both the uncertainty and risk within various contexts and situations.

One final way that scientific communication of uncertainty can shape perception is a function of the type of scientist who communicates the information. As Stocking and Holstein (1993, p. 190) note, “...scientists from one research orientation make one set of knowledge-based cognitive claims (with related interpretive claims), and scientists from another research orientation make competing knowledge-based cognitive claims (with related interpretive claims).” Indeed, Powell (2007) supports this statement in her study on scientists' claims about nanotechnology risk. She demonstrates that upstream scientists – engineers, chemists, physicists

– whose work on the production of nanotechnologies is more reductionist, see no uncertainties related to health risk but only uncertainty concerning technological development. In stark contrast, downstream scientists – toxicologists, epidemiologists, public health scientists – whose work on the ecological and human health effects of such technologies is more holistic and iterative, worry that the uncertainties may produce unanticipated and unintended consequences. It follows that, depending on which type of scientist is entrusted to communicate uncertainty information, the public will likely have very different perceptions of uncertainty from which to judge risks.

Finally, the public may receive uncertainty information from various stakeholder groups who have sharply different agendas. In cases where financial interests are at stake, representatives of interested industrial or corporate stakeholders frequently communicate uncertainty to argue for the continued use of potentially dangerous products or environmentally unsafe practices (Michaels, 2006, 2008; Rampton & Stauber, 2001). The first and most prominent instance of industry attempts to communicate uncertainty on a large and organized scale came from the tobacco industry, which sought to control public perceptions of the uncertainty about the effects of smoking for decades (Michaels, 2008). Another example occurred in the 1950s in the Antarctic, where the lack of certainty about the size and robustness of whale populations was used by the International Whaling Commission (IWC) to argue for the maintenance of the status quo in terms of whaling practices (Heazle, 2004). The subsequent perception of uncertainty and the decision to not prohibit or restrict whaling ultimately led to the collapse of the whaling stocks in the Antarctic (Heazle, 2004). Michaels (2006) outlines three uncertainty messages commonly utilized by industry and their public relations machines in cases such as the ones above:

1. Cause and effect relationships have not been established;
2. Statistical data do not provide answers; and
3. More research is needed

Indeed, these messages of uncertainty have been used in numerous other cases by industrial interest groups to amplify uncertainty perceptions by the public and minimize the risk perception of products, practices, and environmental phenomena such as asbestos, lead (Rampton & Stauber, 2001), aspirin (in relation to Reye's Syndrome) (Michaels, 2008), effluent from concentrated animal feeding operations (Stocking & Holstein, 2009), and most recently, climate change (Antilla, 2005; Boykoff, 2007, 2008; Boykoff & Boykoff, 2004, 2007; Oreskes & Conway, 2010).

While industry interests communicate uncertainty to enhance uncertainty perception and reduce the perception of risk, often competing environmental or public health interests use the opposite strategy. Advocates of the precautionary principle contend that a lack of data, (i.e., a lack of certainty) is too often misconstrued as evidence of safety, and they call for precaution to be implemented in cases where science suggests potential harms could occur but are, as yet, uncertain (Myers & Raffensperger, 2006). Communications from these environmental or public health interest groups can serve to increase uncertainty perception. Breast cancer activists, too, have learned to communicate uncertainty so as to legitimize their claims of the environmental risks associated with breast cancer (Ley, 2009) and advocate for more epidemiological and toxicological research in this area of risk. On the other hand, environmental groups will communicate the lack of uncertainty – or, in other words, the certainty - of climate change assessments to decrease uncertainty perception, increase risk perception and advocate for reduction of fossil fuel use and increased use of renewable energy and “green” technologies.

The final piece in the puzzle in terms of how communication of uncertainty might affect public perception consists of the role of trust. In spite of what is communicated, by whom and how well, trust can affect the inferences drawn by audiences, especially when the uncertainty information is conflicting (Friedman & Egolf, 2011). In general, the public trusts scientists much more than journalists (Dunwoody, 1999). In terms of public trust of stakeholder groups, after the Occupy Wall Street demonstrations of 2011-2012, it would appear that at least a segment of the population carries a tremendous distrust for corporations and their spokespeople, although, if corporate interest groups utilize scientists to communicate uncertainty on their behalf, that could complicate the situation in terms of feelings of trust. As for environmental and public health interests groups, it would seem that the jury is still out as to how much trust the public has in information disseminated by these entities.

All in all, how uncertainty and risk judgments are constructed involves an intricate network of communication actors, actions, and perceptions. From how people conceive of uncertainty in general, to how uncertainties are communicated and by whom, to how uncertainty information can be perceived and for what reasons, to how communication affects risk perceptions, it would seem that the many variables make for difficult evaluations and predictions. Nevertheless, the study of uncertainty within the context of science and risk is a valuable one, as our complex global technological society is one that has become increasingly laden with risks and uncertainties. It is imperative to continue to tackle the task of deciphering the elaborate web of uncertainty information, communication, and perception relative to risks. The proceeding study of how uncertainty and risk are utilized within the context of the Gulf oil disaster might be one means of elucidating how uncertainty is utilized by the news media in stories about environmental and health risks.

Framing

One of the problems with utilizing the concept of frames in communication research is that the concept, while used widely in content analysis, does not have a universally shared definition (Entman, 1993; Scheufele, 1999). In this section, I will first explain how frames have been traditionally defined and utilized in communication research. Then I will show how, given their definition, the operationalization of frames in many scholarly studies has not included all aspects of their true definition. Thus, I will suggest that the words and phrases sometimes constituting “frames” in content research are merely domains or sub-topics; true frames need either context and theme, so a more qualitative approach to their analysis is often needed in research on media content.

In general, with respect to journalistic stories, a frame refers to the manner in which information is selected, organized, and presented or understood within the context of a news story (Veenstra, Sayre, Shah, & McLeod, 2008). Frames have been defined as central organizing ideas “to make sense of relevant events” (Gamson, 1989, p. 157). Framing makes some aspects of an issue more salient, and journalists or individuals use these frames as narrative strategies to make sense of controversial issues (Entman, 1993), often issues pertaining to science and the environment (Nisbet & Mooney, 2007). Frames represent choices involving precisely what message to convey in relation to a particular issue (Tuchman, 1978). Framing is sometimes thought of as secondary agenda-setting, because while the topic of news coverage has already been set (e.g., the Gulf oil spill), the particular thematic emphases (e.g., environmental health effects) are expressed through framing.

Two types of frames are distinguished in research. Scheufele (1999) describes a *media frame* (objective frame) as words, phrases, devices, or styles of presentation of an issue in public discourse (Chong & Druckman, 2007; Druckman, 2001; Gamson & Modigliani, 1989), as opposed to an *individual frame* (subjective frame) which refers to the way an individual's mind conceptualizes the issue. The former type of frame focuses on media constructs, in which the journalist signals to the audience the important aspects of an issue and proposes how to think about the topic at hand (Kim, Carvalho, & Davis, 2010). The latter focuses on the constructs of the audience. Each may be used as dependent or independent variables, depending on the research question at hand. This proposed study consists of a content analysis of news stories in which framing will depend upon certain factors within the media outlet; as such, media frames will be a main concept of concern and will be used as dependent variables.

According to Iyengar (2005), media framing involves a variety of forms of presentation of an issue or event, variety that may stem from more than differing words with respect to the issue. Gitlin (1980, p. 7) offers a similar perspective: "Media frames are persistent patterns of cognition, interpretation, and presentation, of selection, emphasis, and exclusion, by which symbol-handlers routinely organize discourse, whether verbal or visual." Media frames come from the patterns of thought that journalists themselves employ to make sense of the matter about which they are writing (Gamson, 1989). Griffin and Dunwoody state that frames emerge as journalists emphasize some informational aspects of a topic while excluding others (Griffin & Dunwoody, 1997). Most importantly, framing in media involves "selection and salience" of particular aspects of a topic in a news story (Entman, 1993).

Media frames have more recently been classified into two broad categories, *generic frames* and *issue-specific frames* (De Vreese, Peter, & Semetko, 2001). *Generic frames* refer to

narrative elements that may be applied to almost any news story, regardless of the topic of the story (De Vreese, et al., 2001). Episodic versus thematic frames, discussed at length by Iyengar (1991, 1996), fit into this category, as any story may be episodic in nature – i.e., depicting an event in ways independent of context and history – or thematic – i.e., emphasizing the broader social or historical context of an event or process. Thus, episodic framing describes news coverage that focuses on individual or personal perspectives, specific examples, or particular events, while thematic framing offers analytical overviews of topics and presents an extensive setting (Iyengar, 1991, 1996). Other frames that inhabit this generic category include responsibility frames (both causal and treatment/remedy), which seek to diagnose and identify causal factors and causal players or to suggest treatments or players who would be responsible for such treatments (Cerutti, 2010; Entman, 1993; Kim, et al., 2010). Morality frames or value frames can also be thought of as generic frames that reflect values bestowed upon a particular issue or event within the discourse about it (Entman, 1993). Most stories, regardless of topic, can exhibit a theme of responsibility, morality or value, so these frames can guide the construction of almost any type of news story examined.

In contrast, *issue-specific frames* are those that can apply only to specific stories and will not be applicable to other issues or events. For example, a story about the opening of more charter schools in place of traditional public schools would not likely employ an environmental frame, or a human health frame, because the story probably does not have relevance to the environment or to human health, but it may use an economic frame in discussing the costs of the two types of schools. Or, a story about students from these same schools volunteering to help the elderly may have an educational or public service frame, but would not likely have an environmental, a science, or a risk frame.

In the case of the Gulf oil catastrophe, a number of previously studied, issue-specific frames may be relevant to the analysis of this event. A risk frame (Sachsman, Simon, & Valenti, 2004), which emphasizes the risks involved in deep sea oil drilling may come into play. Frames about the scientific uncertainty (Assmuth, 2011; Levidow, 2003) of either deep sea drilling or the effects of oil spills may also be displayed and may in fact overlap with frames about risk. Other issue-specific frames that may be pertinent are those that portray the event in terms of ecology/environment, or economics (Wright & Reid, 2011). Finally, another significant frame might include health, be it human, public, or ecological. Though often a news story is depicted with one dominant frame, more than one frame pertaining to the story could be utilized in any news account.

A media frame, therefore, is a guiding idea, angle, or emphasis through which a topic, event, or issue is presented in the mass media. These frames or guiding ideas may be general (or generic) in nature, or they may be specific to the topic at hand. Traditionally, frames, as described above, garner precise definition through operationalization within media studies. But also, commonly, frames identified by communication research are composed of one or two words that present the topical emphasis of the story but not the angle or direction (the nature) of that emphasis. A number of examples of frames employed in recent studies exemplify this omission. Chong and Druckman (2007) identified “free-speech” and “public safety” frames; Wright and Reid (2011) examined “economic development,” “environment,” and “national security” frames; some frames that Garcia (Garcia, 2011) showed were “credibility,” “power,” “hero,” and “villain”; while Iannantuono and Eyles (2000) looked at “future generations,” “cancer,” and “child health” frames (among others).

Given these utilizations of frames, what delineates frames from topics? How do the aforementioned frames fully explain the interpretation of the story within the context of that “frame”? How do we understand what is being said about “power” (i.e., do certain actors have too much power, if so, which ones?) or “environment” (i.e., is the environment threatened by a certain event, or is the event innocuous in terms of risk to the environment?). One could argue that the current utilization of frames in communication research do not offer enough context about how to think about the story/topic at hand (which framing is defined as doing); instead, these frames identify the sub-topics, realms, or domains of discussion, but not the slant that those domains take.

If frames exist to make a certain aspects of a story more salient and thereby resonate with a particular belief system (Entman, 1993), then these previous examples of frames only accomplish the former (possibly) and not the latter. For example, some scientific experts are suggesting that climate change should be framed as a “food issue” to make it more salient to the public (Goldberg, 2014). Implicit in that suggestion is the assumption that the “food issue” frame would mean that climate change will negatively affect agriculture and food supplies, and produce food insecurity and food scarcity. However, others could use the same “food issue” frame to argue that the warming of the climate will make more areas of the world warm enough to grow more food products, and that agricultural outputs in certain areas will be enhanced by climate change, which they indeed have been. Thus, merely identifying the use of the sub-topic of “food issue” is not really identifying the frame in an article, because it does not explain how the “food issue” is being interpreted.

The aforementioned examples of frames, and in fact most “frames” discussed in research literature, are really more sub-topics or “domains.” To constitute a frame, the domain highlighted

must also include aspects of **how** that domain is interpreted. In other words, if “cancer” is the domain, then to constitute a frame, how cancer is addressed in the narrative must be explicated. Cancer can be discussed in terms of being a tremendous risk in the wake of the Gulf oil spill or it can be discussed as being a negligible public health risk. Consequently, to be a frame, a domain must be more thematic in nature. It must be interpretable. That is, a journalistic frame will impart valence or slant to a domain, much like a theme does to a main topic in a work of literature. Hence, in this study, the sub-topics identified using quantitative content analysis will be deemed “domains.” The true “frame” will not be construed until a qualitative thematic analysis of a story containing that domain elucidates the slant or valence of that domain.

Explicitly, domains can be recognized by identifiable words, phrases, and/or ideas that dominate the reporting of a news story. If a story about the Gulf oil spill speaks mainly of the costs of the spill and its cleanup, the domain of story could be considered economic. On the other hand, if a story consists of portrayals of oil-soaked pelicans and dying sea turtles, it would be ecological. A story about the lack of evidence or uncertainty about the toxicity of “Corexit” (the solvent used as a dispersant to clean up the oil spill) could be covering the domains of both scientific uncertainty and public health if the story covers the potential human health effects from Corexit exposure. However, none of these domain labels explain the overarching frame without specifying the manner in which the domain is addressed. Economy could be discussed in terms of the effects on small fisherman or on the oil industry. Ecology could be discussed in terms of the need to protect it, or conversely, the primacy of economic over ecological concerns. A story might emphasize the long term health risks of exposure to crude oil, or might instead seek to minimize the idea of health risks from the oil spill. In these ways, frames can only be identified when the theme of the domain is explicated, rather than simply the topic.

The existence and detection of domains and frames in a content analysis can prove useful to an overall analysis of media reporting on an environmental issue. The existence, non-existence, or prevalence of particular domains and their accompanying frames may indicate a particular perspective in the overall news coverage of an issue or event. In terms of media propaganda model, the difference in domains and frames used by corporate-controlled media outlets versus independently owned media outlets in describing the Gulf oil disaster may demonstrate the differences in the interests that these media serve.

Chapter 7 - Research Question and Hypotheses

The primary research question in this study is whether or not corporate ownership and advertising influence the production of media stories about the Gulf oil disaster, as theorized by the media propaganda model. More specifically, this study seeks to examine how environmental and health issues are presented by differing media outlets in the context of the 2010 Gulf oil disaster.

Utilizing the propaganda model as a theory of media behavior, one would hypothesize that large, corporate-owned media organizations (i.e., the mainstream media) will present their stories on the Deepwater Horizon disaster using domains and frames that de-emphasize public health and ecological risks and effects. In service to maintaining the economic state and the vast wealth of the fossil fuel industry, corporate media outlets would more likely frame health or environmental risks and effects of the disaster as minimal. Instead, one would hypothesize that economic effects as well as the need for oil would be emphasized by these media outlets. Large multimedia and multinational corporations that control certain media outlets are reliant on maintaining the economic status quo and the market mechanisms that preserve their varied interests (many of which are connected, if only indirectly, to the oil industry or similar energy industries). Their perspective will resemble that of the corporate stakeholder. Thus, it behooves them to ensure that their news media outlets do not imperil their other economic interests. Reporting on risks and negative effects of high-risk technologies such as offshore drilling could serve to endanger some of their assets in the eyes of the public. Moreover, corporate media outlets may utilize uncertainty to cast doubt on the potential negative effects of the oil spill.

By contrast, non-profit, independent media outlets that are not owned by and beholden to large corporations may present more stories with a focus on environmental, ecological and public

health risks. They will offer stories that offer perspectives of the affected citizens, rather than those of the perpetrators (i.e., corporate spokespeople) and regulators (i.e., government) in charge. News outlets that are owned by companies or non-profit agencies whose interests are in providing news may seek to uncover precisely the sorts of corruption or collusion that their corporate counterparts may be attempting to hide. Furthermore, smaller, independently owned media will be more likely to utilize environmental or public health advocates (those who try to prevent disasters and who deal with the spill's effects) as story sources, whereas large media will more likely speak to official sources from government agencies and corporate stakeholders such as BP, Transocean, and Halliburton, with whom they exist in the sphere of global capitalism. Lastly, independent media outlets will likely utilize uncertainty not to cast doubt on potential deleterious effects of the spill but to illuminate the myriad of unknown factors (e.g., long-term effects, sublethal effects on populations and ecosystems, epigenetic transgenerational effects) involved in drawing a conclusion about potential risks and effects.

Consequently, this study presents the following hypotheses:

H1: Corporate media outlets will utilize fewer environmental domains than independent media outlets.

H2: Corporate media outlets will utilize fewer health domains than independent media outlets.

H3: Corporate media outlets will utilize more economic domains than independent media outlets.

H4: Corporate media outlets will utilize fewer risk domains than independent media outlets.

H5: Corporate media outlets will utilize fewer environmental justice domains than independent media outlets.

H6: Corporate media outlets and independent media outlets will differ in the number of uncertainty domains used.

H7: Corporate media outlets will utilize different sources than independent news outlets.

In addition to these quantitative hypotheses, the main themes of these various domains will be explored qualitatively to uncover frames. It is hypothesized that the framing of each of the various domains employed in stories pertaining to the Gulf oil disaster will differ between corporate and independent media outlets.

Operationalization

As previously outlined in Chapter 2, the propaganda model theorizes the existence of five filters through which news stories are constructed. Though these filters are presented as somewhat parallel or concurrent, there is actually a hierarchy in which three of the filters are derived from the first two. That is, sources used in the media, the flak that occurs, and the dominant ideology that permeate media stories all stem from the particular media outlet's corporate ownership and dependence upon advertising. The final domains and frames that are exhibited in media stories, then, are a result of the interaction of the five filters. See Figure 1 for the hierarchy and relationships between the filters and the resulting domains and frames.

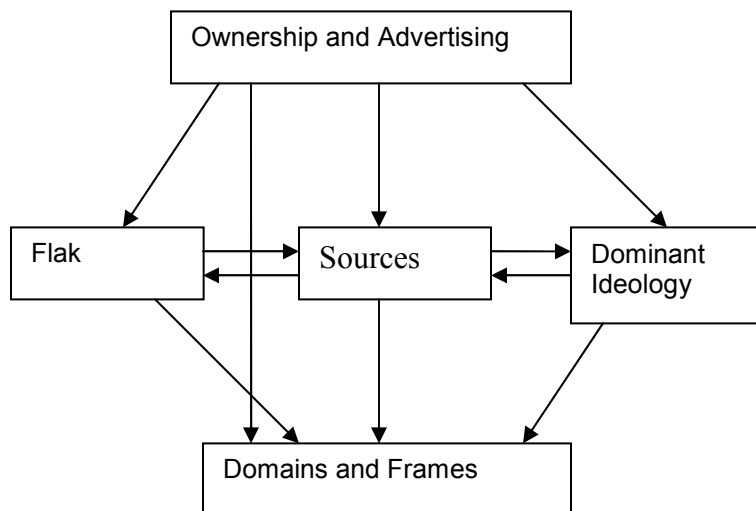


Figure 1. Relationship between the five filters and the domains and frames in media stories

However, because corporate ownership of and advertising in media outlets can be known *a priori*, while flak, sources, and dominant ideology can only be measured from their appearance within news stories, and also because not all of the five filters can be measured quantitatively, the relationship between the filters and the domains and frames can be somewhat complex and non-linear.

Two of those filters – ownership and advertising – serve (in conjunction) as independent variables upon which the resulting domains and frames are dependent. These independent variables are known prior to the study; i.e., it is known which stories in the sample set are derived from corporate media outlets and outlets that depend upon advertising and which are derived from independent media outlets that do not depend upon advertising. The other three filters – sources, flak, and dominant ideology – are derived from the data set. The type of source used in stories can be measured and may act both as a dependent variable and as a moderating variable between the type of media outlet in which the story is reported and the domains and frames. Likewise, the assumed dominant (capitalistic) ideology filter of the media propaganda model may also serve as a dependent variable or as a mediating variable between type of media outlet and story domain and frame, though measuring dominant ideology quantitatively can be difficult. Economic domains within stories might serve as proxies for the capitalist ideology filter, but so may many other ways in which stories are framed. Thus, it is difficult to tease out the domains and frames themselves from the dominant ideology filter and to capture dominant ideology as its own quantitative variable. Dominant ideology may more accurately be accounted for using qualitative analysis of content.

The filter which is probably the least able to be quantified is flak. It could serve as a moderating variable; however, flak is extremely difficult if not impossible to measure

quantitatively because it is often hidden. Sometimes flak can be measured via the sources used in the story, but it is difficult to determine if the source is simply being interviewed/quoted initially (i.e., is simply a “source”), or is a source placed in a story purposefully to employ flak. Flak might be surreptitious, because it might be a result of covert actions by certain actors on journalists or on media organization, which results in a certain framing of a news story. Flak can also be exhibited through op-eds. In the case of the latter, flak may be more recognizable. Nevertheless, because of the difficulty of reliably quantifying flak, it will be examined more through qualitative analysis.

As a result of the inability to quantitatively account for all variables as well as the complicated interaction between the five filters of the media propaganda model, this study employs both quantitative and qualitative aspects of content analysis. In combining both forms of content analysis, the study seeks to gather both statistically reliable data about what is presented in news stories about the Gulf oil disaster in addition to more nuanced, in-depth qualitative data about latent aspects of the news stories. Consequently, the next chapter will explain the methodological rationale behind utilizing both quantitative and qualitative content analysis.

Chapter 8 - Combining Quantitative and Qualitative Content Analysis

The field of content analysis began in the nineteenth century to study various forms of written texts. The systematic methodology of “content analysis” arose in the mid-twentieth century, when Berelson (1952) described it as the “objective and systematic quantitative description of the manifest content of communication” (p. 18). While scholars continue to evaluate manifest content through quantitative methods in fields such as communication, psychology, and anthropology, increasingly researchers also wish to describe latent content within textual information. For such endeavors, qualitative content analysis has emerged as an alternative to and a supplement to the traditional quantitative approach.

Probably the biggest obstacle to performing analyses of media content is the widespread lack of agreement on definition, epistemologies, and methods that define content analysis in general, and qualitative content analysis in particular (Graneheim & Lundman, 2004). Yet, despite these vast discrepancies, qualitative content analyses of media are indeed performed singularly or in combination with quantitative content analyses as regular research methodologies in communication as well as other fields. In fact, the use of qualitative content analysis as a supplement to the more common quantitative approach can serve to greatly enhance a study’s ability to gain more nuanced information, particularly thematic information, from an analysis of media (Zhang & Wildemuth, 2009). Moreover, numerous processes can help to establish rigor and maintain quality throughout the qualitative portion of the study. By following certain guidelines and performing a variety of procedures to maintain quality control, the qualitative content analysis can be a valuable tool to fill in knowledge gaps where quantitative analysis cannot venture, and to complement results gained through a quantitative content analysis of the same material (Berg, 2007; Elo & Kyngäs, 2008; Krippendorff, 2004).

Though a single definition of content analysis has not evolved, in communication it can be thought of as an approach to research or a paradigm of studying written, audio, and/or televised media content. A comprehensive explanation of the term from the Merriam Webster dictionary describes the process as “analysis of the manifest and latent content of a body of communicated materials (as a book or film) through classification, tabulation, and evaluation of its key symbols and themes in order to ascertain its meaning and probable effect.” Clearly, this definition explains a research approach and general methodological principle, but does not include specific procedures. The methods by which this analysis is conducted may differ slightly or substantially in different circumstances, depending upon the nature of the research questions.

But other academics dispute this universal definition. In 2004, a symposium of political scientists discussing qualitative methods resulted in a series of essays debating the meaning of content analysis and its contrast with discourse analysis (in Krippendorff, 2004, p. xvii). These scholars rarely agreed on any definitions, though most if not all described content analysis as being quantitative in nature. Some of these scholars felt that discourse analysis uses a social constructivist epistemology while content analysis only utilizes a positivist one. Others thought that discourse analysis involves a theory of social and political power, or that discourse analysis assumes that texts have no meaning without a broader context (implying that content analysis neglects context).

A great deal of media research as practiced and explained by media scholars would not concur with these assessments (Elo & Kyngäs, 2008; Esmail, Phillips, Kuek, Cosio, & Kohler, 2010; Herrera & Braumoeller, 2004; Hsieh & Shannon, 2005; Irlbeck & Akers, 2010; Kohlbacher, 2006; Krippendorff, 2004; Lim & Jones, 2010; Liu, 2009; Mayring, 2000; Pope, Ziebland, & Mays, 2000; Solomon & Janssen, 2010; Zhang & Wildemuth, 2009). As a leading

expert in the use of content analysis in communication, Krippendorff (2004) does not distinguish between discourse and content analyses, but instead describes discourse analysis as one of the numerous types of qualitative approaches to content analysis. Because of all of the confusion and discord, establishing a good working definition of content analysis would be prudent to begin. Thus, as stated previously, content analysis as used with regard to media content can be thought of broadly as a study of recorded communication (Krippendorff, 2004). It can encompass both quantitative and qualitative methods, it can analyze both manifest and latent content, and it can be evaluative and/or predictive.

With this general definition of content analysis settled, it is important, initially, to distinguish between quantitative and qualitative methods of this research methodology. The quantitative methods of analyzing media content, by definition, involve numerical counts whereby variables such as words, sentences, and ideas are identified and measured and statistics are applied (Babbie, 2010). Qualitative methods, on the other hand, do not count variables but examine the deeper meaning in the text (Golafshani, 2003; Hsieh & Shannon, 2005). Qualitative content analysis may be defined as “a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes and patterns” (Hsieh & Shannon, 2005, p. 1278). However, sometimes even the specific steps in the processes, such as coding (reducing data into meaningful segments and naming those segments) (Creswell, 2007a; Golafshani, 2003; Padgett, 2008a), can overlap quite a bit between quantitative and qualitative methods of studying media content. Zhang and Wildemuth (Creswell, 2007a) describe the general steps of the content analysis process, which apply to both quantitative and qualitative content analyses, as:

1. Prepare the data (the choice of content must be justified by what you want to know);

2. Define the unit of analysis (usually an individual story in an analysis of media content);
3. Develop categories and a coding scheme (for a deductive study; this is left open for inductive coding as codes and their overarching categories will emerge from the text);
4. Test coding scheme on sample of text (a pilot study for qualitative analysis; inter-coder reliability test for quantitative analysis);
5. Code all text;
6. Assess coding consistency (for qualitative analysis this involves refining categories and perhaps grouping them into larger categories; this is already performed in step 4 for quantitative analysis);
7. Analyze the coded data (draw conclusions – interpret thematic findings in a qualitative analysis; statistically analyze data in quantitative method); and
8. Report methods and findings.

The reciprocal nature of the two methods may be why many researchers claim that “qualitative and quantitative methods should be viewed as complementary rather than antagonistic” (Zhang & Wildemuth, 2009); they are not mutually exclusive (Kohlbacher, 2006). Furthermore, a number of scholars state that though few media studies utilize both methods simultaneously, the multi-method approach to content analysis is a way of ensuring quality and rigor, and indeed, the best content analyses use both approaches (Berg, 2007; Elo & Kyngäs, 2008; Krippendorff, 2004; Zhang & Wildemuth, 2009).

Using qualitative analysis as a supplement to quantitative in studying media content may enable a researcher to fill in the voids in areas where the methods of quantitative analysis cannot reach. Therefore, in analyses of media content, qualitative analysis is not usually part of a general qualitative methodological approach or strategy, such as grounded theory, ethnography,

or phenomenology (although the content analysis may be a part of a larger case study that is qualitative, quantitative, or combined in approach). The overall approach in this research study is one of content analysis, and qualitative and quantitative content analyses are the methods.

Both quantitative and qualitative content analyses entail categorizing words and chunks of words from texts into categories (Kohlbacher, 2006; Lim & Jones, 2010; Zhang & Wildemuth, 2009). Quantitative content analysis, though, is most often deductive rather than inductive because it tends to be grounded in positivism (Elo & Kyngäs, 2008). It begins with a hypothesis based on theory, and a coding scheme is generated from that theoretical basis. But many times important textual content is missed (i.e., not coded) because the nature of that textual information was not conceived and made into codes before the content was examined. This can occur because themes or ideas that may be present in the media content were not envisioned ahead of time. The ability of qualitative content analysis to be a deductive, inductive, or a combination (Krippendorff, 2004; Zhang & Wildemuth, 2009) allows for the use of either *a priori* or emergent codes, or an amalgam of both. In addition, it allows for an iterative process, in which existing categories can be modified and or new categories can emerge from the codes (Creswell, 2007a; Elo & Kyngäs, 2008; Fereday & Muir-Cochrane, 2006; Kohlbacher, 2006; Mayring, 2000; Pope, et al., 2000). This openness of qualitative analysis makes it useful because with a deeper reading of the text it may assist in finding themes that could not be found quantitatively, in finding themes that correspond to the underlying theory but were not initially imagined, and also in finding themes that may call for a re-examination of the original theoretical framework.

Quantitative analysis of manifest content – i.e., looking for patterns in the concrete, explicit terms in the text (Kohlbacher, 2006)- is fairly easily accomplished, but quantitative analysis of latent content - i.e., inferred information or the underlying meaning of the text

(Babbie, 2010; Hsieh & Shannon, 2005) - is much more difficult. Even with a coding guidebook that explains precisely what specific words, phrases, and qualities to look for as descriptors of a certain idea, the search for latent content can quickly founder because of a lack of inter-coder reliability. In other words, researchers cannot objectively agree on whether or not that idea is present in various textual messages, so they have to omit that variable as one to assess. This sometimes occurs simply due to lack of time, because agreeing on precise definitions can be difficult and time-consuming, even if coders are objectively interpreting data quite similarly. Although some scholars debate whether or not latent content can be analyzed reliably (Babbie, 2010; Hsieh & Shannon, 2005), most contend that qualitative analysis is the more efficient option if a researcher seeks to evaluate both latent and manifest content (Elo & Kyngäs, 2008). So, qualitative content analysis will enable a researcher to sift through texts to find themes that may not be able to be unearthed with quantitative methods alone. It merges openness with theory-guided analysis (Kohlbacher, 2006; Mayring, 2000; Padgett, 2008a). Though qualitative content analysis does not utilize the same inter-coder reliability testing as quantitative analysis, the latent content that is analyzed through qualitative content analysis will be verified through peer-review. It will also be reported with such detail that readers can act as reviewers in assessing its credibility and dependability.

Consequently, in devising an overall approach to media content analysis that is able to capture the nuances of the textual content, one could begin with a deductive quantitative analysis, then move on to a qualitative analysis. There is general agreement about numerous ways to proceed methodologically in quantitative content analysis (Krippendorff, 2004; Krippendorff & Bock, 2009). On the other hand, while, as Hsieh and Shannon (Kohlbacher, 2006) explain, there is no firm definition of or procedures for qualitative content analysis (there are three common

approaches. *Conventional* is the inductive approach where themes arise from the data; *summative* is a quantitative-sounding qualitative approach that involves quantification (but not in an objectivist, statistical sense) of words or content to understand their contextual use; and *directed* is a deductive but still open and iterative approach where theory and research questions guide codes (Hsieh & Shannon, 2005). The directed approach allows the use of existing theory to inform the coding scheme, but then permits new codes to arise and new concepts that emerge to be incorporated (Hsieh & Shannon, 2005). The directed qualitative content analysis appears to be a common one utilized in media research (Esmail, et al., 2010; Hsieh & Shannon, 2005; Irlbeck & Akers, 2010). Though the description of the actual procedures involved in the analysis still do tend to be very general and ill-developed in many research studies, the method can be beneficial in combination with quantitative analysis (e.g., Esmail, et al., 2010; Irlbeck & Akers, 2010; Liu, 2009).

A thematic, directed qualitative content analysis can enable a closer examination of media material already coded via quantitative analytic methods. Assuming the unit of analysis is a particular news story, a subset of stories from the original data set can be flagged during the quantitative analysis for its particular value in offering a deeper understanding of the research question at hand and can be used as a purposive sample for the qualitative analysis. The stories might contain interesting, unique, and/or especially important information not apparent in or not collected within the coding of the quantitative analysis.

For example, a series of media news stories might be quantitatively analyzed to count mentions of the ecological effects of a disaster. A high story count of ecological effects might lead one to assume that the media coverage is presenting ecological effects as an important issue. However, but adding in qualitative analysis of some of those stories, one can find out exactly

how those ecological effects were framed, and might discover most mentions of ecology in the stories actually discounted the topic as unimportant and minor.

The thematic, directed qualitative analysis process follows the general procedure, adapted from Braun and Clarke (2006) and Grandheim and Lundman (Graneheim & Lundman, 2004):

- 1) Select the unit of analysis (a story, in media content);
- 2) Become familiar with the data (via quantitative analysis);
- 3) Generate initial codes (from research questions and/or underlying theory) by condensing the text;
- 4) Search for themes (according to pre-identified categories in deductive analysis, according to emergent categories in inductive analysis, or a bit of both in directed approach);
- 5) Review themes;
- 6) Define and name themes; and
- 7) Produce report.

The utility of the qualitative addition to the content analysis is in not only providing a deeper meaning and context to the content but also in generating evidence that may contradict the underlying theory and point toward a new theory.

The flexibility and openness of qualitative methods, such as a qualitative content analysis, facilitates the extradition of more nuanced meaning and context. The addition of qualitative content analysis to a study of media texts can assist in, if not fully enable the extraction of latent content from the texts, which will certainly provide more a more complete and inclusive analysis of the media content. But because qualitative research methods have been criticized for lacking the credibility, i.e., objectivity, of quantitative methods (even when they are approached from a perspective such as constructivist or critical-ideological, which by definition do not view

knowledge as completely objective), assurances for quality and rigor are integral to the research process (Braun & Clarke, 2006).

Standards of rigor are those that are applicable during the qualitative research process, while standards of quality evaluate the analysis after the study is completed (Creswell, 2007c; Golafshani, 2003; Morrow, 2005; Padgett, 2008b). In the quantitative, positivist realm, the terms used for these standards are validity, reliability, and objectivity. Some qualitative researchers adopt the use of these terms and define them slightly differently (Padgett, 2008b), but most scholars agree that the use of a different lexicon for quality and rigor is important in qualitative methods, even though they do not completely agree on appropriate terminology. Nevertheless, there is a substantial overlap in terminology and ideas that can serve the quest for quality and rigor (e.g., Creswell, 2007c uses the term "validation").

First, there exist numerous strategies to ensure a rigorous qualitative research project, not all of which pertain to a qualitative analysis of media content. In any case, some are germane to the process and have been elucidated by more than one qualitative scholar (Creswell, 2007c; Elo & Kyngäs, 2008; Golafshani, 2003; Hsieh & Shannon, 2005; Morrow, 2005; Zhang & Wildemuth, 2009). *Prolonged engagement and persistent observation* commonly refer to methods that involve interaction with informants/participants, but in the case of media content, these standards could apply to spending a lot of time with the content, reading it and re-reading it for clarity of understanding. In fact, this strategy can be accomplished during the initial quantitative phase of the project. *Peer review/debriefing/support* occurs when research peers discuss the methods and analysis for clarity, accuracy, and lack of bias in interpretation. This is an important step, which can include sharing the qualitative analysis with a collaborator who can help to corroborate the coded themes. *Negative case analysis* involves looking out for

cases/instances that might disconfirm one's hypotheses. If found, these cases do not necessarily mean that an entire theory must be discarded, but that more consideration and evaluation are needed to evaluate the theory's viability (Creswell, 2007c; Hsieh & Shannon, 2005; Morrow, 2005; Padgett, 2008b; Zhang & Wildemuth, 2009). *Triangulation* refers to the use of multiple methods, theories, sources, and/or investigators. Within the context of media content analysis, the use of both qualitative and quantitative methods can provide a good means of triangulation (Padgett, 2008a). Finally, detailed explanation of the analytic process, and rich, thick description of results can assist with rigor (Golafshani, 2003; Lim & Jones, 2010).

The measures of quality in qualitative analytic methods tie directly back to the standards of rigor because they verify that the methods used were indeed rigorous. They also correspond to the quantitative quality standards of internal and external validity, reliability, and objectivity (Creswell, 2007c; Elo & Kyngäs, 2008). Trustworthiness, or the defensibility of the methods and the confidence in the results (Creswell, 2007c; Morrow, 2005; Padgett, 2008b) is the sole measure of quality in qualitative methods. A number of standards of trustworthiness exist. The generally agreed upon gauges of trustworthiness in qualitative research include the following four (with their corresponding quantitative term in parentheses):

Credibility (internal validity) = an adequate representation of what is being studied; can be achieved during the peer debriefing

Transferability/Applicability (external validity/generalizability) = the ability to transfer the hypothesis/analysis to other similar contexts; can be achieved during the reporting p

Dependability/Auditability (reliability) = the coherence of the internal methodological processes; can also be achieved during the reporting

Confirmability (objectivity) = the findings represent the situation studied and not the biases of the researcher (Golafshani, 2003); can be achieved during peer debriefing.

Some scholars also mention terms such as integrity (Creswell, 2007c; Golafshani, 2003; Morrow, 2005; Padgett, 2008b; Zhang & Wildemuth, 2009) or neutrality (Creswell, 2007c), which could fit under the category of confirmability (Golafshani, 2003), and consistency, which might fit under the umbrella of dependability. Regardless of the specific language utilized, a qualitative content analysis of media should strive to achieve these values of trustworthiness to guarantee the quality of the study.

Qualitative content analysis can help contribute to answering the how and why of communicative messages (Babbie, 2010, p. 333). It can greatly contribute to the illumination of media content by more deeply exploring latent meanings and by placing ideas and themes from the media in context. Although no precise definition or procedures for qualitative content analysis are shared by all scholars, the flexibility provided by this lack of consensus allows the qualitative process to more easily search for and discover meaning in places that the quantitative process might be forced to overlook. Moreover, by adhering to the careful standards of quality and rigor, qualitative research can be conducted in a robust manner that maintains its credibility on par with any quantitative study. Hence, as many scholars have noted, examining media content through the combined processes of qualitative and quantitative content analysis may procure the most robust data, produce the most complete answers to the intended research questions, and provide the most comprehensive analysis, resulting in superior research project overall.

Chapter 9 - Methods

Quantitative

To examine the frames with which various different news outlets contextualized the Deepwater Horizon Disaster, quantitative and qualitative content analyses were used. Because the study sought to characterize media discourse and potential differences in discourse surrounding the disaster, content analysis was the most appropriate methodology. As Babbie (2010, p. 333) states, content analysis is the preferred method of research for answering, “Who says what, to whom, why, how, and with what effects?” This study addresses the question of who (i.e., media outlets) says what (i.e., domains) and how those messages are stated (i.e., frames). It will offer suggestions as to why such messages are constructed by utilizing the media propaganda model as a theoretical explanation. Although the effects of such discourse on the public consumers of the content could also be an area of great interest for research, the scope of such a project is too large. Additionally, in order to determine the media effects of discourse about this specific issue, the dominant domains and frames must first be identified.

Population of Interest and Sampling Frame.

Recent evidence suggests that citizens may be turning to the Internet as a news channel, a phenomenon particularly pronounced in certain age groups, or they may be supplementing their news with Internet sources (Gaskins & Jerit, 2012). There is no clear evidence that traditional news outlets have been entirely supplanted (Gaskins & Jerit, 2012). In addition, while circulation of traditional newspapers and viewership of television news has been steadily declining, online consumers of news most often obtain their information from the same news outlets that they previously read in print or watched on television. Of the top fifteen website visited for news as of May 2012, eleven of them were websites associated with newspapers or television news channels

(eBiz, 2012). Thus, daily newspapers and daily evening news programs still serve as influential conveyers of information content, even as that content may be obtained via online outlets. As a result, the general population of interest for this project is national, corporate-owned daily newspapers and television news programs, as well as national independently owned producers of news content in a video and print format. National and international, rather than local, media outlets were chosen because they present the Gulf oil disaster to an audience larger than those who may be directly affected by the spill. Since local news outlets would likely have a much more personal interest in the story, this study focused on national and international news outlets, all of which were geographically distant from the event and all of which had numerous other stories from which to choose, given their national and international reach. In addition, their audiences are more likely to encompass members of the public who do not have close ties to the event, in which case narrative frames in their stories that identify with “common citizens” or local interests may be more obvious if they are found. Thus, because their audiences should be more largely represented by the entire U.S. population, these media’s stories should not be affected by the types of factors explained by the structural pluralism theory of media content.

More specifically, the sampling frame for this study consisted of newspapers, television news programs, and online news outlets purposively chosen to correspond to the independent variables of interest – corporate-owned and independently owned news outlets. Each different news outlet type was represented by three print or online outlets and one television/radio outlet. The major types of news outlets were divided into two categories:

1) Corporate-owned (for-profit, i.e., mainstream media) and 2) Independently owned (not for profit). Corporate-owned media were defined as outlets that have ties to commercial interests, are traded publically on the stock market, and are for-profit endeavors. Independently owned

media consist of outlets that derive no funds from commercial or for-profit interests and are run on a non-profit basis.

Since most independent, non-profit media outlets that produce original daily content do not have a presence in the traditional television and print realms, these independent outlets could not be precisely matched to the corporate media outlets in that their content is not presented in exactly the same manner as the corresponding corporate-owned media outlets. Independent news outlets who produce daily video reports are present either via cable or satellite television and/or online streaming, and independent news outlets produce print material both via hard copy and online.

The list of news outlets utilized is shown in Table 1, along with identifying information relevant to the grouping of these specific outlets into independent variables of interest, and an explanation of these news outlets.

Table 1

News outlets examined, organized by format, place of origin, and type of ownership

News Outlet	Media Format	Place of origin	Corporate, Non-Profit
The New York Times	Newspaper	USA (New York, NY)	Corporate
USA Today	Newspaper	USA (Tysons Corner, VA)	Corporate
The Washington Post	Newspaper	USA (Washington, D.C.)	Corporate
NBC Nightly News	Television	USA (New York, NY)	Corporate
The Christian Science Monitor	Internet (print)	USA (Boston, MA)	Independent
The Guardian	Newspaper	UK (London, England)	Independent
ProPublica	Internet (print)	USA (New York, NY)	Independent
Democracy Now	Television, radio, internet (video)	USA (New York, NY)	Independent

The three national newspapers comprise those with the highest overall print circulation (Media, 2012) as well those that offer the most popular news websites in terms of online readership (eBiz, 2012) in the United States. *The New York Times* is owned by the New York

Times Media Group, an American multimedia corporation (Times & Company, 2012). The New York Times Company has holdings in print and online news media; online marketing, consulting, news aggregation, and other online websites; and paper production, among other joint ventures (CJR, 2011; Times & Company, 2012). *The Washington Post*, is owned by the Washington Post Company, a multi-media conglomerate with holdings in print and online media, educational test preparation, cable services, and social media advertising (CJR, 2011; Post & Company, 2012). *USA Today* is owned by Gannett Company. By circulation, Gannett is the largest newspaper corporation in the United States; it also owns a large number of U.S. television stations and websites, among many other holdings (CJR, 2011; Gannett, 2012).

The national television news program used in this study is NBC Nightly News, the highest rated (Pew & Center, 2014) national daily news broadcast. NBC is owned by a multinational corporation with ties to media as well as numerous other corporate holdings. NBC used to be owned by the General Electric Corporation. It now operates under the company name NBCUniversal, whose parent company is Comcast. Comcast operates numerous ventures including all types of media, sports management, theme parks, telephone, and internet services (CJR, 2011; NBCUniversal, 2012).

The corporate news media obtain much of their revenue from advertising. As of 2013, corporate news media outlets as a whole derived approximately 69% of their revenue from advertising, both in print and digital forms (i.e., on their websites) (Holcomb & Mitchell, 2014). The advertising revenue for all U.S. newspapers amounted to \$23.57 billion (NAA, 2014), a amount that has been decreasing since 2005 (Edmonds, Guskin, Mitchell, & Jurkowitz, 2013). Figures on the amount of advertising revenue generated by each individual newspaper used in this study were not obtainable as this information is privately held by the corporations.

According to the Pew Research Center, which used figures from Kantar Media, NBC Nightly News generated over \$201 million in ad revenue in 2012 (Pew, 2013). Nearly 85% of the broadcast revenue generated by all U.S. television news outlets, local and national, was derived from advertising in the year 2012 (Guskin, Jurkowitz, & Mitchell, 2013).

Four independent news outlets, none of which has ties to large multinational corporations, were examined. The Christian Science Monitor is an international, independent, Pulitzer Prize-winning news organization. Its revenue is derived from a trust established by The First Church of Christ, Scientist, a religious organization. Despite its religious affiliation, the Christian Science Monitor is a secular publication; save for one religious article published daily as mandated by its founder, its news coverage is devoid of religious-inspired content. Instead, the Christian Science Monitor claims to have a “public-service mission” and a “commitment to cover the world” (CSM, 2014).

ProPublica is an online, independent news content provider, which seeks to preserve unbiased investigative journalism and which functions as a non-profit organization. It is funded by public interest charities and foundations (ProPublica, 2013). The third outlet selected, *The Guardian*, is a British newspaper owned by Scott Trust Limited, a small media company in the UK that also owns several other newspapers, and radio, stations in the UK. It is operated by the Scott Trust Foundation, a charitable organization that exists to ensure the editorial independence of the newspaper, something mandated under the trust. As stated in its charter, “Rather than benefiting shareholders or a proprietor, Guardian Media Group’s profits are reinvested to sustain journalism that is free from commercial or political interference.” (GMG, 2013). It serves the UK, as well as many other parts of the English-speaking world, including the United States and has an office in New York City. While the Guardian does accept some advertisements (which may

be a confounding factor in the framing of its stories), it does not rely on advertising for revenue, and thus should be independent of its influence.

Finally, Democracy Now is an independent, non-profit news organization that airs a daily news program on some public broadcasting stations, cable and satellite television stations, and independent and public radio stations in America and throughout the world. It also airs its program in full on the Internet. It accepts no commercial or governmental funds (Democracy & Now!, 2012). A list of news outlets and their commercial affiliations can be found in Table 2.

Table 2

News outlets examined and information regarding their ownership

News Outlet	Owner	Scale of Ownership Connections	Other Ownership assets
The New York Times	The New York Times Company	Regional, national, and international	Print (newspaper only), digital media, paper products, (plus other joint ventures)
USA Today	Gannett Co., Inc	Regional, national, and international	Print (newspaper and magazine), TV, radio, digital media, (plus other joint ventures)
The Washington Post	The Washington Post Company	Regional, national, and international	Print (newspaper only), digital media, for-profit educational services, TV, (plus other joint ventures)
NBC Nightly News	NBCUniversal	Regional, national, and international	TV, cable TV, film studios, parks and resorts, digital media
The Christian Science Monitor	Christian Science Publishing Foundation (Trust)	n/a	Religious publications affiliated with, but run independently from, the C.S. Monitor
The Guardian	Scott Trust Foundation	n/a	n/a
ProPublica	n/a	n/a	n/a
Democracy Now	n/a	n/a	n/a

Unit of Measurement, Sample Selection, and Randomization.

Individual news stories about the Gulf oil spill comprised the unit of measurement through which domain frames were identified. These stories were culled from the eight news outlets over a time period from April 10, 2010 (the date of the oil rig disaster), to April 10, 2013.

Stories about the Gulf oil disaster were obtained via a search in the Lexis-Nexis database using the keywords “Gulf oil spill,” and/or “BP spill,” and/or “Deepwater Horizon,” the terms most commonly associated with the disaster. Because the ProPublica and Democracy Now are not located on any commercial database archives, their own website archives were searched using the same keywords from the same time frame. News stories in each outlet numbered from a high of 455 to a low of 99 (see Table 3).

Table 3

Total number of stories found about Gulf oil spill from each news outlet

News Outlet	Total Number of Stories about Gulf oil disaster	Number of Stories Used	Percentage of Total Stories Used
The New York Times	455	75	16
USA Today	189	75	40
The Washington Post	350	75	21
NBC Nightly News	99	75	76
The Christian Science Monitor	344	75	22
The Guardian	266	75	28
ProPublica	141	75	53
Democracy Now	166	75	45
TOTAL	2010	600	30

Once stories were chosen, each was examined to ensure relevance. Editorials, op-ed, and letters to the editor were included, since they are equally likely to be read by audiences and since they represent viewpoints sanctioned by the media outlets. Stories that were repeated in the database (i.e., duplicates) and stories that only mentioned the Gulf disaster in passing but did not contain any information about it at all were eliminated. Also, synopsis pieces that consisted of a

list of data about the spill (e.g., a list of the “latest” quantities of oil spilled, workers used in clean-up, etc.) but no narrative were also eliminated. Finally, any biblical or Christian editorials related to the spill from the Christian Science Monitor were discarded, since these represent the once-daily religious stories that the Monitor published but do not represent its secular content.

Next, a random sample of equal size was derived from each outlet. The time that the news article was published could affect the content obtained for analysis, since different specific events occurred at different moments in the progression of the Gulf Oil Spill. While that suggests that a stratified random sample would be a good choice, the paucity of news stories after the first few months of the disaster meant that the resulting sample would “sample” initial stories but include a census of later stories. To avoid any potential bias that could result from that situation, I chose to use a simple random sample of each outlet’s stories instead.

The random sample was derived using a random number generator in order to choose each story (number) individually from each media outlet. Seventy-five stories were chosen from each outlet for a total of 600 stories. This number was chosen from an estimated range of possible sample sizes to achieve optimal power, based upon the assumption of a small effect size. The number was derived from statistical power estimates provided by Wuennsch (2009).

Coding and Variables.

A codebook was constructed to capture the quantity of the domains and sources utilized in stories. In addition, a codebook guide was created to explicate the meaning of all of the quantitative codes.

The independent variables in the quantitative portion of this study were constructed based upon the combination of the first two filters of the media propaganda model – ownership and advertising. Thus, the independent variables were corporate-owned media outlets and

independently owned (non-profit) media outlets. The dependent variables were sources and domains used in the news stories. (Refer to Figure 1.)

Domains that were relevant to the issue of an environmental disaster such as the Gulf oil spill were sought within each story. Domains previously employed in content analyses of such environmental disasters and deductively concluded to be pertinent included the following:

Environment

Health

Economy

Risk

Scientific uncertainty

Environmental justice

Episodic/thematic

As explained in Chapter 7, it is hypothesized that, based upon the corporate or independent control of the media outlet, the number of stories employing the aforementioned domains will vary between type of media outlet. Independent outlets should have more environmental, health, risk, and environmental justice domains if they are acting in support of citizen interests, while corporate outlets should have more economic and uncertainty domains if they are indeed supporting corporate interests.

The manner in which these domains were framed was to be elucidated through coding of their use in the context of the story. Some quantitative codes about the quality of some of the domains were established to assist with elucidating frames; however, many of these codes were eliminated when inter-coder reliability could not be established during reliability testing. The major reason reliability could not be established was because the codes did not accurately predict

all of the possibilities within the stories. For example, a code that asked about how the scientific uncertainty about environmental effects was presented could not predict exactly the contextual parameters in which the uncertainty was delivered in the stories. Thus, these nuances were left for the more open-ended qualitative content analysis.

Sources utilized in the stories were also sought. Initially, nine different types of sources were sought:

- (1) Government scientist*
- (2) Corporate scientist*
- (3) Independent or university scientist*
- (4) Other government official*
- (5) Corporate or company spokesperson/official*
- (6) Activist from an organization*
- (7) Individual activist,*
- (8) Affected citizen affiliated with organization*
- (9) Unaffiliated affected citizen*

A sample of ten percent of the stories ($N = 60$) was randomly generated for reliability testing. Eight stories were collected from the four media outlets with the highest numbers of total stories and seven stories were collected from the four media outlets with the lowest numbers of total stories. The primary investigator and two additional coders read a smaller sample of ten stories, then met to discuss issues with codebook clarity and confusion.

As mentioned in Chapter 5, most frames - or domains, in this study's terminology - tend not to carry well-established, all-encompassing definitions, but instead are defined within each research context. Thus, it was incumbent upon the researcher and her colleagues to apply reliable

definitions, which any reader could readily identify, to the domain identified. While the concept of framing is widely acknowledged and utilized in communication theory and research (Scheufele, 1999), the specific attributes of individual frames or domains are largely dependent on the definitions of the researcher. Many of the details and minutiae that most clearly define a particular domain may only be arrived at after observing the data, rather than before. Often these may only be clearly defined once they are identified and established during the reliability testing phase of the content analysis, because they may be specific only to the issue at hand. Indeed, domains were more thoroughly elucidated and more clearly defined after the three coders read a sub-sample of stories and discussed codes and definitions.

The codebook and codebook guide were updated to reflect coding issues and clarify definitions. Then, inter-coder reliability tests were conducted on the sample of 60 stories using Krippendorff's alpha as the measure of reliability. Krippendorff and Bock (2009) state that an alpha greater than or equal to .80 indicates fully acceptable reliability, while an alpha of greater than .667 is sufficient for tentative conclusions. Consequently, codes that generated a Krippendorff's alpha inter-coder reliability of greater than .70 were accepted, while any below this threshold were eliminated. (See Appendix A for inter-coder reliability results.)

Of the initial 36 codes, half were eliminated due to lack of inter-coder reliability. The majority of the codes discarded were codes that tried to capture the quality/nuance of a variable, but could not because the specific quality was not always anticipated or listed in the coding. In addition, episodic versus thematic framing could not be established reliably (likely because most news stories in daily news outlets are episodic in nature). Since most of the sources were also not reliably identified based upon the established parameters because it is not always easy to establish where a source is from and/or what the specific , a new coding scheme for sources was

constructed, based more directly upon the media propaganda model's demarcation of types of sources. These criteria delineated sources: from (1) *corporations*, from (2) *government*, defined as (3) societal "*experts*," from (4) *advocacy organizations*, or those who were (5) *independent citizens*. The media propaganda model posits that corporate outlets would use more corporate, government, and expert sources, while independent media outlets would use more advocate and citizen sources. Using the new criteria, two of the coders re-coded the sources and achieved high reliability on all. (The third coder was unavailable.) (See Appendix A for inter-coder reliability results.)

Data Collection, Reliability Testing, Coding and Analysis.

After inter-coder reliability was established on a number of variables, the codebook (see Appendix B) and codebook guide (see Appendix C) were both revised and final versions established. Full coding of the total sample of 600 stories by the primary investigator commenced. As with inter-coder reliability testing, data were input onto a spreadsheet. In addition to capturing domains and sources within each story, a brief narrative note was input about each story. These notes would serve as markers from which to derive a sample of stories for further qualitative analysis. After all 600 stories were coded and data input, the spreadsheet was re-checked for numerical irregularities and anomalies, and those data were cleaned of input errors.

Analysis of Quantitative Data.

The number of stories in which each domain appeared was counted. Descriptive statistics about the number of various types of domains and sources used by corporate versus independent media were derived from the data. Chi-squared tests were performed to measure the significance

of differences in domains counted and sources counted between each type of media outlet (corporate versus independent) at the $p < 0.05$ significance level.

Qualitative

As defined in this paper, frames do not consist of simply domains or sub-topics of articles, but are more thematic in nature. Frames serve to illustrate the main themes the audience should conjure about the sub-topic/domain. For example, the domain of uncertainty might have a theme suggesting too little information to declare a potential risk safe, or, on the other hand, the main theme of the uncertainty domain may be that there is not enough known to suggest a risk at all. These are polar opposite thematic frames of the same domain – uncertainty - within the context of the Gulf oil spill. In order to more fully elucidate the thematic frames of the stories, a qualitative analysis on a subset of purposively chosen articles was performed.

Drawing upon the initial quantitative codes as well as notes pertaining to each of the articles read for quantitative analysis, a subset of 24 articles was chosen for qualitative analysis, 12 from corporate media outlets and 12 from independent media outlets. Because qualitative content analysis of news stories is not generally well defined in terms of methodology (Fields, 1988; Jankowski & Jensen, 1991; Macnamara, 2005) and does not necessarily fall into the same categories of qualitative research approaches utilized in studies involving participants/informants and interviews (i.e., ethnography, grounded theory, phenomenology, etc.), the sample size was chosen based upon general recommendations by Creswell (Creswell, 2007b). In addition, the sample size was chosen after reading through the entire quantitative sample and recognizing the number of stories and the particular story examples that would be sufficient to describe the main patterns seen within the independent and corporate media stories. Within this subset, a typical case sample of articles were chosen that were representative of how the given type of media

outlet covered the Gulf oil spill in terms of the main domains examined in the quantitative analysis: environment, health, risk, economy, uncertainty, and environmental justice.

Additionally, opinion articles potentially characterized as flak - those from government officials, corporate officials, and members of think tanks - were marked for analysis. A total of four were recognized and all were analyzed for emergent themes. Because more than half of the stories from both corporate and independent media outlets did not contain the main domains of interest for this study, a total of approximately 300 articles ended up containing the relevant domains from the quantitative analysis. Nearly ten percent of those relevant articles (for a total of 30) were then used in the qualitative content analysis.

These articles were read and each story was condensed into smaller units (phrases, sentences, or multiple sentences) through the method of chunking – i.e., highlighting pieces of the text and assigning a specific code to pieces with specific meanings. Initial codes were generated through directed open-coding. This involved both deductive content analysis, based upon what was known about the text from the quantitative analysis and from the theoretical framework, and inductive content analysis, in which new codes were generated as they emerged from the text. These codes assigned categories of meaning to each unit of text. When coding was completed, the coding was reviewed by a colleague who offered suggestions and verification about the codes that were generated.

Once the codes were corroborated with peer-debriefing, they were analyzed for emergent themes. Themes were defined and labeled and these thematic labels were also reviewed by a colleague through peer debriefing. When themes were agreed upon, the analytical data from the qualitative analysis were organized and portions of coded articles that exemplified the emergent themes were prepared for reporting.

Chapter 10 - Results

Quantitative Results

In examining the domains or sub-topics of the stories about the Gulf oil disaster, what was most noticeable were the number of stories that did not contain any of the domains of interest in this study. The majority of stories from both corporate and independent media outlets focused on daily procedures. These types of stories covered the logistics of the oil leakage, of the efforts to cap the well, and also included numerous vague, general statements by governmental and corporate officials related to the aforementioned logistics.

The remainder of stories that dealt with less logistical sub-topics/domains were the focus of this study. While many of the domains analyzed resulted in significant differences between the corporate media and independent media stories as anticipated, some domains exhibited differences contrary to those predicted by the media propaganda model. In addition, some of the types of sources used in stories also did not follow patterns anticipated by the media propaganda theory.

Considering the first hypothesis, that corporate media outlets would utilize fewer environmental domains than independent media outlets, the results varied depending upon whether one examined stories that reflected on environmental effects of the spill or on environmental risks (i.e., risks to the environment). While independent media stories included information about environmental effects (16%, $n = 48$) more than did corporate media (12%, $n = 36$) (see Figure 2), the proportion of stories in both corporate and independent media outlets that mentioned environmental effects was low, and the difference between the outlet types was not significant; $X^2(1, N = 600) = 1.99, p = 0.16$.

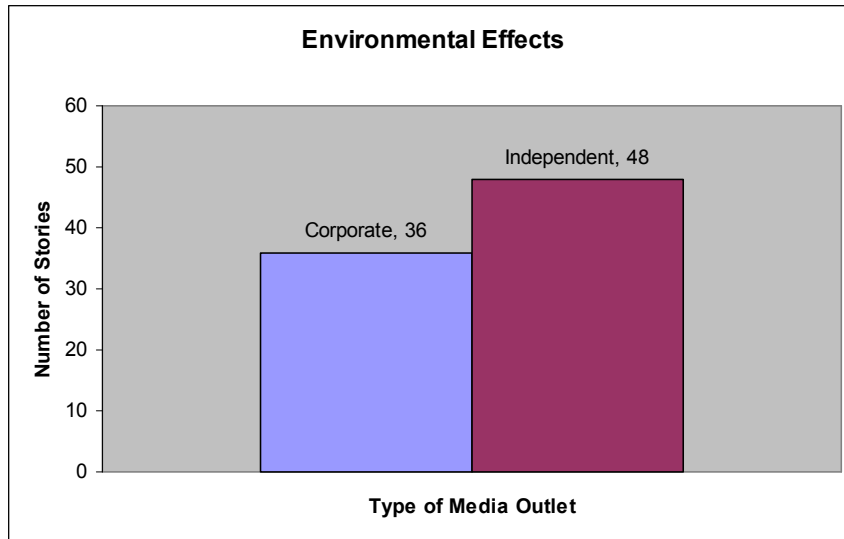


Figure 2. Number of stories containing environmental effects domains

In terms of the environmental risk domain, corporate media outlets and independent media outlets varied significantly in the number of stories (see Figure 3) ; $\chi^2 (1, N = 600) = 6.83$, $p = 0.009$, with corporate media containing significantly fewer environmental risk domains (11%, $n = 34$) than independent media (19%, $n = 57$).

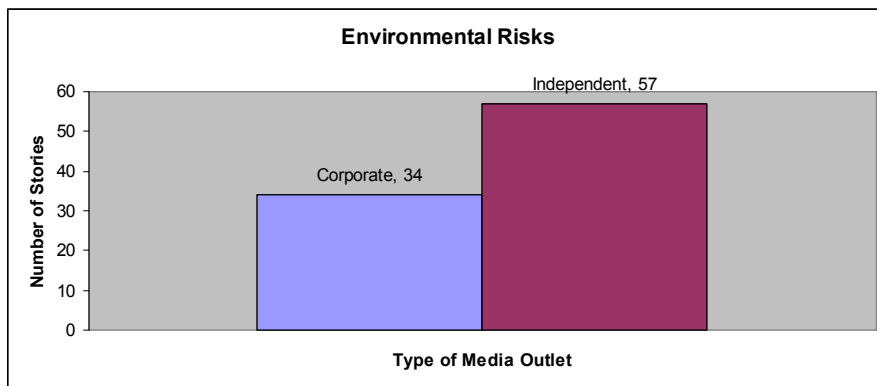


Figure 3. Number of stories containing environmental risk domain

The total number of stories that contained domains about both environmental risks and environmental effects varied significantly between corporate and independent media; $\chi^2 (1, N = 600) = 9.88$, $p = 0.002$. Again, corporate media employed fewer environmental domains overall

(23%, $n = 70$) than did independent media (35%, $n = 105$), as expected. (See Figure 4.) So H1 was partially supported.

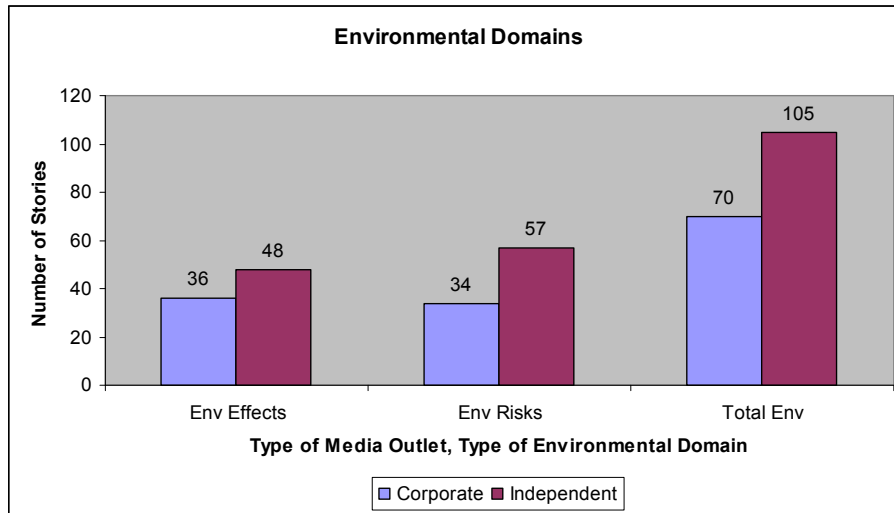


Figure 4. Number of stories with environmental domains

The second hypothesis--H2: Corporate media outlets will utilize fewer health domains than independent media outlets—was also supported by the data, except in the case of mental health. There were only 4 stories (1.3%) about physical health effects in corporate media and 26 (0.09%) in independent media. Corporate media had 2 stories (0.7%) about mental health effects for a total of 6 stories (2%) about health effects. Independent media outlets had 7 stories (2.3%) about mental health effects for a total of 33 stories (11%) about health effects overall. Corporate media reported on health risks in 7 stories (2.3%), while independent media reported on health risk in 26 stories (8.7%). The total number of stories that mentioned some type of health domain – i.e., health effect or health risk – was 13 (4.3%) in corporate media versus 59 (20%) in independent media. Physical health effects [$\chi^2 (1, N = 600) = 16.98, p = 0.00004$], total health effects [$\chi^2 (1, N = 600) = 19.99, p = 0.00000008$], health risks [$\chi^2 (1, N = 600) = 11.58, p = 0.0007$], and total health domains [$\chi^2 (1, N = 600) = 33.40, p = 0$] were represented significantly

more often in independent media stories than in corporate media stories; however, some subcategories of health domains, including mental health effects [$\chi^2 (1, N = 600) = 2.82, p = 0.09$] and long-term health effects [$\chi^2 (1, N = 600) = 2.82, p = 0.09$], were rarely represented in news stories and were not significantly different between types of media outlets. Both mental health effects and long-term health effects were mentioned in 2 stories (0.7%) in corporate media outlets and in 7 stories (2.3%) in independent media outlets. See Figure 5 for number of stories by type of health effect, Figure 6 for number of stories depicting long-term health effects, and Figure 7 for number of stories from all types of health domains. Thus, H2 was partially supported by the data.

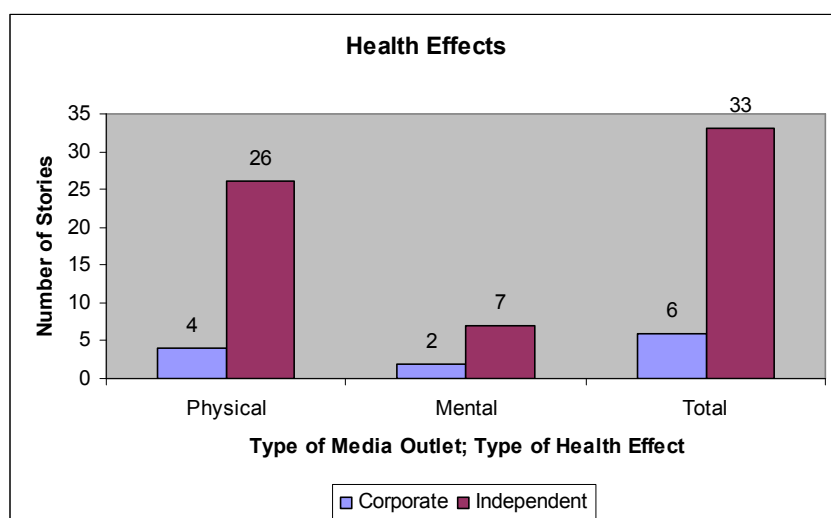


Figure 5. Number of stories containing all types of health effects

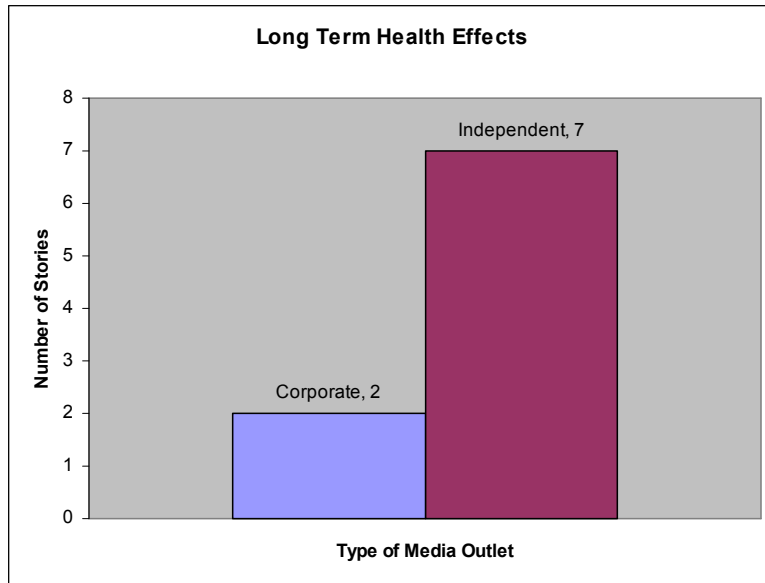


Figure 6. Number of stories containing long-term health effects (physical or mental)

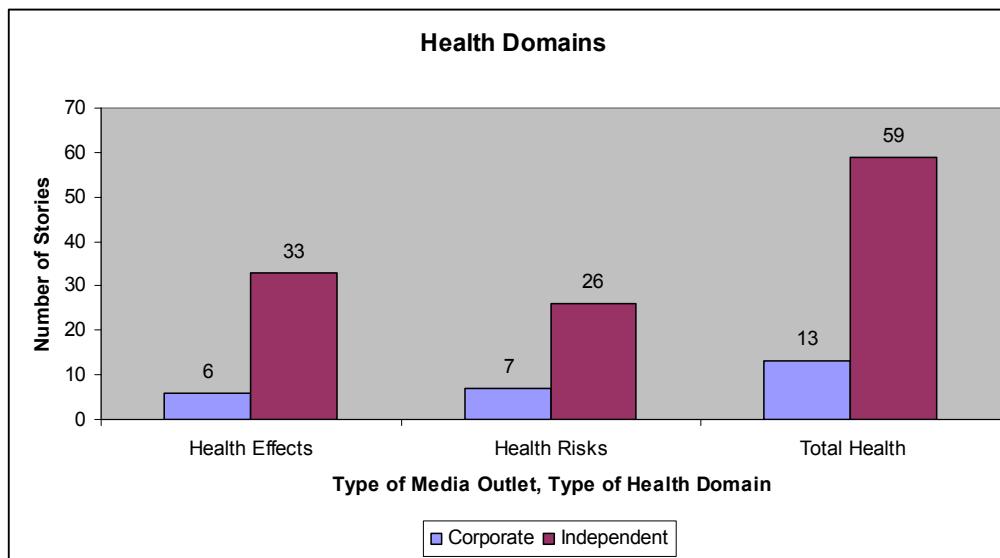


Figure 7. Number of stories containing all types of health domains

The hypothesis (*H3*) that corporate media outlets would utilize more economic domains than independent media outlets was generally supported by the data. Corporate media outlets mentioned economic consequences of the oil spill 90 times (30%) compared to 54 times (18%) in independent media outlets (see Figure 8). This difference was statistically significant: $\chi^2 (1, N$

$= 600) = 11.84, p < 0.001$. However, when examining the subset of economic domains about effects on fisheries, fisherman, and the fishing industry, there was no significant difference between coverage in differing types of media outlets: $\chi^2 (1, N = 600) = 1.84, p = 0.17$. See Figure 9 for number of stories mentioning fisheries. Overall, $H3$ was supported by the data.

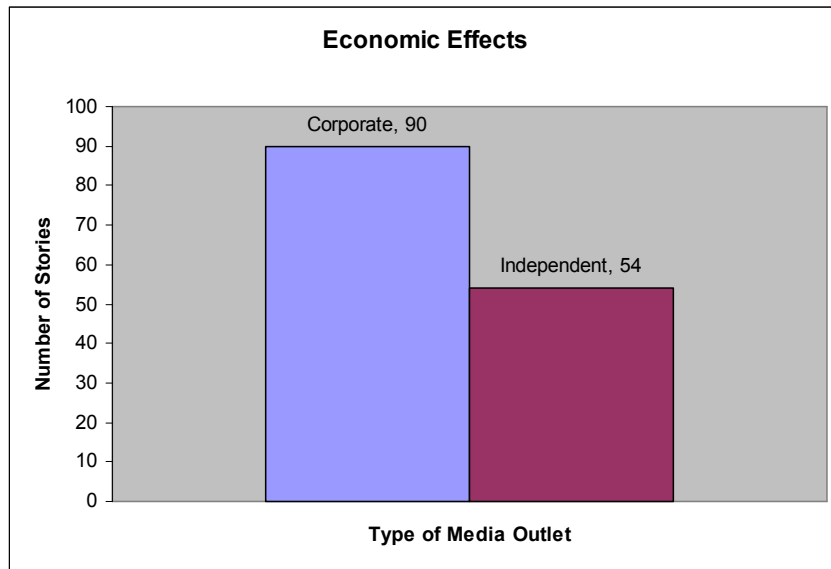


Figure 8. Number of stories containing economic domain

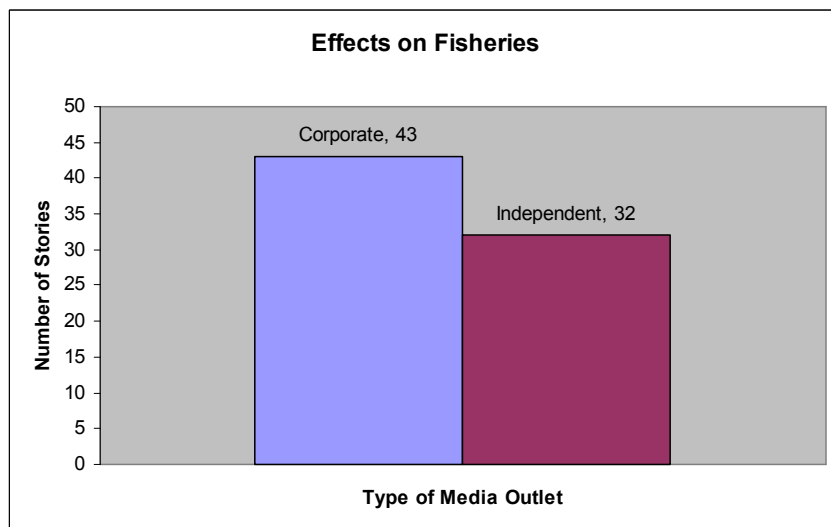


Figure 9. Number of stories mentioning effects on fisheries

As mentioned previously, corporate and independent media outlets differed significantly in their number of stories containing health risk domains and environmental risk domains. Thus, combining the total risk domains mentioned in stories, the difference was statistically significant as well: $\chi^2 (1, N = 600) = 17.93, p = 0.00002$. Corporate media used the risk domain 41 times (14% of stories) while independent media used the risk domain 83 times (28% of stories). Hypothesis 4, which predicted that corporate media outlets would utilize fewer risk domains than independent media outlets, was supported by the data. Figure 10 shows the total number of stories containing risk domains.

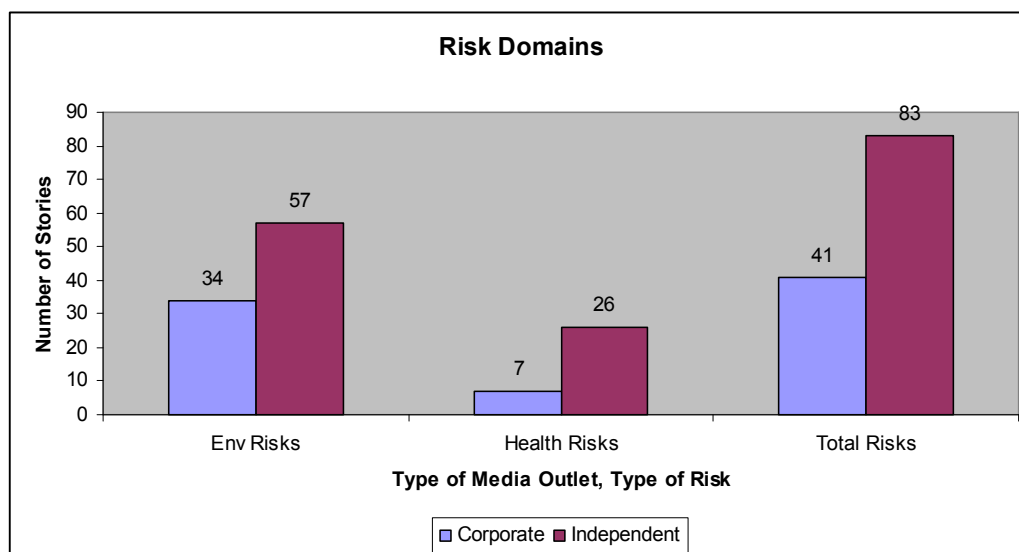


Figure 10. Number of stories with risk domain

It was hypothesized ($H5$) that corporate media outlets would utilize fewer environmental justice domains than independent media outlets, since independent media were thought to use citizens more as sources, and thus might represent more citizen voices who would likely speak about environmental justice issues. The data showed that corporate and independent media outlets each only mentioned environmental justice 5 times in 300 stories (1.7%). Thus, these

results were not different quantitatively and hypothesis number five was not supported. A sample of stories about environmental justice was further examined via qualitative analysis to ascertain if the framing of these environmental justice stories differed in any way; see that discussion below.

Hypothesis 6, that corporate media outlets and independent media outlets would differ in their number of uncertainty domains used, was not supported by the data. While corporate media outlets mentioned scientific uncertainty slightly more often ($n = 48$, 16%) than independent media ($n = 32$, 11%) (see Figure 11), the difference was not significant: $X^2(1, N = 600) = 3.69, p = 0.05$. Sub-categories representing some of the specific manners in which uncertainty was discussed were captured for analysis, but none produced enough data points for comparison. Consequently, the quality of the scientific uncertainty domains (i.e., how uncertainty was framed) was examined further in the qualitative analysis.

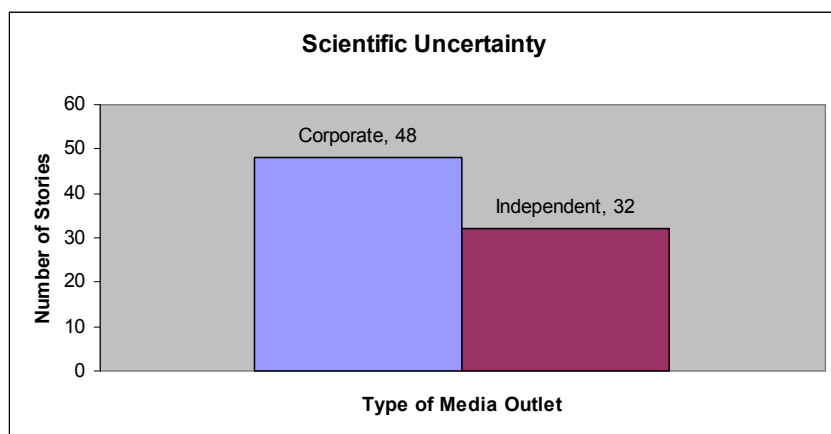


Figure 11. Number of stories with scientific uncertainty domain

The final hypothesis, that corporate media outlets would utilize different sources than independent news outlets, rendered some unexpected results. Overall, the types of sources used did not vary significantly between corporate and independent media. The total number of stories containing government sources was exactly equal ($n = 171$) from both types of media outlets.

The number of stories containing expert sources ($n = 119$, 40% of stories in corporate media; $n = 124$, 41% of stories in independent media) (see Figure 12) and those containing advocacy sources ($n = 42$, 14% of stories in corporate media; $n = 52$, 17% of stories in independent media) (see Figure 13) did not differ significantly. For expert sources, $X^2(1, N = 600) = 0.17, p = 0.67$; for advocacy sources, $X^2(1, N = 600) = 1.01, p = 0.31$.

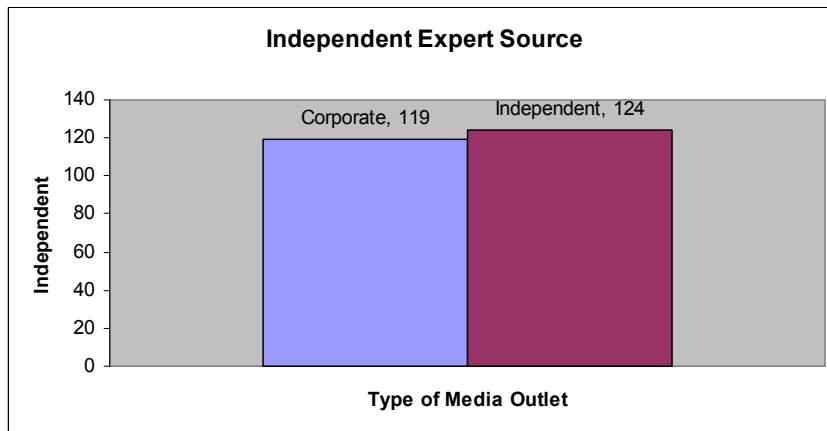


Figure 12. Number of stories with expert sources

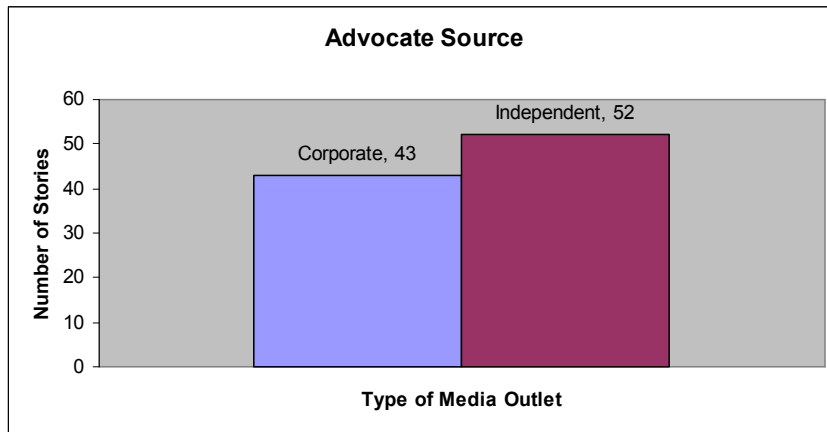


Figure 13. Number of stories with advocate sources

The number of stories containing corporate sources did differ significantly, as expected, $X^2(1, N = 600) = 8.41, p = 0.004$, with corporate media outlets utilizing more corporate sources

($n = 142$, 47% of stories) than independent media outlets ($n = 107$, 36% of stories) (see Figure 14).

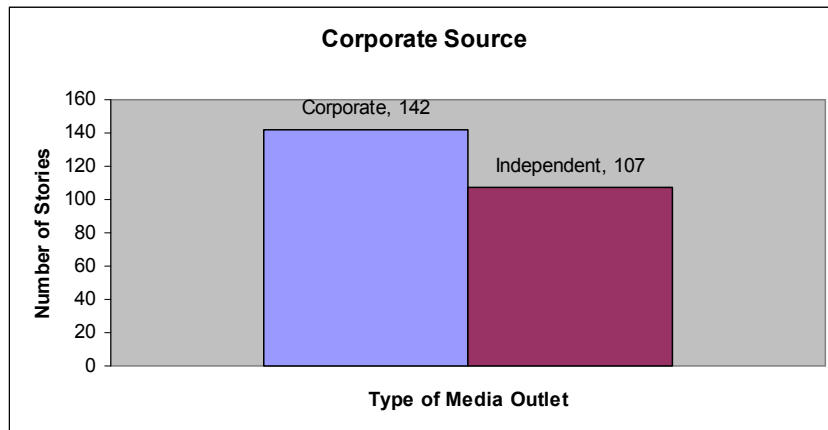


Figure 14. Number of stories containing corporate sources

Most surprisingly, however, was the number of stories containing citizen sources. These also differed significantly, $X^2(1, N = 600) = 6.79, p = 0.009$, but corporate media outlets utilized citizen sources in more stories ($n = 92$, 31%) than did independent media outlets ($n = 64$, 21%) (see Figure 15). Consequently, $H7$, that sources used in stories would differ between corporate and independent media outlets, was only mildly supported in one case, but mostly not supported as anticipated.

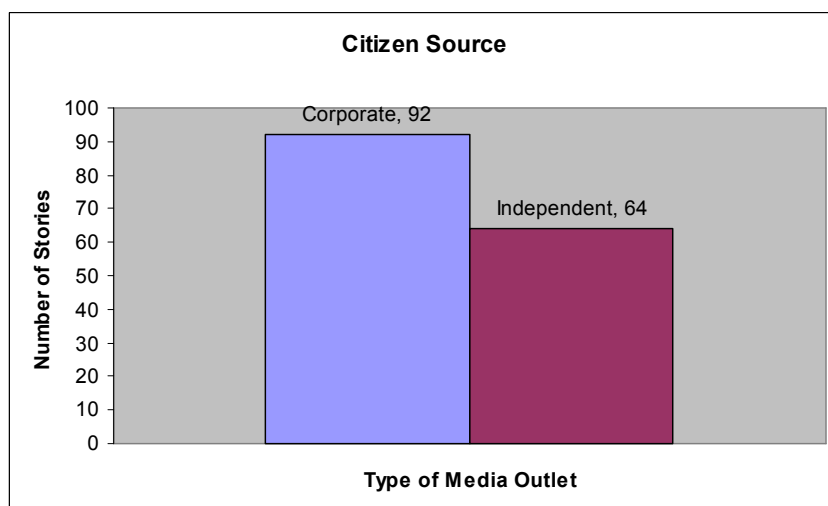


Figure 15. Number of stories with citizen sources

Overall, there were a number of significant differences between the domains and sources utilized in the coverage of the Gulf oil spill in corporate media versus independent media; however, not all of the differences were as predicted by the media propaganda model. (See Table 4 for summary statistics.)

Table 4

Summary of Chi-square tests of significance for domain differences between corporate versus independent media outlets

Domain or Source	X^2	p -value	Significance
Environmental effects	1.99	0.16	n/a
Environmental risks	6.83	0.009	**
All environmental domains	9.88	0.002	**
Physical health effects	16.98	0.00004	***
Mental health effects	2.82	0.09	n/a
Total health effects	19.99	0.00000008	***
Health risks	11.58	0.0007	***
Long-term health effects	2.82	0.09	n/a
All health domains	33.40	0	***
Economic effects	11.84	0.0006	***
Effects on fisheries	1.84	0.17	n/a
All risk domains	17.93	0.00002	***
Scientific uncertainty	3.69	0.05	n/a
Environmental justice	0	1	n/a
Government source	0	1	n/a
Corporate source	8.41	0.004	**
Expert source	0.17	0.67	n/a
Advocate source	1.01	0.31	n/a
Citizen source	6.79	0.009	**

sig. at * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In addition to the results of the hypotheses tests, a few other patterns are worth mentioning. Comparing the amount of coverage of environmental effects versus economic effects mentioned in corporate news outlets, it is clear that corporate media devoted significantly

more stories, $X^2(1, N = 600) = 29.29, p < .001$, to the economy ($n = 90$) than to the environment ($n = 36$). By contrast, independent media outlet devoted a similar number of stories to both economic ($n = 48$) and environmental effects ($n = 54$) of the disaster, $X^2(1, N = 600) = 0.43, p = 0.51$. (See Figure 16.)

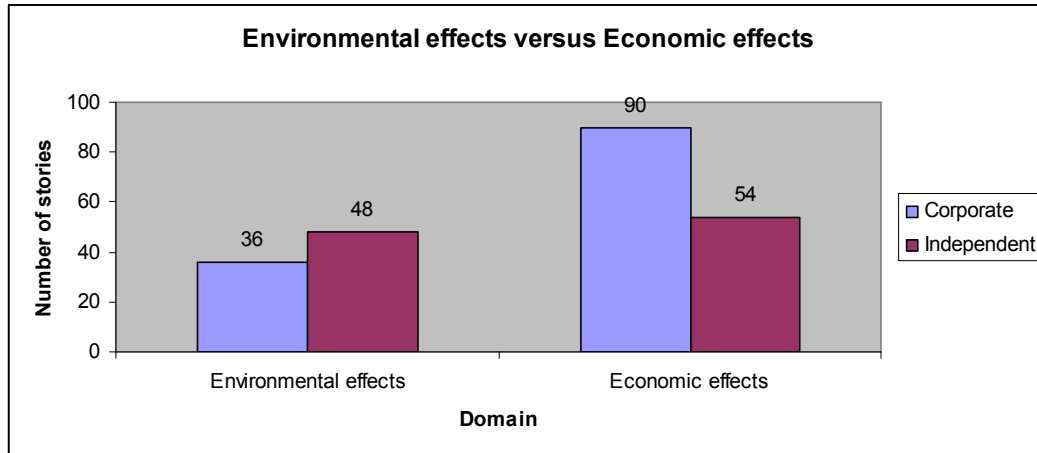


Figure 16. Number of stories of environmental versus economic effects of disaster by type of media outlet

By contrast, in examining the number of stories covering health effects versus economic effects of the oil disaster, both corporate and independent media outlets carried significantly more stories about the economic effects compared to health effects; $X^2(1, N = 600) = 87.5, p = 0$ for corporate media, $X^2(1, N = 600) = 5.93, p = 0.015$ for independent media. (See Figure 17.) In general, there was a scarcity of stories about health effects in all media outlets.

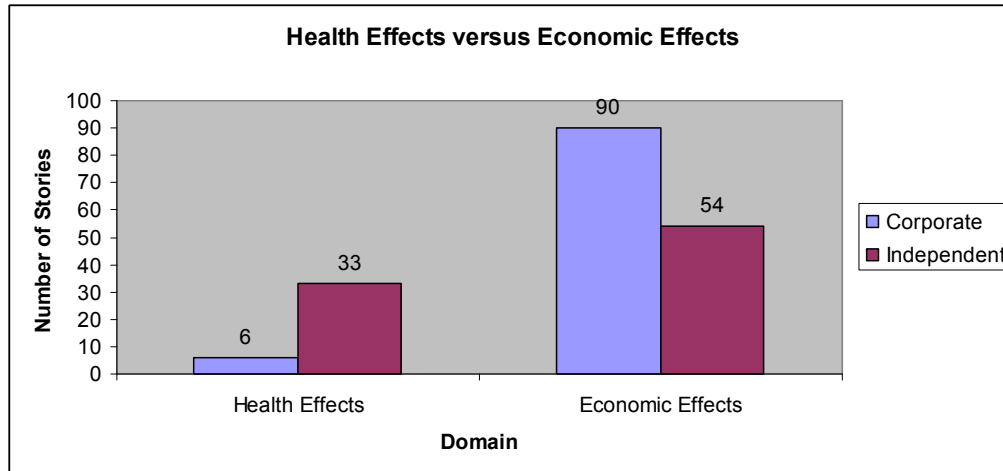


Figure 17. Number of stories of health versus economic effects of disaster by type of media outlet

Finally, while inter-coder reliability was too low to make possible an analysis of whether stories were episodic or thematic in nature (likely because most daily news stories are simply episodic by design), stories were examined for whether they put this current oil disaster in historical context. Specifically, stories were coded if they referred back to the most recent large-scale oil disaster on the shores of the United States, the Exxon-Valdez spill of 1989. Indeed, independent media outlets referenced the Exxon Valdez spill significantly more often ($n = 54$, 18 % of stories) than did corporate media outlets ($n = 30$, 10% of stories): $\chi^2(1, N = 600) = 7.97$, $p = 0.005$. (See Figure 18.)

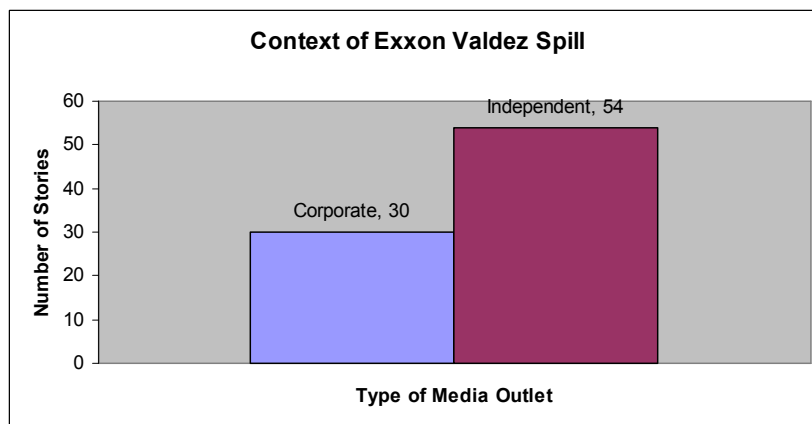


Figure 18. Number of stories referencing the Exxon Valdez disaster, by type of media outlet

(See Appendix D for full Chi-Square test results.)

Qualitative Results

As explained in Chapters 8 and 9, the thematic content analysis was conducted in order to elucidate the context in which the quantitative domains were presented in articles. Simply because a certain number of news articles about the Gulf oil disaster spoke about environmental risks or about scientific uncertainty, those numbers alone do not necessarily reveal what was being said about risks and uncertainties. For example, were risks to the environment or to health treated as insignificant or potentially catastrophic? Was there uncertainty about whether or not environmental effects were occurring due to the spill, or was there uncertainty about whether or not the crude oil could induce toxicological effects in animals at all? Additionally, the qualitative analysis was used to examine if a pro-capitalistic perspective – the dominant ideology filter described in the media propaganda model – was encountered in themes of the corporate media stories more than the independent media stories. Finally, the thematic analysis was used to investigate the quality of the articles that could be construed as flak. Overall, the qualitative analysis was conducted in the hopes of better understanding the framing of all of the major domains studied in the quantitative analysis. By revealing general themes of the corporate and independent news stories containing environment, health, economic, risk, uncertainty, and environmental justice domains, the thematic analysis revealed that corporate and independent media outlets did not necessarily present these sub-topics similarly and that the capitalistic dominant ideology could be seen more in corporate versus independent media outlets, particularly in the examples of flak.

The qualitative thematic analysis of stories found different types of themes, indicative of different types of framing, apparent in stories from corporate versus independent media despite the similar domains utilized in the stories. Though these themes are not necessarily generalizable

over the whole of corporate and independent media news stories, they reflect some of the noticeable variations in the framing of the stories of the Gulf oil disaster. See Table 5 for the themes found in the different media outlets.

Table 5

Major themes in corporate and independent media stories

Corporate media outlet themes	Domain(s) to which themes correspond	Independent media outlet themes
<i>Encouraging forecast, hope for future recovery</i>	Environment	<i>Severity of environmental and health risks and inability to recover</i>
<i>Uncertainty about causes</i>	Health	<i>Uncertainty about scope of effects and remediation</i>
<i>Unfounded fears about health and environment</i>	Risk	<i>Prevarication and lack of transparency</i>
<i>Psychological crisis with hopefulness</i>	Environment	
<i>Loss of livelihood and freedom</i>	Health	<i>Mental health crisis exacerbated by insufficient response by BP</i>
<i>Preparation for economic repercussions</i>	Scientific uncertainty	<i>Threat to local and global community survival</i>
	Health (Psychological)	<i>Thriving industry needs regulation</i>
	Risk	
	Environmental justice	
	Economic	

Thematic framing in corporate media stories.

In examining twelve specific stories from corporate media outlets that employed the use of environmental, health, risk, uncertainty, environmental justice, and economic domains, six major themes were uncovered that coincided with the domains. Oftentimes, these themes overlapped across one or more domains of interest. In addition, some of the coded text exemplified more than one theme.

1) Encouraging forecast, hope for future recovery

Although corporate media certainly documented many of the detrimental impacts resulting from the oil spill, they tended to also instill optimism in terms of the outlook for the

health of the environment and the ecological risks. While acknowledging the many evident ecological effects, they balanced much of the negative news by stressing the resilience of the Gulf. They also seemed to indicate that the worst-case scenarios were unfounded, that the severity of the disaster was less than anticipated, and that the news for the recovery of the Gulf of Mexico ecosystem was encouraging. While mentioning causes for concern, many news stories seemed to put a positive spin on the disaster and sought evidence of resilience and cause for hope. Numerous textual examples are indicative of this theme.

While the *Washington Post* reported about some areas of concern in terms of the environment, it tended to bring the focus back to the good and hopeful news that many ocean organisms were surviving. It also mentioned that, given the ever-present ecological issues in the Gulf Coast region, the oil spill may not have exacerbated these problems very much.

The oil's damage was relatively small, at least in comparison with the marsh's existing problems ... evidence that even plankton – some of the smallest, most sensitive creatures in the Gulf – are living in the area around the leaking well (The Washington Post, 7/5/10)

Another example found encouragement in the visible signs that the oil was not tarnishing ecosystems and that, because there were no visible signs of the spill, there was hope that the ecosystem is healthy.

We're welcomed by evidence, at least near the surface, ay marine biologists, that the ecosystem here is healthy...

... we're finding – visually, anyway, as everybody's been saying – we have – we have seen no visual signs of the oil (NBC Nightly News, 7/22/10)

"I have not seen any evidence, any data, that has shown wildlife sickened or killed because of dispersants" ... Short term good news ... (NBC Nightly News, 8/2/10)

Despite the known toxicity of the Corexit dispersants used in the Gulf, NBC emphasized that it could find no signs of harm.

The corporate media outlets reported that there were signs that the majority of the crude oil was gone from the Gulf, indicating that a number of various factors contributed to the quick removal of the oil from the sea.

The vast majority of the oil from the Deepwater Horizon spill is already gone, according to a final government report released last month...

Fortunately, conditions in the Gulf of Mexico are quite friendly to oil gobbling bacteria, and the overwhelming majority of the BP oil was recaptured, burned off, evaporated, flushed out by ocean currents, or eaten by bacteria by the end of July ...

... researchers haven't found any plumes in the last six months, suggesting that they probably aren't having a significant ecological impact at this point. (The Washington Post, 1/11/11)

Gulf scientists believe that the oil has mostly evaporated, been consumed by bacteria, or dispersed in deep water (The New York Times, 4/18/12)

While remediation by methanotropic bacteria was touted as a significant factor in the reduction of oil plumes (Kessler et al., 2011), more recent information has emerged to suggest that these bacteria did not function in quite as efficient a manner as originally imagined (Crespo-Medina et al., 2014). Moreover, large quantities of oil remain unaccounted for (Fikes, McCormick, Inkley, & Gonzalez-Rothi Kronenthal, 2014).

Optimism was also expressed in terms of the changes that would occur in regulating the deep sea oil industry, in order to help prevent future catastrophes such as this current one.

The commissioners seemed encouraged by steps the administration had taken to strengthen the regulatory machinery and improve safety standards. (The New York Times, 4/18/12)

Yet, Representative Frank Pallone (D-New Jersey) recently asserted that “nothing has occurred that would make it safer to drill in deep water or to make it any better to clean it up. Nothing. All of the recommendations that were made by the bipartisan congressional commission after the BP spill – none were adopted” (“Crude Awakening,” 2014). Also, a report by the U.S. Chemical Safety and Hazard Investigation Board (CSB) revealed that regulatory gaps remain that could leave the Gulf vulnerable to another accident such as this one (CSB, 2014). Furthermore, deep sea drilling is now occurring in the Arctic Ocean, and most experts and officials agree that the potential for harm is great in these endeavors (Graham et al., 2011). The likelihood of future oil disasters remains great. Consequently, it seems that the optimism expressed in many of these stories may have been premature.

2) Uncertainty about causes

A great deal of the uncertainty expressed in corporate media stories simply reflected the uncertainty about how much oil was leaking and about whether or not the technological fixes applied to the leaking well would work to stop the flow of oil. While there was discussion in both corporate and independent media about the oil flow rate from the leaking wellhead, and there appeared to be more questioning of official flow measurements by the independent media (see next section about independent media themes), other uncertainty domains of more relevance to this research study involved the scientific uncertainty about environmental and health risks and effects. Although the corporate media outlets reported on areas of concern in terms of environmental and human health effects resulting from the oil spill, they also balanced these reports by expressing uncertainty about the causes of these effects. The corporate media outlets tended to question whether certain health and environmental effects were definitely linked to the Gulf spill. A few examples of this theme include:

Here, we have a patient that's dying of cancer, you know, and now they have a sunburn too ... "What will kill coastal Louisiana is not this oil spill. What will kill coastal Louisiana is what was killing it before the oil spill" ... (The Washington Post, 7/5/10)

...something is killing baby dolphins in large numbers and their bodies are washing up on shore... While not one yet is definitively saying what it is ...

Dr. Solangi cautions against rushing to a conclusion. He says there could be other factors as well ... (NBC Nightly News, 2/22/11)

3) Unfounded fears about health and environment

Closely connected to and partially overlapping with the theme of uncertainty about the causes of health and environmental effects is the theme that unjustified fears abounded about the ecological and health risks from the spill. Again, though corporate media did mention cleanup workers falling ill and various ecological effects, they also tended to stress safe and acceptable levels of exposure to the oil constituents and to the dispersant.

LuAnn White, a toxicologist and director of Tulane University's Center for Applied Environmental Public Health, doesn't believe there's much danger to people, especially those on the coast or inland...

"Oil spills are ecological events, not human health events," she says. The most dangerous gases that come off the hydrocarbons in crude oil, benzene and toluene, will disperse as they come up through 5,000 feet of ocean water and then into the air, she says. And as the entire event "is happening in the middle of the Gulf of Mexico," they won't have much effect on people on land.

(USA Today, 5/6/10)

Corporate media stories also entertained straw man arguments, negating the health risks in the disaster by comparing them to other health risks:

As for workers trying to clean the spill and cap the well, if they follow standard procedures "chances are when they load up the diesel on their boats they're getting a higher dose" of hydrocarbons, which can cause lung irritation, than from the spilled oil," she says.

(USA Today, 5/6/10)

Since diesel is a known carcinogen, the comparison between diesel and crude oil exposure is not necessarily a good one because the routine exposure to diesel fumes is, in itself, a risk for disease outcomes such as cancer. Nonetheless, it appears that the comparison is meant to assuage fears by weighing a common exposure against a novel one.

In another example, a scientist was quoted as saying that the weathering process turns most of the leaked crude into an inert and non-hazardous substance fairly quickly. Yet, missing from this assertion is the fact that the dispersants have disrupted the normal weathering process by chemically diffusing the molecules much more than they normally would separate, and rendering them more difficult to decompose (Zuijdgeest & Huettel, 2012).

Eventually, the weathering process -- decomposition, evaporation and dissolution -- turns them "into a fairly hard, asphalt-like substance fairly quickly" which makes any toxic substances that might be trapped in it relatively inert, Short says.

"You wouldn't want to eat" these tar balls, but they're not considered dangerous, Short says. The beaches in Santa Barbara, Calif., site of a 1969 spill, "have tar balls all over them to this day," he says.

(USA Today, 5/6/10)

Another article explained the testing of seafood for toxicity. Because laboratory tests were too expensive and time consuming, the "sniff test" was utilized instead.

...sniff tests are "the gold standard" to detect tainted seafood, says LuAnn White, a toxicologist and environmental health expert at Tulane University. The sniff tests can take minutes vs. days for laboratory tests.

(USA Today, 6/4/10)

Interestingly, these sniff tests conducted by experts, which concluded seafood was safe to consume, would likely not have been allowable if citizens attempted to employ the same methods of inquiry. Local knowledge and citizen science using such methods as “sniff tests” would have likely been discounted as evidence (Ottinger, 2010). In any case, these stories reassured the public by reporting that other laboratory tests indicated that levels of hydrocarbons in seafood were safe.

None have tested positive for hydrocarbons even close to levels that NOAA or the Food and Drug Administration say reach a "level of concern," says Randy Pausina of the Louisiana Department of Wildlife and Fisheries....

The Mississippi Department of Marine Resources also recently tested shrimp and crab and found them to be fine, says Dale Diaz of the Mississippi Department of Marine Resources....

Despite concerns, toxicologist White says fish eaters are in little danger. Should tainted products be eaten, she says, people could suffer stomach aches, but the oil isn't highly toxic. Shrimp and other seafood quickly metabolize it, she says....

White says studies after oil spills in Washington and Texas showed increased levels of hydrocarbons in oysters and mussels. But concentrations were so low that someone would have to eat "tons" of them over decades to be harmful. (USA Today, 6/4/10)

The argument that concentrations of hydrocarbons were too low to produce harm is not necessarily a sound one. First, it relies on the assumption of monotonicity in dose-response, which is increasingly being discredited (Colborn & Thayer, 2000; Vandenberg, et al., 2012). Second, even when that assumption of monotonic dose-response may be correct, the reference level used in risk assessments for how much fish is generally consumed by an individual is not necessarily sufficient or reliable for high consumers and for vulnerable individuals such as pregnant women, children, and the elderly (Rotkin-Ellman, et al., 2011).

Finally, there was discussion about the use of chemical dispersants. Citizens seemed to express fears about the hazards of the Corexit used to break down the oil. Officials quoted in corporate media stressed that these dispersants were used according to proper protocols, and while there might be a potential risk to cleanup workers, others citizens need not fear.

Dispersants used by BP to break up oil slicks, while posing potential risks to clean-up workers, present even less risk to consumers, White says. That's because the dispersants quickly break down in water, she says. (USA Today, 6/5/10)

Though dispersants can degrade relatively quickly, what is left out of this statement is that the breakdown products of the dispersant could be equally or more toxic than the dispersant itself (Paul, et al., 2013; Rico-Martínez, et al., 2013). Additionally, the data safety records for the two Corexit dispersant types used in the Gulf (Corexit 9500 and Corexit 9527) both indicated that that “exposure guidelines for this product have not been established” (Nalco, 2005, 2008). Moreover, Dr. Riki Ott, a marine toxicologist who worked with cleanup workers during both the Exxon Valdez and Gulf oil disasters, noted that dispersants sprayed in the seas then enter the water cycle as they become aerosolized and rain down onto adjacent land masses, posing a less mentioned risk to communities ("Crude Awakening," 2014).

The corporate media no doubt spent time in their stories mentioning possible hazards from the oil spill and from the chemical dispersants. Yet concurrent with their theme of encouraging news, they tended to err on the side of optimism by de-emphasizing risks and expressing that citizen fears were exaggerated because all data suggested safe and acceptable levels of toxics. Given the current scientific knowledge about the issues with standard risk assessments and the methodology for determining safe levels (see Chapter 3), the framing of unfounded fears about environmental and health risks may not be entirely accurate.

4) Psychological crisis with hopefulness

In terms of the very few stories that dealt with psychological health and the psychosocial ramifications of the spill, one main theme emerged in the corporate media – that of a crisis with some underlying hope. Once again, this theme concurs with the overall optimism expressed in the corporate media. Though there was a definite expression of the enormous emotional and psychological toll on citizens affected by the Gulf spill, there seemed to be a need to interject some positive aspects about the lifestyle changes occurring that were resulting in the tremendous stress and depression. Thus, negative psychological effects were wholly noted:

The toll for a few individuals has been extreme... "We're dealing with people who are very resilient and used to being in charge of their own destiny. When that's taken away, it creates an emotional and psychological crisis," said Anthony Speier, deputy assistant secretary of Louisiana's Office of Mental Health....

Don McPherson, another Alabama charter captain, said the nature of the work -- which for him requires long, exhausting days on the water -- could compound the problem, by making it hard for captains to talk about their stress with their families or one another....

Steve Picou, a professor of sociology at the University of South Alabama who has studied the psychological impacts of major disasters such as the Exxon Valdez oil spill and Hurricane Katrina, said it was surprising to see the first suicide from the BP oil spill so soon. The first suicide linked to the Exxon Valdez happened four years after the spill, he said.

"This is very sudden," he said. "It is almost like Exxon Valdez fast-forward."

(The Washington Post, 7/13/10)

But there seemed to be a need to interject moments of hope within the grim psychological reports. For example, though fishermen were forced to work for BP to make up for the loss of their normal means of income during the spill, the job cleanup job was characterized as tough but also good.

For these crews ...working for BP can bring good pay and the pride of fighting the spill hand-to-hand...

"The unknown of where you were going to get your next paycheck from, all of that was taken away when BP employed us," said William Scarborough, 40, who owns five of the boats that sail out of Pass Christian harbor....

The good and bad of working for BP's cleanup were illustrated in just the few hours that Cortez -- the Louisiana crabber -- and his crew spent working one recent day, tending the boom on Bayou Dufrene. On the good side, they said, BP pays well. (The Washington Post, 7/13/10)

One story went on to describe what the workers envisioned doing with their newly earned money. The psychological difficulty of the aspects of the cleanup work, such as the sadness of witnessing all of the oil washing up and affecting fish and other wildlife, was explored. Yet, as one of the workers lamented upon seeing an oiled pelican, the article concluded by underscoring his hopefulness.

"Not real dirty, but dirty. I can see it on his wings," he says, opting for optimism. "Good enough to survive and fly." (The Washington Post, 7/13/10)

It is not clear whether that need to express hope in the corporate media was for the benefit of the audience and their own emotional needs, or for the sake of protecting the corporate interests involved in their own media industry, but either way, it promotes a tone of positivity that may or may not be reflective of the actual situation.

5) Loss of livelihood and freedom

Articles that explored the environmental justice domain were extremely rare, much like those that explored psychological health effects. Nevertheless, it is interesting to note the theme used in stories that discussed especially vulnerable populations. First, it should be noted that in the corporate media stories, the only community of interest in terms of the environmental justice

domain was the immigrant Vietnamese fishing community in the Gulf region. Mainly, stories that employed this environmental justice domain focused on the financial losses to the community and the loss of the livelihood that generations of Vietnamese fisherman had traditionally pursued.

The gushing oil from the Deepwater Horizon rig has upturned countless lives across the Gulf Coast. The Vietnamese community in and around Biloxi has been particularly devastated....

About 2,000 of the area's 7,500 Vietnamese have been directly impacted by the oil...

A fisherman from Nha Trang, Vietnam, Kieu came to the U.S. in 1982, seeking political and job freedom. For the first time in his life, he fears he may have to do something else. "I was trained to be a fisherman," Kieu says. "It's all I know." ...

Oil from the runaway well in the Gulf of Mexico halted his livelihood of trawling the surrounding bays for shrimp... (USA Today, 7/9/10)

Part of the loss of the traditional livelihood of this population included the loss of freedom that came with their generations-long vocation of fishing. Now, these people had to struggle with not only trying to get work with BP as part of the cleanup crew but also receiving compensation, all of which has taken away from their financial and personal freedom in their lives.

Tung Kieu, 53, a deckhand, comes out every day hoping for an assignment. Sometimes he gets on a boat, sometimes he doesn't. So far, he has received one \$2,500 check from BP, he says. He has been out on boats adjusting boom for 14 days but hasn't been paid for any of them, he says....

As BP began compensating those affected, language barriers quickly became a problem, Truong says. Claim forms and posters were initially English-only and translators were scarce, she says.

Those issues have been corrected by BP, but the Vietnamese still struggle to navigate through the system and get fully compensated, she says ...

"We came here for freedom. We wanted to work for ourselves. Now I just sit and wait for a phone call."... (USA Today, 7/9/10)

The loss of autonomy and traditional the way of life in the Vietnamese community was the theme of the environmental justice domains in the corporate media. Noticeably absent from the environmental justice domain were both the mention of other vulnerable communities and the increased susceptibility of this community to potential environmental health risks.

6) Preparation for economic repercussions

The economic domains used in corporate media stories demonstrated a much more foreboding theme than did the health and environmental domains, particularly when focused on the economic effects of the spill on BP itself. Unlike the optimism displayed in framing environmental and health risks, the economic domains contained themes with more pessimism and caution, highlighting potential worst-case scenarios.

An early economic story spoke about the very real possibility that the spill might ruin BP for good. It offered some balance in estimating whether or not BP could withstand the deluge of financial lawsuits to come, but it stressed that the worst-case scenario might very well be a reality for BP.

It seems unthinkable, even now, that the disastrous oil spill in the Gulf of Mexico could bring down the mighty BP. But investment bankers get paid to think the unthinkable -- and that is just what they are doing. The idea that BP might one day file for bankruptcy, particularly as part of a merger that would enable it to cordon off its liabilities from the spill, is starting to percolate on Wall Street. Bankers and lawyers are already sizing up potential deals (and counting their potential fees)...

But all those numbers don't account for the greatest possible threat: a jury verdict against BP.

Such a verdict might push the cost of the spill into the hundreds of billions. If that happened, even BP might buckle....

"Even with a prepackaged bankruptcy, BP's brand is permanently tainted," said Robert Bryce, a senior fellow at the Manhattan Institute ...

BP will spend the coming decades circling the drain, mired in endless litigation, its reputation irreparably damaged, and its finances weakened," Mr. Bryce said That, if you believe the bankers, is the optimistic outcome. (The New York Times, 6/8/10)

A Washington Post editorial stressed that BP should not pay enormous fines. This could be problematic to the company and to the industry, and would not foster an amenable environment for petroleum enterprises.

But, in establishing BP's punishment, federal and state governments shouldn't try to extract excessive punitive fines. Even if BP is found to have been grossly negligent, it does not follow that it must face the harshest punishment the law allows....

...the Economist calculates, BP's total Deepwater Horizon payout could reach an incredible \$90 billion. A bill anywhere near that large is impossible to justify...

The government should welcome economically useful investment and enterprise, and seeking a maximal punishment for BP would do the opposite, discouraging even firms that would behave more responsibly than BP did in the run-up to the Deepwater Horizon blowout.

(The Washington Post, 3/4/13)

The corporate media, while thematically framing ecological and health threats as unfounded or overblown, framed economic effects as potentially catastrophic to the company involved. Moreover, they suggested that, because the resulting fines and compensation claims leveled at BP could negatively affect the industry, prudence should be followed in calculating the fines that BP should pay. Overall, it seems there is a disparity in the manner in which

environmental, health, and risk domains were framed by the corporate media as compared to economic domains.

Thematic framing of independent media stories

In examining the major themes utilized in the environmental, health, risk, environmental justice, and economic domains in independent media, one finds subtle and nuanced divergences from those in the corporate media outlets. Generally, the themes covered observed and potential problems experienced by the human and wildlife communities in the Gulf, and the ability of the oil industry to carry on since the disaster. The following six main themes were uncovered in independent media stories:

1) Severity of environmental and health risks and inability to recover

The independent media outlets used a less balanced tone than the corporate media in terms of treating both positive and negative aspects of the disaster as necessarily equivalent. In framing the environmental and health domains pertaining to the oil spill, they provided much detailed anecdotal evidence (as displayed in the longer excerpted examples below), as well as evidence from scientific experts pertaining to the unprecedented nature of the environmental and public health catastrophe unfolding in the Gulf.

Many stories emphasized the health effects being experienced and those that were potentially imminent. Unlike the corporate media stories, these stories stressed that potential health risks were widespread and difficult to contain. They mentioned more the large scope of the problem, discussing both future both current and future health effects.

...fishermen reported feeling "drugged and disoriented," "coughing up stuff," and feeling "weak."...

One marine toxicologist and activist, Riki Ott, studied the 1989 Exxon Valdez spill and told the Times that these illnesses emerging from the Gulf were "déjà vu ... What we saw with Exxon Valdez was a parallel track -- sick animals and sick people." (ProPublica, 5/26/10)

— several of the fishermen out on the worksite, they were complaining of burning eyes and strong smells. And my experience told me that they were getting exposed to dangerous chemicals — the benzenes, all the light ends off the crude — and this Corexit is a new experience for me. I have been doing some research. It contains a substance called 2-butoxyethanol, up to 60 percent by volume, which is a very, very dangerous chemical. I don't have a lot of experience with it, but just doing the research. And I knew that they spraying this chemical in the same area where my fishermen were working... it's chemical poisoning. They will detox them. And they may be OK today and tomorrow. But being exposed to dangerous carcinogens, who knows what's going to hold, what's in their future? (Democracy Now, 5/27/10a)

These stories went into more detail about the toxicity of the constituent substances in the crude oil and the dispersants, and expressed more concern about the potential hazards than did corporate media. Rather than present both sides of the argument about hazards and then downplaying the risks, independent media presented both sides, then followed the worst-case scenarios, erring on the side of precaution in terms of what could result from the spill. In addition, they mentioned details about risk that were not elucidated in the corporate media.

It's been very well studied that, you know, oil or petroleum products have lots of constituents, volatile organic compounds, which include benzene, which are strongly linked to leukemia and other cancer-causing diseases — other cancer-causing chemicals....

When we were down in Robert, Louisiana, we met with Central Command, and we raised the issue of, you know, how much oil is being spilled. We need to know this. And one of the responses was that, "Well, 40 percent of it evaporates into the air anyways." Well, that's exactly what we're concerned about, is, of that oil evaporating into the air, there's these volatile organic

compounds, there's hydrogen sulfide, which smells like rotten eggs and leads to like hardness in breathing, irritation of the eyes, and then the benzene itself, which can — like I said, has cancer-causing effects, can lead to burning of the eyes, the nose, nose bleeding, coughing. I mean, these are all of the symptoms that we hear a lot of people reporting on the ground.

(Democracy Now, 5/27/10a)

What are the long-term health effects of the workers on Exxon Valdez? ... There's many different impacts. There's neurological disorders, cancers, skin disorders, all kinds, respiratory disorders.

(Democracy Now, 6/7/10)

Whereas corporate media mentioned some health and environmental effects as relatively incidental and less severe than expected, the independent media thematic displayed the widespread severity of the effects. Furthermore, they focused on the harshness of the effects by speaking in detail to witnesses

...my partner and I were down in Baratania talking with shrimpers and fishermen and people affected by the oil disaster. And literally within minutes of driving down there, the air was so chemically laden, you could smell and taste chemicals in the air. And immediately, our eyes began to burn. And everyone that we were talking with there ... everyone was complaining of different kinds of health problems — headaches, which, actually, again, within minutes, I personally was starting to experience that; shortness of breath; nausea — all kinds of different symptoms, which I then went home and started to educate myself on the immediate and then longer-term effects of the two Corexit dispersants being used and realized that myself and everyone that we spoke with down there were basically having onset of these symptoms, and people were suffering from it very much...

...we have people, wildlife — we have dolphins that are hemorrhaging. People who work near it are hemorrhaging internally. And that's what dispersants are supposed to do. EPA now is taking the position that they really don't know how dangerous it is, even though if you read the label, it

tells you how dangerous it is. And, for example, in the Exxon Valdez case, people who worked with dispersants, most of them are dead now. The average death age is around fifty.

(Democracy Now, 7/20/10)

The independent media treated environmental risks and effects with the same tone of severity and precaution as human health risks and effects. They stressed the unprecedented risks to wildlife.

The brown pelican had been removed from the threatened-species list just last year, but now, as the BP oil spill washes onto beaches and wetlands, the species is up against a new challenge....
...wildlife experts say the spill could produce mass casualties and steep declines of populations in the coming weeks, months, and years. Of particular concern: bluefin tuna, Kemp's ridley turtles, and Florida manatees...

"The situation in the Gulf is unprecedented for wildlife, in terms of magnitude and numbers of species involved,"...

"If oil gets into the waterways, we could see a significant impact on the manatees," Hewitt says.

"They're herbivores, like cows, and have finely tuned digestive tracts. No one knows how this oil could affect the manatees: Nothing has ever occurred on this scale before."...

The area of the Deepwater Horizon rig disaster is one of a handful in the Gulf where western Atlantic bluefins breed, accounting for one-quarter of the species' spawn each spring, says marine biologist Barbara Block of Stanford University in California. The oil spill, she says, will have serious effects on bluefin eggs and larvae, which free float in Gulf waters....

"The spill is so tragic for the bluefin because it happened right at the time of year when the fish come in to breed," Ms. Block says. "Big fish can sense the oil and swim away. The smaller fish, the eggs and larvae, can't get away."...

We've never dealt with this type of oil release, with oil doing stuff we've never seen before."

(The Christian Science Monitor, 5/26/10)

...the Gulf of Mexico is a tremendous engine of life and also a tremendous concentration zone, where animals from the whole open Atlantic Ocean funnel into the Gulf for breeding and millions of animals cross the Gulf and concentrate there on their northward migration and then fan out to populate much of North America and the Canadian Arctic, the East Coast, the Canadian Maritimes. So it's a real hotspot, and it's a terrible place to foul...

...not only do you have birds there that are breeding, like the pelicans and some of the gulls and some of the terns, those birds will probably have a completely catastrophic breeding season, because it's not just birds on the beach or birds in their nest. Their parents make a living diving into water...

But also, there were sanderlings, ruddy turnstones, black bellied plovers and a dozen other species that don't stay there. They're moving, and they're migrating through. They come — they winter as far south as southern South America. They nest across the Canadian tundra and in the High Arctic. They're some of the longest-distance migrants in the world. They cannot do that unless their fathers are working. And if their feathers are sticking together, they're not going to be able to make it. They don't have the energy to get to where they're going to go. So they're going to be dropping out along the way. The other thing is you have peregrine falcons that are coming across from the Yucatan on their way to breeding grounds in the Arctic — excuse me — and as far away as Greenland. They will be selectively picking off these birds that are compromised. So they will be getting higher doses of oil. So this is just a horrible place to have something like this happening, because it's such a concentration point for animals that move.

(Democracy Now, 5/27/10b)

Incorporated into this theme of severity was the notion that recovery and resilience might be difficult. Some of this doubt about resilience in the Gulf stemmed from the experiences of scientists and citizens in Alaska after the Exxon Valdez Spill.

[In the Exxon Valdez spill]: Out of twenty-two species that were harmed, only eight are on the recovered list. Some of the other things we've shared is there is there is a long recovery in this process.

[In terms of the recovery period]: we're in for the long haul — I'm talking a twenty-year

marathon

(Democracy Now, 5/7/10)

Whatever the case, it seems certain that the damage will not be inconsequential. Oil in marshes could take years to clean up ...

A worst-case scenario of a hurricane blowing large parts of the spill onshore, even into beach towns, could not only disrupt whole communities, but would limit the ability of anaerobic bacteria to degrade the oil left onshore, especially on dry, sandy beaches....

What a lot of us are concerned about is about the impact of a spill of this magnitude where things may recover or seem to recover, but we get this subtle degradation of the environment that's hard to quantify from repeated impacts," says Snyder. "There is a point of no return where we exceed the resilience of the environment. Have we done that [with the Gulf oil spill]? We don't know."

(The Christian Science Monitor, 7/14/10)

The overall theme related to environmental and health domains in the independent media was one of extreme severity and urgency. This differed considerably from corporate media.

While both types of media outlets mentioned various levels of concern, what was and was not yet known, and offered room for optimism, the corporate media theme was one of general optimism – stressing that the spill's effects were less severe than anticipated - while the independent media theme was far more measured and cautionary.

2) Uncertainty about scope of effects and remediation

As far as the scientific uncertainty domains expressed in independent media, the overall frame was less one of uncertainty about whether or not health and environmental effects would

arise and more one of how widespread and severe those effect would be. (See quotations from the Christian Science Monitor in previous theme section for some overlapping examples.)

Still, the unprecedented use of kerosene dispersants and the deep-water nature of the BP oil spill is littered with unknowns. In localized places such as marshes and beaches, they could stretch the ability of the Gulf's natural restorative powers to correct what one Gulf biologist calls man's "insult" to the ecosystem. Researchers, for example, have spotted fluorescent clouds in the deep Gulf, likely a byproduct of benzene in the water - a new phenomenon.

(The Christian Science Monitor, 7/13/10)

Additionally, there was uncertainty about the accuracy of a government report, as early as a few months after the initial blowout, indicating that most of the oil was gone from the sea.

By the end of last July and into the beginning of August, methane decomposition rates in the broad area the team studied "were faster than had ever been recorded in any other place on the planet." ...

"It's a bold hypothesis," says Samantha Joye, a marine biologist at the University of Georgia at Athens, who also has been gathering methane-related measurements since the blowout on April 20 last year. But "there are other, alternate hypotheses that could just as easily explain" the data.

"I would be thrilled if I could sit here and tell you, 'Yeah, the methane's all gone, isn't that wonderful?' " Joye says. But "500,000 tons of methane does not get microbially consumed in three months.

(The Christian Science Monitor, 1/6/11)

In recent weeks, many scientists have also criticized or expressed skepticism about a rosy report from NOAA announcing that most of the oil BP spilled into the Gulf is gone. A quick compilation of reactions: "These are just what we call WAGs — wild-a-- guesses," Rick Steiner a retired University of Alaska professor, told the Times. "I'm suspect if that's accurate or not," Ronald Kendall, director of the Institute of Environmental and Human Health at Texas Tech University, told McClatchy Newspapers. "There is a lot of uncertainty in these figures,"

Louisiana State University professor James H. Cowan Jr. told McClatchy. "If an academic scientist put something like this out there, it would get torpedoed into a billion pieces," Samantha Joye of the University of Georgia, a leading scientist on this spill, told The New York Times. "This is a shaky report. The more I read it, the less satisfied I am with the thoroughness of the presentation. ... There's some science here, but mostly, it's spin," Florida State University professor Ian MacDonald told The Associated Press. (ProPublica, 8/10/14)

It is interesting to note that the story by ProPublica compiled quotations of scientists taken from other, mainly corporate, media outlets. But unlike the corporate outlets who used these quotations one at a time in various stories and balanced each quotation with an alternate opinion, ProPublica compiled all of the skeptical sources and framed the uncertainty more clearly as doubtful of official reports rather than as two sides offering differing opinions, either of which may be valid.

3) Prevarication and lack of transparency

Another theme that arose, stemming from environmental, health, and risk domains was the lack of transparency by both the government and BP. The theme corresponds to the theme of uncertainty about the scope of effects, because each offers questions and criticisms of official data and reports.

More specifically, there were a number of instances where independent media pointed out the seeming lies and cover-ups perpetrated by either the federal government or BP. They also expressed concern over the lack of openness on the part of governmental agencies and industry officials. ProPublica reported that BP would not share important health data with the public.

BP has been withholding the results of "tests on the extent of workers' exposure to evaporating oil or from the burning crude over the Gulf." The data is important to determining whether current

conditions are safe for workers in the Gulf, researchers told McClatchy. BP said it's sharing the data with "legitimate interested parties," but would not release it publicly:...

That's not the only instance in which the company has restricted the media's access to information.

CBS News reported that one of its news teams was filming on an oil-tarred public beach when Coast Guard officials and BP contractors [came by and threatened them with arrest](#). The incident was caught on tape. (ProPublica, 5/20/10)

In addition, independent media reported that BP initially would not disclose the rate of oil leakage, and the federal government tried to stifle scientists who gathered their own data to estimate the rate of the oil flow.

As we've pointed out, BP has maintained there's "just no way to measure" the oil flow, even as the company turned down scientists offering to measure it with techniques that could yield a more accurate result. A BP spokesman told The New York Times that calculating the flow is "not relevant to the response effort." (ProPublica, 5/20/10)

Now, scientists behind some of the plume research have spoken out about what went on behind the scenes with the federal agencies that sponsored their research...

"We expected that NOAA would be pleased because we found something very, very interesting," Vernon Asper, an oceanographer at the University of Southern Mississippi, told the Times.

"NOAA instead responded by trying to discredit us. It was just a shock to us. ... [NOAA Administrator Jane Lubchenco] basically called us inept idiots."...

Scientists, however, say that they're still waiting for NOAA to either give them a shared analysis or return the oil plume samples, which were taken for use "in an eventual court case against BP and other oil companies involved in the disaster." (ProPublica 8/10/10)

Nor would BP disclose air pollution sampling data to anyone other than the Occupational Safety and Health Administration (OSHA), but OSHA would not make this data public, according to the independent media outlets.

McClatchy reported that when the Occupational Safety and Health Administration was asked about air sampling data that BP has shared with the agency, an OSHA official again deferred to BP: "It is not ours to publish," said Dean Wingo, OSHA's assistant regional administrator who oversees Louisiana. "We are working with (BP) and encouraging them to post the data so that it is publicly available." (ProPublica, 5/20/10)

Stories also noted that BP would not offer protective equipment to cleanup workers, denied any knowledge of health effects that had already been highly reported.

Cleanup workers told the Times that they were not given protective equipment -- no gloves, no respirators. Here's BP's response on the issue, from the Times piece:

BP spokesman Graham McEwen said Tuesday he was unaware of any health complaints among cleanup workers. (ProPublica, 5/26/10)

I bought respirators, and I brought them down to these people. And when they tried to wear them, the BP representatives on site told them that it wasn't a dangerous situation, and they didn't need to wear them, and if they did, they would be taken off the job... Because BP lies, and BP protects BP. And that is the biggest problem we have in the south of Louisiana right now, is BP, with its big oil big money, is buying up all the cover — and when I say "cover" I mean camouflage — that they can to try to make a little of the situation, not only environmentally, but health-wise... the same situation occurred with Exxon Valdez over twenty years ago. It is a question of liability. The minute BP declares that there is a respiratory danger on the situation is the day that they let the door open for liability suits down the line. If they could have gotten away with covering this up, like they did in Alaska Valdez situation, like Exxon, they would not have to pay a penny for any kind of health-related claims. (Democracy Now, 5/27/10a)

EPA administrators saying the same thing, that the air is safe and the water is safe...

And basically, the problem is dispersants mixed with oil and air pollution. EPA, like in 9/11 — I did that investigation nine years ago — was not doing adequate and proper testing. Same thing

with OSHA with the workers, they're using mostly BP's contractor. And BP's contractor for doing air testing is the company that's used by companies to prove they don't have a problem. If you remember the wallboard pollution problem from China, the wallboard from China, this company does that environmental monitoring. It's a massive cover-up.

(Democracy Now, 7/20/10)

Other stories indicated that the use of dispersants to clean up the oil spill was less about remediation and more about covering up the disaster. Moreover, the independent media were the only type to mention that BP has financial stakes in the company that manufactures Corexit.

I think the whole idea of using a dispersant is wrong, and I think it's part of the whole pattern of BP trying to cover up and hide the body. They don't want us to see how much oil, so they've taken this oil that was concentrated at the surface and dissolved it. But when you dissolve it, it's still there, and it actually gets more toxic, because instead of being in big blobs, it's now dissolved and can get across the gills, get into the mouths of animals.

(Democracy Now 5/27/10b)

Well, Corexit is one of a number of dispersants, that are toxic, that are used to atomize the oil and force it down the water column so that it's invisible to the eye. In this case, these dispersants were used in massive quantities, almost two million gallons so far, to hide the magnitude of the spill and save BP money. And the government — both EPA, NOAA, etc. — have been sock puppets for BP in this cover-up.... The sole purpose in the Gulf for dispersants is to keep a cover-up going for BP to try to hide the volume of oil that has been released and save them hundreds of millions, if not billions, of dollars of fines. That's the purpose of using the dispersants, not to protect the public health or environment. Quite the opposite. (Democracy Now. 7/20/10)

...it turns out that Corexit, which is manufactured by a company that actually BP owns, so there's an interesting conflict of interest there... we've asked repeatedly for release of the ingredients of

Corexit, that's being used, and it's been claimed that there is — these are industry proprietary information they cannot release. (Democracy Now 5/27/10a)

What is observed in independent media reports is a skepticism of official word and more of normative practice of investigative reporting on the Gulf incident. While there are elements of investigation in the corporate media, their norm of balance tended to diffuse the questioning of public and corporate official narratives, and thus lead to differences in thematic framing of such domains as environmental and health risks and effects.

4) Mental health crisis exacerbated by insufficient response by BP

As mentioned previously, the psychological crisis stemming from the Gulf disaster was neglected as a whole in all forms of media outlets. Nevertheless, it is interesting to note the subtle difference in framing of the psychological effects of the spill. While the corporate media noted the severe mental health crisis occurring, and even noted the need for more mental health services for victims, their stories infused hopefulness. Independent media stories, by contrast, simply stressed the lack of much-needed counseling services that were supposed to be provided by BP.

More than six weeks after Louisiana health officials warned of a [looming mental health crisis](#) in communities affected by the Gulf oil spill, BP has yet to provide an answer to the state's repeated requests that the company fund emergency services...

Louisiana's demands have significant implications for future disputes over BP's liability in the spill. Much like [claims for damages from bodily injury](#), mental health is not covered under the Oil Pollution Act, the 1990 federal law that holds oil companies liable for "[removal costs and damages resulting from an incident](#)." BP's response to the request could be seen as a precedent in a new area.

For mental health in particular, tort law has a narrow definition of liability. Louisiana would have to prove that mental health problems were a predictable outcome of any BP negligence in allowing the spill to occur, David Owen, a law professor at the University of South Carolina, has told us. (ProPublica 7/14/10)

Here again, this theme spills over onto previous themes, in which the independent media frame the psychological crisis as partially a result of prevarication and cover-up by BP, who is attempting to thwart financial losses in not provided needed services to victims of the spill.

5) Threat to local and global community survival

Much like the corporate media, the independent media outlets did not devote many stories to environmental justice domains. Also like the corporate media, the loss of the traditional livelihoods figured prominently in the environmental justice stories; however, independent media stories went a bit further. They not only mentioned vulnerable Vietnamese fishing communities but also mentioned African-American and indigenous communities. They focused not only on the threat to the subsistence way of life of many communities but also on the threat to human health and the ecosystem as a whole, not just in terms of financial livelihood (e.g., fishing industry).

But traveling through the Gulf of Mexico last week, we spoke to many who hold BP responsible for a damaged ecosystem, threatened livelihoods, and an end to a way of life. We visited one community in Grand Bayou, a village accessible only by boat, that feels they're on the brink of extinction. The indigenous Atakapa-Ishak people in this coastal Louisiana community have relied on the land and water around them to survive for generations. They live mostly off the oysters, the shrimp and the fish in the waterways and the marshes. Now the traditions and the very survival of this community are at risk...

...I think it's fair to say [this] is an endangered community...

We're facing something that we have never faced before. And it has the potential to imperil us all for the next twenty, thirty years....

And we live a subsistent life. It's 2010, and we still live the same way that we did centuries ago.

The life of our community is more than just ourselves. You know, we are part of this ecosystem.

Everything in it, you know, we're a part of, and it's part of us. People ask us, you know, how long have we been here. We've been here forever... (Democracy Now, 6/7/10)

They also tied these threats to the global threat being experienced due to climate change and other anthropogenic industrial maladies.

But I think the most difficult challenges that we're facing are the human-induced challenges. And those are the ones that are hard to recover from. We're facing a challenge right now with an oil disaster and chemicals, and that's new. And we really don't know what to do at this point...

We can't allow this industry, which is so polluting, to continue to harm our peoples, but not only us, all peoples. This is not our issue; this is everyone's issue. Everyone is affected by global warming. Fossil fuel development is the leading human-induced contributing factor of climate change. We're all dealing with it. (Democracy Now, 6/7/10)

Moreover, they linked the current threat to what occurred to indigenous communities during the Exxon Valdez disaster, by speaking to members of that community as well.

I'm Faith Gemmill. I'm Neets'aai Gwich'in, Pit River and Wintu, and I'm from [inaudible], Alaska. It's Arctic Village, Alaska... Now we share this disaster, which has impacted people in Alaska with the Exxon Valdez oil spill twenty-two years ago, and now the Gulf spill, which is impacting these communities now. (Democracy

Now, 6/7/10)

So beyond the loss of a financial livelihood and traditional means of making an economic living, which was how the corporate media framed the environmental justice domain, independent

media outlets thematically focused on the community culture and the sustainable way of life threatened globally by industrial catastrophes like the Gulf spill.

6) Thriving industry needs regulation

In reporting on the economic effects, particularly to BP and the oil industry, the independent media did not take the view that the industry was in peril. While acknowledging the initial deleterious effects to BP stock (especially in the Guardian), the prevailing theme of the economic consequences was one that demonstrated an industry that would weather the crisis and that needed more regulation if such disasters were to be averted in the future.

First, it was explained that the oil industry has not suffered from the enormous catastrophe and that deep-sea drilling has been expanding.

...after a brief pause, business has not just returned to normal in the Gulf of Mexico, but been turbo-charged. There are now 39 oil rigs operating in its deep seas, about a third more than before the Deepwater disaster...

A fifth of all offshore oil is now dredged from the depths and this is expected by the industry to rise to over half by the end of the decade and two-thirds by 2030. (The Guardian, 4/2/12)

Then, there was an explanation as to why this potentially risky deep-sea drilling continues and why it will continue even for BP.

The reason for this calm reliance on everyday technical miracles is ...devastatingly simple: it is still cheap. Despite costing between four and eight times more to pump up than onshore oil, oil from the depths remains highly profitable.

The New Orleans court case will push the boundaries of the US legal system and corporate responsibility. But oil exploration will continue to push the boundaries of the planet, until the cost of failure exceeds the prize of success. (The Guardian, 4/2/12)

Because of the profitability of the deep sea drilling venture, independent media outlets explored the calls for banning of the risky practice, unlike corporate media outlets.

BP had a lease to drill. They did not have a lease to pollute the Gulf of Mexico. They did not have a lease to blow oil into the environment. They did not have a lease to disperse the oil and try to hide the body. They don't have a lease to clean up. They don't have a lease to make the fishermen sick. They don't have a lease to tell the United States, "We'll keep using a dispersant that's banned in Europe, even though you're telling us to stop using it." ...The obvious right thing is the drilling ban was the right thing to do. The drilling ban is the right thing to do. We don't know how to take care of these problems. We need to stop it. We need to make this a pivotal moment and have a national energy policy for the first time that gets beyond this and phases out fossil fuels, which kill people, make people sick and destroy the environment.

(Democracy Now, 5/27/10b)

I strongly think that offshore development needs to stop now. This is a wakeup call. We need to look at this and realize that we have to change what we're doing. And especially in the Arctic, there should be a moratorium on it, because they don't know what they're doing. They're going into these ecosystems that they don't understand... there needs to be a moratorium on offshore development.

(Democracy Now 6/7/10)

Overall, independent media framed the disaster more critically and with a more precautionary tone than did corporate media. Corporate media relied on the balancing of viewpoints and the word of officials to paint a hopeful view of the disaster. On the contrary, independent media did not let the official narrative of events stand alone, giving framing preference to first-hand narratives. When reporting on the declarations of those in power, independent media continuously questioned the veracity of official statements. This could be, in part, because independent media referred back to the historical experience of the Exxon Valdez spill more often, and recalled the experience in trusting official sources during that similar event.

Flak.

As mentioned before, the incidence of flak is difficult to observe in the media. Many times it takes the form of corporate or governmental representatives contacting media outlets to offer suggestions or scold them about their framing of stories. Or it may take the form of sources from corporate or governmental entities inserting themselves into stories to offer their official public relations account of the events. Such covert phenomena are nearly impossible to quantify or qualify reliably. However, the existence of op-ed pieces in the media written by governmental and corporate interests (or others with close ties to these official interest groups) is more easily identifiable. Thus, four op-ed pieces were found in the total sample of 600 stories, which could be construed as flak. All four articles came from the corporate media outlets. These were analyzed for dominant themes. See Table 6 for the major themes found in the op-ed pieces identified as flak.

Table 6

Themes in op-ed articles identified as flak

Themes from corporate media flak articles <i>Government commitment to accountability and reform</i> <i>Corporate commitment to responsibility and transparency</i> <i>Disaster could be worse</i>
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The one op-ed from a government official was written by Ken Salazar, the secretary of the interior of the United States in USA Today on May 25, 2010. The theme of his piece was the federal government's *commitment to accountability and reform*. In it, he explained that everything possible was being done and all possible resources were being employed to deal with the oil disaster.

The armada of ships, scientists and coastal protection teams is the largest ever mobilized for an oil spill. Still, even with every human and technological resource being made available, BP's spill continues....

So long as BP's oil spill threatens America's communities, we will continue the all-out, all-hands-on-deck battle to protect the Gulf Coast, its people and its irreplaceable beauty.

Salazar then emphasized that regulations would change so that all responsible parties would be help accountable, for repair, future protection, and reform.

BP and everyone who is responsible for this catastrophe will be held accountable for their actions. And they, along with other offshore oil and gas operators, will face more oversight, policing and safety standards....

The breakup of the Minerals Management Service, the federal agency responsible for offshore oil and gas regulation, is the latest in a series of reforms the Obama administration has made to clean up a troubled agency and restore balance to the development of our nation's offshore energy resources.

These reforms are vital. And more reforms are on the way.

It seems this piece may have been written in response to accusations that the government was not doing enough to clean up the spill and to regulate the industry. Interestingly, the people in the Gulf do not necessarily agree that the government has utilized its full power to restore the region, nor has the government passed any reform measure to ensure the safety of future oil drilling ("Crude Awakening," 2014).

Another opinion article was written in USA today on June 14, 2010 by Doug Suttles, the chief operating officer of BPP Exploration and Production. Somewhat similar to Salazar's article, Suttles' main theme was BP's *commitment to responsibility and transparency*. First, he assured the public of BP's responsibility in dealing with the disaster:

We're working around the clock to stop the flow of oil, protect the shore, clean up the damage and restore the Gulf Coast. We also want to ensure that a tragedy like this never happens again.

Then, he asserted that information will be openly shared with the public.

BP understands that our responsibility goes beyond stopping the flow of oil and making things right in the Gulf. We know that transparency and responsiveness go hand-in-hand with accountability.

BP is working side-by-side with our response partners and the federal government to execute an unprecedented response and to provide thorough briefings on developments in the Gulf.

From the beginning, we have tried to provide information, data and access to government officials, the news media and the public. But we always are striving to enhance and improve our lines of communication and our responsiveness.

we know that in a crisis, better and more timely information is always desired, and we will continue to strive for openness and transparency in all we do.

Suttles' piece looks as if it could have been a direct response to the accusations leveled by many media outlets that both the government and BP were withholding information and covering up aspects of the disaster,

The other two opinion pieces came from members of think tanks with interests in energy and oil industries. Both coincide thematically in their notion that the *disaster could be worse*. Jonah Goldberg, a visiting fellow at the American Enterprise Institute, writing the USA Today (May 2, 2010), stressed that the catastrophe was being exaggerated and that it was fairly minor, in the scheme of events.

Once again, many people are eager to turn a Gulf Coast catastrophe into something more apocalyptic, this time not to tear down a president but to discredit offshore drilling. It most certainly is a horrific disaster, but the "worse than Valdez" theme, hyped on the Drudge Report and cable news, hasn't been validated.

Even if the higher estimates turn out to be true, the spill so far is relatively minor in size compared with others in history.

But it's worth remembering that the damage from previous, and much larger, spills wasn't nearly so lasting as people had feared.

He mainly used the *could be* worse theme as a pretext to declare that we should not stop drilling for oil.

The Three Mile Island nuclear mishap in 1979 caused America to stop building reactors for a generation because we let media hype set the policy. It would be a tragedy if we let the same thing happen with domestic oil drilling ...

...now's not the time to debate the policy. Now's the time to deal with this disaster.

Kyle Thompson-Westra, a research assistant at the Center for Strategic and International Studies, wrote an article for The Washington Post in which used the theme that the *disaster could be worse* as a pretext to demonstrate that we should leave oil corporations alone. Unlike what state-owned oil companies would do in the same situation, BP has taken responsibility for the spill, he asserted, and the spill has not caused a diplomatic controversy between governments.

But this could be far worse. Imagine if BP were a state-owned oil company. Instead of reasoning with an incompetent chief executive, we'd be reasoning with a protectionist prime minister....

Humor me and picture what would happen if BP were owned by the British government... the nationalistic vitriol coming from both sides would be 10 times worse as issues of blame, recovery costs, national pride, domestic security, and economic competition are endlessly debated between leaders, economists, and cable pundits.

and any disaster caused by a state-owned company might unravel any diplomatic progress [in certain geopolitical regions]

The thematic frames employed by the writers of flak was strikingly similar to the overall framing in the corporate media. As the media propaganda model suggests, it stands to reason that

the flak from these op-ed writers could have influenced the framing of the Gulf oil disaster in proceeding stories. Salazar and Suttles emphasized governmental and corporate responsibility in order to try to steer the media and public toward less criticism of both parties. Goldberg and Thompson-Westra tried to divert the conversation away from industry regulation by conjuring potentially worse scenarios than the disaster that was unfolding in an attempt to minimize the current environmental repercussions of the spill. In this way, the writers of flak attempted to frame the disaster in ways that support the maintenance of the status quo, as the media propaganda model theorized.

Chapter 11 - Discussion and Conclusion

Discussion

The differences in the content of stories about the Gulf oil disaster in corporate media outlets versus those in independent media outlets are enough to point to possible differences in normative operational frameworks that exist between the two types of media. Though not all of the differences align with the expectations of the media propaganda theory, there may be enough evidence, especially when the results of the qualitative analysis are also considered, to suggest that the media propaganda model can explain why issues related to the Gulf oil spill are framed differently in corporate media outlets than in independent media outlets.

First, it is of note that a large proportion of news stories about the Gulf oil disaster did not discuss economics, environmental effects, or health impacts, which were the main domains of interest in this study. Many stories were more procedural in nature, covering the details of such topics as how the explosion may have occurred, what methods were being utilized day to day to try to contain the spill, and what people were involved in dealing with the containment process. These stories were more about logistics than any broader issue, and may speak to the tendency of the news media to focus more episodically on the daily details of a story – even an ongoing story such as this one – rather than on more thematic matters of historical or social context related to a story. Nonetheless, in examining the broader topical domains associated with the spill, some patterns emerged that demonstrated differences between corporate and independent media stories.

Independent media outlets generally employed more environmental domains (35%) ($n = 105$) in their news stories about the Gulf oil spill than did corporate media outlets (23%) ($n = 70$). Though there was no significant difference in the number of stories that spoke of environmental effects, there were significant differences in the number of stories that spoke of environmental

risks, and thus environmental domains in general. Not surprisingly, since the bulk of the news coverage of the spill took place in the first few months that the event was taking place, the short term environmental effects were clear. The oiling of charismatic megafauna such as sea turtles, dolphins, and brown pelicans (the state bird of Louisiana) was apparent, and both corporate and independent media noted these environmental impacts. However, in speculating about environmental risks, independent media were more likely to discuss the potential environmental impacts of the spill. Indeed, toxicological evidence suggests that long-term, sublethal, and ecosystem level effects are still occurring or are likely to occur as a result of the Gulf oil spill (Ali, et al., 2014; Brunner, et al., 2013; de Soysa, et al., 2012; Incardona, et al., 2014; Inkley, et al., 2013; Schwacke, et al., 2013; White, et al., 2012). Even though many environmental effects take a long while to be observed and it takes a long while for scientific data to amass from the observations, given the knowledge from previous oil disasters it is not too difficult for scientists to speak about possible risks yet to come. In accordance with the media propaganda model, corporate media tended to talk less about the potential ecological risks of the Gulf oil spill. One possible explanation for this tendency could be that these risks could call into question the viability, necessity, and sustainability of the deep-sea drilling, potentially endangering the oil industry. While the corporate media followed the scientifically known ecological repercussions of the spill, they were less speculative about the as yet unknown negative consequences, which could have more widespread ramifications. Some might see the identification of potential environmental risks as alarmist, but given what is known about the short and long-term toxicological effects of both petroleum by-products and the toxic dispersants utilized in the Gulf clean-up, it follows that mentioning risks at the species, population, and ecosystem levels reflects

sound science and precaution. As anticipated, independent media were more likely to use this normative standard of reporting precautionary environmental information than corporate media.

Similar to the coverage of environmental domains, corporate media differed significantly in the amount of coverage they devoted to human health domains with regard to the Gulf oil spill. Only 1.3% ($n = 4$) of the stories from corporate media outlets mentioned physical health effects as a result of the Gulf oil spill, despite the fact that citizens, and cleanup workers in particular, complained of various acute ailments (D. Abramson, et al., 2013; D'Andrea & Reddy, 2013; Law, et al., 2011; Rangel, et al., 2011; Solomon & Janssen, 2010). The fact that both the volatile organic compounds that emanated from the crude oil and the dispersants sprayed as a response are toxic was already known scientifically (Anderson, et al., 2011; D'Andrea & Reddy, 2013; Krajnak, et al., 2011; McCauley, 2010; Roberts, et al., 2011; Solomon & Janssen, 2010; Zheng, et al., 2014). Yet corporate media chose to mention few to no health issues related to the spill. Independent media outlets mentioned physical health effects in 8.7% ($n = 26$) of their stories, which is also a low percentage. It may be that human health effects were not as demonstrable as environmental effects, which is why there is a relative paucity of health-related stories in general. But as D'Andrea and Reddy (2013) showed in one of the few peer-reviewed studies yet of health impacts from the spill, acute health outcomes from the spill were not inconsequential, and altered hematologic and hepatic indicators in exposed individuals portend potential long-term health effects. Lingering health effects were also chronicled in a 2014 HBO documentary report ("Crude Awakening," 2014). It may be that the media were not aware of ailments that actual residents of the Gulf were suffering because information came to the media outlets more from official sources than from citizen sources. As per the media propaganda model, corporate media outlets might tend to deemphasize health impacts, so as not to potentially alarm the public about

the consequences of deep-sea oil drilling technologies gone wrong, which is what was observed in this study. In contrast, independent media, purportedly in service to the public good, might speak slightly more to these types of effects that impact individual citizens, also as documented in this study, though not more frequently to be considered significant. It is curious as to why long-term health effects were rarely discussed in any media outlets, particularly given that the study sample extends to three years past the disaster itself. Long-term outcomes such as cancer or inter-generational health effects may not be apparent in as little as three years time so discussion of potential long-term impacts might have been too uncertain an endeavor for many media outlets to undertake. Such speculation could lead to criticism from the medical and scientific community if it were proven to be inaccurate.

One of the most well known and demonstrated effects of disasters such as the one in the Gulf are mental health impairments caused by various social, behavioral, and economic stressors (Berger & Calabrese, 1975; Couch & Krollsmith, 1985; Edelstein, 2004; Gill & Picou, 1991, 1998; Palinkas, 2014; Palinkas, et al., 1993). In fact, these mental health issues began emerging in the Gulf region soon after the spill and were acknowledged in scholarly literature far more than the physical health effects (Grattan, et al., 2011; Lee & Blanchard, 2012; Ngo, et al., 2014; H. J. Osofsky, et al., 2011; Howard J. Osofsky, Osofsky, & Hansel, 2012). Nevertheless, the media studied here failed to cover psychological impacts that arose from the disaster. Independent media only spoke of mental health issues in 2.3% ($n = 7$) of stories while corporate media spoke about mental health effects in 0.7% ($n = 2$) of stories. Given the widespread knowledge about psychosocial effects of disasters, this negligence on the part of the media might suggest that issue coverage is not being driven by the needs of the citizens but rather by the needs of economic stakeholders tied to the media outlets. Even though one would have expected

the independent media to take on a domain that was neglected by the corporate media, often because of the lack of resources in independent media outlets, their topics may follow the dictates of the corporate media, from whom they derive source quotations (Shoemaker & Reese, 1996). One explanation for the lack of coverage about mental health effects is that these effects are more widespread in victims below the poverty line than in victims of higher socio-economic class (Drescher, Schulenberg, & Smith, 2014). Thus, both independent media and corporate media may be demonstrating their bias toward their likely higher socio-economic classes of audience members. Both the physical and the psychosocial effects of the Gulf disaster are sure to be greater for people with fewer economic resources and from lower socio-economic groups. These people are less able to leave the disaster area and more likely to need to be employed as cleanup workers, because they cannot afford the loss of income resulting from the closing of their fisheries or area businesses. The overall lack of coverage of one of the well known and well documented public health issues (mental health effects) stemming from the disaster could indicate that the domains in news stories are not always reflective of the issues affecting the public at large and especially of the less privileged public in either type of media outlet. Mental health may indeed be an area that is generally neglected in the media. More research might elucidate why that is the case, given over one in four Americans suffer from mental health disorders (NIMH, 2014) in any given year

Like the emerging health effects, possible health risks were not widely discussed within the media coverage of the Gulf spill. With the spraying of dispersants that were known to be toxic to wildlife and humans, and with the numerous chemical constituents of crude oil known to be carcinogenic, mutagenic, immunotoxic, neurotoxic, and endocrine disrupting (Barron, 2012; Hewitt & Servos, 2001; Solomon & Janssen, 2010), it is questionable as to why media outlets

would not devote more space to discussing the numerous health risks to exposed individuals. Dr. Michael Skinner, one of the scholars on the forefront of epigenetics research (Kaiser, 2014) commented that he would expect to see epigenetic impacts in individuals exposed to chemicals from the Gulf oil spill (Graedon & Graedon, 2014). Independent media did have significantly more stories about potential health risks, but these still amounted to less than 10% of stories. Given the numerous issues with risk assessment, particularly the emerging information about non-monotonic effects, sublethal effects, and epigenetic effects, it seems that the media are behind the science in reporting on potential health effects.

But this may be explained in part by the conservatism of science, especially when communicating risk (Brysse, Oreskes, O'Reilly, & Oppenheimer, 2013; Freudenburg & Muselli, 2010) and its preference for Type II statistical errors (Edelstein, 2004; Marshall & Picou, 2008). As Dale Sandler, the director of the National Institutes for Environmental Health Sciences (NIEHS), explained to reporters at a conference in early 2014, residents' fear of health effects from the spill were inflated part because of media reports (Alexander-Block, 2014). Yet this study demonstrates that, given the scientific information, media reports were not at all overstating health risks; if anything, both corporate and independent media devoted very little coverage to potential risks. Moreover, the NIEHS has yet to generate any research studies about the health consequences of the Gulf spill. So, while independent media did cover health risks significantly more than corporate media, the overall lack of health risk domains, particularly in corporate media, may be in part a function of some sector of scientists (perhaps those tied to government) who paint citizens as alarmists and the media as fear-mongers. In addition, the lack of coverage may be again caused by the fact that those most likely to suffer from emerging health issues are of lower socio-economic status. The media propaganda model would predict

that corporate media would not want to imperil their ties to government officials as well as corporate interests and thus would follow the lead of these scientists in not reporting health risks. Moreover, the model would predict that the narrative in the corporate media would reflect elite perspectives, so the issues affecting those less privileged would not be prominent.

The one other health domain that was examined was long-term health effects. Although scholars like Diaz (2010) spoke of chronic health outcomes from the exposure to crude oil and/or dispersants, media stories rarely mentioned long-term effects such as cancer and other chronic diseases. One explanation could simply be that, since these effects will take decades or more to emerge, they were not part of the story at that time. Along the same lines, these long-term effects could be thought of more as risks at this point in the story. Thus, while this was a potentially interesting variable to consider, it did not generate any meaningful results.

In examining the coverage of health domains overall – including physical health effects, mental health effects, and health risks – independent media devoted 20% ($n = 59$) of their stories to health, while corporate media only discussed health in 4.3% ($n = 13$) of stories. This significant difference is certainly worth noting. As Brown (P. Brown, 2007) and colleagues (P. Brown & Kirwan Kelley, 2000; P. Brown, et al., 2006) have shown, when illness arises from toxic exposures, often physicians are not well aware of the symptoms or causes. The media play an important role in alerting both the public and medical health professionals about real and potential health outcomes from exposure to toxics, such as from a disaster like the Gulf oil spill. Thus, the news media can be essential in assisting with public knowledge of toxic exposures both during current crises, and for the preparation for and/or prevention of health impacts in future disasters. The independent media served more of this function in the Gulf disaster. Not unexpectedly, the corporate media did not service the public in terms of health awareness.

As far as the media coverage of risk domains, these were already discussed previously, as the risk domain was delineated as part of environmental risks and health risks. Nonetheless, it is worth noting that, overall, independent media had more than twice as many stories pertaining to risks ($n = 83$, 28% of stories) as did corporate media ($n = 41$, 14% of stories). Again, this outcome was predicted by the media propaganda model as corporate media are likely to downplay all risks from the oil disaster so as not to upset the industry interests who serve and collaborate with the media outlets themselves. Indeed, the large public relations and advertisement campaign by BP within numerous corporate media outlets speaks to their collusion. Whereas the independent media outlets have no stake in preserving the oil industry and only have a stake in serving the public, they were apt to identify relevant risks from the oil disaster. To be sure, the mass media are an important source of risk communication to the public, and public risk perception is shaped by the way in which news stories cover risk (Allan, 2002; Driedger, 2007; Kasperson, et al., 1988). Consequently, public risk perception can be amplified or attenuated, depending upon how much coverage the news media dedicate to risk. It could be argued that independent media, in offering more risk coverage than corporate media, were simply amplifying risks to the public; however the bulk of the scientific literature on the Gulf and other previous oil disasters does not seem to indicate that amplification was taking place, as increasing risks and effects are still being recognized. (See previous chapters regarding documented effects of the disaster).

Economic effects of the Gulf spill received primary coverage in corporate news media, as predicted by the media propaganda model. The model proposes that news is filtered through the dominant capitalistic ideology, which would favor economic effects over environment or health effects. Not surprisingly, not only did corporate media contain significantly more stories with

economic domains ($n = 90$, 30% of stories) than did independent media ($n = 54$, 18% of stories), but corporate media also had significantly more stories about economic effects than about health or environmental effects. One might suppose that these economic stories served the public good because they conveyed the economic plight of the struggling fisherman of the region, but fewer than half of the economic stories in the corporate media were about fisheries or fisherman ($n = 43$), and the number of stories about fisheries was not significantly different between corporate and independent media. Thus, it would seem that corporate media allocated the majority of its economic stories to larger economic effects, such as those pertaining to BP or other corporate interests. This result is perhaps the one that most demonstrated the media propaganda model at work. Since the Gulf disaster was undoubtedly one of the worst environmental catastrophes in the history of the United States, it is telling that corporate media considered it more of an economic rather than an environmental story, whereas independent media did not differ significantly in their apportioning of stories between environmental or economic domains.

Both scientific uncertainty and environmental justice did not differ significantly in relation to the number of stories that corporate or independent media outlets dedicated to these domains. Scientific uncertainty was certainly involved in the assessment of environmental and public health risks, but because scientific uncertainty can be used as a rhetorical tool to different ends by different actors, it is difficult to predict how or why one media outlet might utilize this tool more than another without further context. For this reason, it was important to examine exactly how uncertainty was framed by the different media outlets. What became apparent through the qualitative analysis is that the corporate media framed uncertainty in terms of doubts about whether the oil spill caused or would cause various environmental and human health effects, while the independent media outlets framed uncertainty in terms of experts being unsure

about how widespread and deep the environmental and health effects would be. These are vastly differently ways of presenting uncertainty information.

According to the media propaganda model, one would have expected independent media outlets to devote more stories to environmental justice issues; however, environmental justice issues concern some of the most marginalized members of society. Thus, while it is not surprising that corporate media did not devote time to the topic, independent media outlets also failed to focus on this, indicating that they may still be far from serving the entire realm of the public. Corporate media outlets may indeed serve the more elite members of society, but independent media outlets, while purportedly serving the public good, may also be neglecting some of the less visible segments of society.

Nevertheless, like the scientific uncertainty domain, the difference in coverage of environmental justice may be more nuanced than it appears quantitatively. In terms of the framing of environmental justice, the corporate media focused on monetary losses and loss of freedom (very capitalistic notions) to only one vulnerable community, Vietnamese immigrants, while the independent media mentioned a number of vulnerable communities and framed environmental justice as an environmental and health threat to not only to vulnerable, traditional populations in the Gulf region but also to all populations of the planet. So while there were very few environmental justice stories overall in all types of media outlets, independent media outlets framed the stories they carried much differently than did corporate media outlets.

As for the use of sources in news stories, it is difficult to give meaning to the patterns found. Independent news media outlets often utilized the same quotations from government and company officials as did the corporate news outlets, perhaps partially just a product of the nature of this particular story. Officials from the federal government and from BP spent a great deal of

time providing information to the news media, as they were sometimes the only sources of information for the public at all. Government, expert, and advocate sources appeared in roughly equivalent numbers of stories between independent and corporate media outlets. Though there were significantly more corporate sources used by corporate media, as the media propaganda model would assume, there were also significantly more citizen sources in the corporate media stories, contrary to what the model would predict. This could be, in part, simply a function of the lack of resources of most independent media outlets, which do not have the ability to either fly to other locales to meet sources or to have sources fly in to meet them. While corporate media outlets stationed correspondents reporting in the Gulf area for long periods of time, independent media outlets often could only interview citizen source via phone or internet, which might have rendered citizen witnesses less accessible to them. In any case, the data do not suggest that sources played a mediating role in determining the domains used by independent or corporate media stories, given that the number of types of sources used did not follow the theoretical model. Furthermore, there may be some limitations in the manner in which sources were defined and delineated (see the section below on study limitations). But more importantly, through the qualitative analysis, one could see the differences not in the quantity of sources but in what the sources were allowed to say and what privilege they received in the media. The independent media outlets, while quoting official government, corporate, and expert sources, often critically questioned their comments and did not take them at face value. By contrast, corporate media outlets employed comments from officials as stated, without question. In addition, independent media outlets allowed citizens to speak about environmental and health effects, while corporate media outlets were more likely to only privilege expert opinions on such issues and, when quoting citizens, emphasized citizens' personal feelings or their economic hardships but not their

speculation on issues for which they had no obvious expertise. Again, this qualitative difference demonstrates how the different types media outlets approached their stories from different perspectives – the corporate media favoring a more elite perspective while some of the independent media stories enabled a citizen perspective.

Summary

The media propaganda model contends that, because of internalized assumptions and practices established within standard news media institutions, the resulting news favors elite perspectives and thus promulgates a propagandized version of events. The model contends that five filters – ownership, advertising, sources, flak, and dominant ideology - serve to generate this specific version of the news ("Crude Awakening," 2014; Herman, 1996, 2000; Herman & Chomsky, 1988). This study examined whether evidence existed for the media propaganda model in the reporting on the Deepwater Horizon Gulf oil spill of 2010. By exploring the domains and frames utilized by in stories about the Gulf disaster, the study found some support to suggest that the propaganda model could account for differences in stories presented to the public by corporate media versus independent media outlets.

Differences in ownership and advertising characterized the two types of media outlets examined. Corporate media and the independent media outlets seemingly reported on many similar events and domains within the larger story about the Gulf oil disaster. They sometimes used the same sources and brought to light the same issues, but they differed quantitatively in how often they wrote about certain domains of interest. Furthermore, it was in how they thematically framed those issues that the overarching differences in tone could be seen.

In accordance with the media propaganda model, corporate media outlets framed economic effects as more substantial than environmental and health effects and risks, the latter of

which they tended to minimize. This thematic framing coincided with the overall favoring of stories with economic domains rather than with environmental or health domains in the corporate media. Independent media, in contrast, offered more stories with environmental and human health domains and risk domains than did corporate media. Goss (2013, p. 23) noted that “with respect to media content, it [corporate-owned media] is also more likely to channel the elitism and consumerist celebration of the neoliberal zeitgeist.” Indeed, the results here demonstrate that the neoliberal agenda of maintaining the economic interests of petroleum corporations seemed to be more prevalent in the coverage by the corporate media based upon the domains and frames used by these media outlets. The relative minimization of health and environmental risks and effects in the corporate media versus the independent media further signifies this slant. Consequently, if the media propaganda model can explain these correlations, it is possible that the first two filters of the media propaganda model, ownership and advertising, might have been factors in influencing how media outlets treated the unfolding story of the Gulf disaster.

In terms of the third filter of the media propaganda model, sources utilized in the media, there was not a great deal of support for the hypothesis that corporate media would use more governmental and corporate sources and fewer advocate and citizen sources than independent media outlets; however, the media outlets as a whole favored government sources (in 57% of stories in both corporate and independent media) and corporate sources (in 47% of stories in corporate media, 37% of stories in independent media) over advocate sources (in 14% of stories in corporate media, 17% of stories in independent media). The prevalence of government and other official sources in media reports about environmental risks is demonstrated in other research as well (i.e., Sandman, 1994). The source figures can be somewhat misleading, however, given the circumstances of the story. All media outlets often relied on information from

government and BP about exactly what was occurring day to day with the leaking oil well, because no one else had first hand access to the technical details about the leak. So, when simply describing the day-to-day situation and updates about the leak, government and corporate sources were mainly quoted. Quotations from these official were easily accessible to all media outlets big and small, and were a point from which to generate topics for stories.

What might be more important to note was not how many times a certain type of source was quoted in the media, but rather *what* that source was able to express and/or *how* that information was conveyed. First, it was surprising that corporate media used considerably more citizen sources than independent media, but often citizens were limited in what they had to say. Usually, the quotations from citizens had to do with the effects on their economic livelihoods and their loss of means of employment. Rarely if ever did citizens comment on environmental or human health risks and effects. In contrast, as exemplified in what was discovered through the qualitative analysis, independent media outlets presented long-winded quotations from citizens about environmental and health risks and effects. Citizens were able to pontificate about numerous issues and experiences pertaining to health and safety and the environment in the independent media outlets, particularly ProPublica and Democracy Now. Thus, local knowledge and situated knowledge (Allen, 2003; Corburn, 2002) were given legitimacy and treated as viable measures of risk assessment in independent media. Furthermore, while independent media outlets might have used the same quotation from the same source as corporate media outlets, their framing of those quotations differed. Independent media outlets often used official quotations as a reference from which to challenge and counter the assertions by authorities in power. (See pp. 175-178 for examples of challenges to official statements.) Corporate media outlets, in line with the media propaganda model, rarely contested the official word. As Herman

and Chomsky (1988, p. 14) stated, “Information obtained from bureaucracies is further advantaged as ‘presumptively accurate’ and without the demands for explanation...”

Consequently, independent media outlets generally used citizen perspectives as a foundation for their reporting, and their reporting was aligned more with the experiences of citizens (see citizen perspectives in "Crude Awakening," 2014), whereas corporate media outlets structured their stories from the perspectives of those in power, much as previous research corroborates (Shoemaker & Reese, 1996).

With regard to flak, this phenomenon was not evidenced in independent media, but some evidence for it could be identified in corporate media. The media propaganda model describes flak as emanating from interests groups that seeks to discipline the media for their questioning of official narrative (1988, p. 2). Shoemaker and Reese also identified flak in describing how elites will form a united front and respond to media as a class when their core principles are threatened (Shoemaker & Reese, 1996). Just as described, the flak that could easily be found in the corporate media did reiterate the importance of the oil industry, justified the responsibility undertaken by the government, and minimized the environmental impact of the disaster.

The dominant capitalistic ideological filter through which the corporate media framed their news could be seen via numerous results. The favoring of economy over ecology in the number of stories containing those domains corresponded to this filter. In addition, the framing of an imminent and profound threat to industry and economy versus encouraging news about environmental and health effects in the corporate media also pointed to this dominant ideological filter. By contrast, the independent media framed the industry as in need of tremendous oversight and regulation (even banning of drilling), while it highlighting the potential risks to health and environment.

It could be said that, in reporting on the environment and health, the corporate media erred on the side of optimism, while independent media erred on the side of precaution. This narrative perspective coincides with the societal and governmental biases found by Gareau (2014) who looked at the Montreal Protocol, which worked in the 1980s to regulate emissions to combat the hole in the ozone layer. Gareau suggested that the protocol was enacted at a time when the United States utilized precaution in its regulatory regime, while 21st century regulatory obstacles with regard to the environment stem in part from the fact that regulation is now based on the profit model (favoring regulations that best maximize profit) rather than on the precautionary principle. Similarly, it seems that corporate media framing of environmental and health issues is also based on the profit model, favoring economic repercussions over environmental and health effects.

By contrast, independent media framing was based on the precautionary principle and favored making Type I errors in terms reporting on environment and health risks and effects. And while the bias of precaution can be deemed alarmist, two comprehensive reports from the European Environment Agency show that a substantial number of historical environmental and public health harms could have been prevented if precaution had been heeded earlier, rather than waiting for overwhelming scientific evidence to finally mount (Harremoes et al., 2013; Harremoës, Gee, & Vaz, 2001). In addition, research has shown a conservatism in science when reporting risk (Brysse, et al., 2013; Freudenburg & Muselli, 2010), so journalists who report only on established scientific evidence about potential risks could be biasing their stories by downplaying risks, and journalists who stress uncertain risks could be acting in greater service to the public interest. In fact, in a recent presentation at the Scripps Institution of Oceanography, Dr. David Victor (2014) asserted that the media should talk less about the scientific consensus on

climate change and more about the potential disastrous effects – the low probability (or low consensus) but high consequence outcomes. In other words, the media should be focusing on precaution. In providing a service to society and its citizens, then, the news media might be advised to err on the side of precaution according to Victor, rather than reflecting only on established consensus. The suggestion by Victor and by the European Environment Agency may counter the current norm of journalism, in which speculation may be frowned upon; however, this tendency displayed by the current normative structure of journalism is merely a value. The value aligns with favoring the error of not reporting about a potential and uncertain risk even if the risk may turn out to be true over the error of reporting about a potential and uncertain risk that may turn out to be false. This is merely a value of conservatism over precaution when it comes to reporting on health and ecological risks. The narrative perspective of precaution was more common in the independent media stories on the Gulf oil disaster than in the corporate media stories.

Limitations and Future work

Because there is little precedent for research on independent media outlets, there are some limitations inherent in this study. Foremost among the limitations is that independent media outlets that produce their own news content and have their own journalistic teams are difficult to find. Many independent outlets do not report news but mainly provide commentary on the news reported and gathered by others. After finding viable independent media outlets, being able to access their stories was the second major limitation. Corporate broadcast media transcripts and newspaper archives are easily accessible and searchable via databases such as Lexis-Nexis, which is why they are so commonly used as sample sets. Independent media stories do not exist in formal databases, so finding archives of independent media stories was difficult in

and of itself. Consequently, some media outlets that might have generated good data could not be accessed at all. The independent media outlets utilized in this study did have their own archives of stories, but sorting and organizing the sample from their own databases was tedious and less systematized when using Lexis-Nexis.

The independent broadcast news stories used in this study came from Democracy Now. Unlike the format of NBC Nightly News (the corporate broadcast used in the study) wherein short-medium length news stories make up the bulk of the program after the introduction, Democracy Now begins its programs with a dozen of more very short news briefs, then goes highly in-depth for one of two news stories that comprise the remaining 85-90% of the broadcast. Consequently, when quantitatively comparing news stories, many of the stories from Democracy Now that only consisted of second-long news brief generated less data than the comparable stories from NBC. However, the long-form stories from Democracy Now may have generated more data, and offered much more qualitative information for analysis, because of their depth.

The *Christian Science Monitor* and the *Guardian* were chosen as representatives of independent media because of their lack of reliance on corporate funding. A few limitations came from their use in this study, though. First, the *Guardian* does accept advertisements in its print form in the UK, although it is not beholden to advertisers in any way because it is wholly funded by a trust. Nevertheless, even the voluntary use of advertising could compromise its independence and influence media content. Second, because the *Guardian* is from the UK, it could frame stories sympathetic to BP due to a nationalistic allegiance, though there was little evidence of such slant. Finally, both the *Guardian* and the *Christian Science Monitor* follow similar structural formats to that of other corporate news media. Their adherence to parallel formulae is useful for comparison, but could be a result of these news organizations emulating

the more powerful and dominant media establishments (such as the New York Times), who set the agenda for the less powerful media (Shoemaker & Reese, 1996). Though the *Guardian* and the *Christian Science Monitor* did not seem to follow the dictates of more powerful media organizations, they did not deeply challenge official establishment and persons of power as readily as ProPublica and Democracy Now. But there may be something less quantifiable than ownership and advertising – perhaps the inherent personal values of prestige, elitism, or other specific values within the news organization – that affect framing of news. This makes choosing truly independent news outlets for studies particularly difficult.

The resources available to corporate media outlets as opposed to independent media outlets could have been another confounding variable. Corporate entities generally have a larger pool of monetary resources, so they may have more access to the story. In addition, they generally have a larger pool of specialty journalists like science, health, or environmental reporters, who may enable that news outlet to cover certain topics (domains) related to the oil spill more than other outlets do. Nonetheless, given the results of both the quantitative and qualitative analysis, it appears that special environmental or public health bureaus in corporate media outlets did result in a skewing of their coverage of environmental and health issues, i.e., they did not cover these domains more than independent media outlets. If anything, the lack of special resources for these areas of reporting in independent media further corroborate the results that independent media, even given their limited resources, cover these domains that are of particular interest to the public more than corporate media.

Defining and quantifying the sources used in news stories was yet another limitation of this study. First, sources were given relatively general categories, partially in order to achieve inter-coder reliability. However, it would have been more illuminating to parse out the sources

quoted in the stories more. For example, the category of “ independent experts” included independent scientists, as well as other people considered to have expertise in a particular field. Given that different experts carry their own particular biases, the generalized “expert” category does not provide enough information. It would have been good to uncover if more environmental toxicologists were quoted about risks, or if chemists and geologists were used as sources to assess environmental risks. It is known that the expert quoted in news reports is not necessarily one who has an expertise in the field of inquiry for the story (Stocking & Holstein, 1993). This incorrect use of expert opinions has implications for communication, so I would try to differentiate sources more in future studies. Second, some sources used were difficult to categorize. The nonpartisan mediator assigned to handle the Gulf spill compensation fund, Kenneth Feinberg, was coded as an independent expert, because he has been characterized by all accounts as an independent mediator. However, Feinberg is also being financially compensated by BP, so it may have been more accurate to code him as a BP employee (i.e., “corporate source”). Given the frequency with which Feinberg was quoted, a re-categorizing of him alone would have changed sourcing patterns.

Second, the total number of sources was not counted; what was counted was the number of times a particular type of source appeared in a story. Thus, if six government sources and one citizen source appeared in a story, the story would be coded as having source representation from the government and citizen categories, each singularly. As it was, it seems the source categories used were not definitive enough to garner meaningful results. Thus, I would alter source codes in future work to see if more rigorous data could provide more robust results.

As a whole, the methodology of content analysis comes with limitations itself. One limitation of content analysis of a particular issue is that the findings cannot always be

generalized to all issues, particularly with regard to the findings of the qualitative analysis. Nevertheless, the findings can point to a pattern and a theoretical framework of explanation, which may then be confirmed or invalidated by future similar research. In addition, findings may confirm previous similar research, such as media studies about the Exxon-Valdez oil spill of 1989 or the oil spill off the coast of Santa Barbara in 1969.

One of the biggest of the limitations of content analysis is that it cannot predict or explain the effects of media on audiences, only the actions of the media itself. But knowing how media outlets act can be insightful in and of itself. It might elucidate whether or not information is being transmitted to audiences in a fair, impartial, or otherwise valid manner. It may demonstrate if news media are acting in the interests of the public good, as per their generally recognized code of ethics. It might even uncover if information is being disseminated to audiences at all. Moreover, many of the effects of media stories cannot be studied until the messages in the stories are fully explicated.

Another of the limitations of the content analysis in this study is that it demonstrates correlations, but not necessarily causation. Though the media propaganda model is consistent with these correlations, other theoretical models may fit the same patterns. Further studies, if they find similar associations, could help to point more to causation based upon a common theoretical framework.

Conclusion

The media play a significant role in communicating science, environmental, and health information to the public (NSB, 2010, 2014) in addition to conveying information about risk (MacKendrick, 2010). Yet, institutional practices in corporate news media can bias reporting on critical environmental and public health issues. As Bennett (1996, p. 182) explained, “Important

biases in the news occur not when journalists abandon not when journalists abandon their professional standards, but when they cling most responsibly to them,” resulting in an “establishment slant.” This establishment slant is exactly what the media propaganda model describes, and it can be harmful to the public’s ability to access critical information about environmental and health risks, such as those stemming from the Gulf oil disaster.

This study is one of a small number of studies, in what appears to be an emerging area of research, that compares established, corporate (mainstream) media reporting to independent (alternative) media reporting. One previous study examined the framing of climate change in two New Zealand newspapers and found few differences (Kenix, 2008). Other studies have noted differences in reporting about Occupy Wall Street (Cissel, 2012) and labor strikes (Martin, 2008) in mainstream versus alternative news outlets. Kenix (2005) found that news coverage most generally reflected the interest of upper socio-economic groups, while Rauch (2003) found that a mainstream news service favors the U.S. interests as opposed to the interests of Southern nations of the globe, which an alternative news service reports about more often. This study of the Gulf oil spill news was more comprehensive than these others in that it looked at a wide variety of corporate and independent outlets, including broadcast news outlets. In addition this study examined not only the amount of the major domains in news stories, but the thematic quality of those domains, which demonstrated not only the differences in what sub-topics received more or less coverage, but the greater difference in narrative perspectives between the corporate and independent media. Determining whether differences exist in different forms of news media is crucial to assisting the public in obtaining accurate and relevant information about health and environmental information that affects their lives.

Much as Molotoch (1970, p. 140) found in the news coverage of the 1969 oil spill in the Santa Barbara Channel, the coverage of the Gulf oil spill by the corporate media was “inadequate in its quality and quantity to adequately inform the American public.” The results here indicate that independent news media outlets, as a whole, may have served a more important role of informing publics about the news of particular value to those publics. The corporate media, in line with the media propaganda model, tended to favor the values of those in power. In writing more about the issues of interest to those in power – such as the economic interests of the oil industry – the news media relinquished their role as a the fourth estate and purveyor of information for the citizenry.

As technological environmental disasters such as the Gulf oil spill become more and more prevalent, it is imperative that the public be aware of the real and potential effects that may arise from such disasters. By knowing about potential environmental and health hazards from similar catastrophes, citizens may better prepare to prevent or mitigate the impacts. The news media play a vital role in disseminating this information to the public, but, as this study illustrates, what the public learn may be influenced by what media outlets they follow. More studies examining the content of different types of media outlets are necessary to corroborate the provisional results of this research. If independent media do tend to favor the non-elite perspectives on science and environmental issues, exposure to these alternate perspectives may enlighten certain member of the elite, who have never heard these stories framed in such a manner and who may have never considered viewpoints dissimilar to their own. Furthermore, if the corporate media do indeed follow the tenets of the media propaganda model in news reporting, it could have implications for society as a whole. If the corporate media organizations that so many citizens rely on for information about science and health issues do frame these

topics from a different perspective than independent media, this may result in a less informed populace about issues of consequence to their lives. Therefore, it is important for researchers and the general public alike to know whether or not science and environmental concerns are treated similarly in independent and corporate media outlets, and then it is important for citizens to know that they may have more options for obtaining information about science and the environment.

In an ever-changing landscape of media, where newspapers, television stations, and even internet sites are undergoing consolidation, the propaganda model becomes an ever more important theory with which to describe media content. In addition, as catastrophic environmental events such as the Gulf Oil spill and the meltdown at Fukushima become more prevalent and as the effects of climate change and environmental pollution increasingly become global threats to planetary sustainability, the consolidation and ownership of media by stakeholders whose corporate affiliates are involved in the causes of these environmental issues emerge as a great concern to public citizens seeking information. This study provides important information about how different news media treat environmental and public health issues. It could offer a prescriptive solution to citizens who wish to find media outlets that offer science and health information of value to them, rather than to the global elite. It also offers a normative approach, grounded in the precautionary principle, which all news media might consider when reporting on environmental and health issues. By favoring a precautionary perspective with regard to environment and health, news media may better occupy their role as a fourth estate, as a check for the powerful and a guardian of the public.

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Appendices

Appendix A Inter-coder Reliability

ENV EFFECTS		Reliability 1.csv	EFFECTS ON FISHERIES		Reliability 2a.csv
filesize		420 bytes	filesize		420 bytes
n coders		3	n coders		3
n cases		60	n cases		60
n decisions		180	n decisions		180
average pairwise percent agreement		90%	average pairwise percent agreement		94.44%
pairwise agreement cols 1 & 3		0.916666667	pairwise agreement cols 1 & 3		0.916667
pairwise agreement cols 1 & 2		0.933333333	pairwise agreement cols 1 & 2		0.983333
pairwise agreement cols 2 & 3		0.85	pairwise agreement cols 2 & 3		0.933333
fleiss' kappa		0.750769231	fleiss' kappa		0.83321
FK observed agreement		0.9	FK observed agreement		0.944444
FK expected agreement		0.598765432	FK expected agreement		0.666914
average pairwise cohen's kappa		0.754074074	average pairwise cohen's kappa		0.833523
pairwise CK cols 1 & 3		0.8	pairwise CK cols 1 & 3		0.747475
pairwise CK cols 1 & 2		0.822222222	pairwise CK cols 1 & 2		0.949495
pairwise CK cols 2 & 3		0.64	pairwise CK cols 2 & 3		0.803601
krippendorff's alpha		0.752153846	krippendorff's alpha		0.834136
Î£cocc		162	Î£cocc		170
Î£cnc(nc - 1)		19220	Î£cnc(nc - 1)		21428
ECONOMIC EFFECTS		Reliability 2.csv	HEALTH EFFECTS		Reliability 5.csv
filesize		420 bytes	filesize		420 bytes
n coders		3	n coders		3
n cases		60	n cases		60
n decisions		180	n decisions		180
average pairwise percent agreement		87.78%	average pairwise percent agreement		95.56%
pairwise agreement cols 1 & 3		0.866666667	pairwise agreement cols 1 & 3		0.933333
pairwise agreement cols 1 & 2		0.833333333	pairwise agreement cols 1 & 2		0.983333
pairwise agreement cols 2 & 3		0.933333333	pairwise agreement cols 2 & 3		0.95
fleiss' kappa		0.702524038	fleiss' kappa		0.767216
FK observed agreement		0.877777778	FK observed agreement		0.955556
FK expected agreement		0.589135802	FK expected agreement		0.809074
average pairwise cohen's kappa		0.703790441	average pairwise cohen's kappa		0.774626
pairwise CK cols 1 & 3		0.672131148	pairwise CK cols 1 & 3		0.661972
pairwise CK cols 1 & 2		0.603174603	pairwise CK cols 1 & 2		0.9
pairwise CK cols 2 & 3		0.836065574	pairwise CK cols 2 & 3		0.761905
krippendorff's alpha		0.704176683	krippendorff's alpha		0.76851
Î£cocc		158	Î£cocc		172
Î£cnc(nc - 1)		18908			
Î£cnc(nc - 1)		26034			

HEALTH EFFECTS TIME FRAME		ENVIRONMENTAL RISKS	
	Reliability		Reliability
	6.csv		12-4.csv
	420		420
	bytes		bytes
filesize		filesize	
n coders	3	n coders	3
n cases	60	n cases	60
n decisions	180	n decisions	180
average pairwise percent agreement	98.89%	average pairwise percent agreement	90%
pairwise agreement cols 1 & 3	1	pairwise agreement cols 1 & 3	0.916667
pairwise agreement cols 1 & 2	0.983333	pairwise agreement cols 1 & 2	0.883333
pairwise agreement cols 2 & 3	0.983333	pairwise agreement cols 2 & 3	0.9
fleiss' kappa	0.795687	fleiss' kappa	0.699778
FK observed agreement	0.988889	FK observed agreement	0.9
FK expected agreement	0.945617	FK expected agreement	0.666914
average pairwise cohen's kappa	0.774011	average pairwise cohen's kappa	0.700656
pairwise CK cols 1 & 3	1	pairwise CK cols 1 & 3	0.748322
pairwise CK cols 1 & 2	0.661017	pairwise CK cols 1 & 2	0.665605
pairwise CK cols 2 & 3	0.661017	pairwise CK cols 2 & 3	0.688042
krippendorff's alpha	0.796822	krippendorff's alpha	0.701446
$\hat{E}cocc$	178	$\hat{E}cocc$	162
$\hat{E}cnc(nc - 1)$	30458	$\hat{E}cnc(nc - 1)$	21428

REFERENCE TO EXXON VALDEZ		HEALTH RISKS	
	Reliability		Reliability
	11.csv		12-5.csv
	420		420
	bytes		bytes
filesize		filesize	
n coders	3	n coders	3
n cases	60	n cases	60
n decisions	180	n decisions	180
average pairwise percent agreement	87.78%	average pairwise percent agreement	98.89%
pairwise agreement cols 1 & 3	0.85	pairwise agreement cols 1 & 3	1
pairwise agreement cols 1 & 2	0.9	pairwise agreement cols 1 & 2	0.983333
pairwise agreement cols 2 & 3	0.883333	pairwise agreement cols 2 & 3	0.983333
fleiss' kappa	0.733297	fleiss' kappa	0.917089
FK observed agreement	0.877778	FK observed agreement	0.988889
FK expected agreement	0.541728	FK expected agreement	0.865988
average pairwise cohen's kappa	0.73332	average pairwise cohen's kappa	0.92
pairwise CK cols 1 & 3	0.667488	pairwise CK cols 1 & 3	1
pairwise CK cols 1 & 2	0.781288	pairwise CK cols 1 & 2	0.88
pairwise CK cols 2 & 3	0.751185	pairwise CK cols 2 & 3	0.88
krippendorff's alpha	0.734779	krippendorff's alpha	0.91755
$\hat{E}cocc$	158	$\hat{E}cocc$	178
$\hat{E}cnc(nc - 1)$	17372	$\hat{E}cnc(nc - 1)$	27878

SCIENTIFIC UNCERTAINTY	Reliability 13.csv 420 bytes	EXPOSURE NOT RESPONSIBLE FOR HEALTH EFFECTS	Reliability 20.csv 420 bytes
filesize		filesize	
n coders	3	n coders	3
n cases	60	n cases	60
n decisions	180	n decisions	180
average pairwise percent agreement	87.78%	average pairwise percent agreement	98.89%
pairwise agreement cols 1 & 3	0.933333	pairwise agreement cols 1 & 3	0.983333
pairwise agreement cols 1 & 2	0.85	pairwise agreement cols 1 & 2	0.983333
pairwise agreement cols 2 & 3	0.85	pairwise agreement cols 2 & 3	1
fleiss' kappa	0.691541	fleiss' kappa	0.794286
FK observed agreement	0.877778	FK observed agreement	0.988889
FK expected agreement	0.603765	FK expected agreement	0.945988
average pairwise cohen's kappa	0.68992	average pairwise cohen's kappa	0.772727
pairwise CK cols 1 & 3	0.836066	pairwise CK cols 1 & 3	0.659091
pairwise CK cols 1 & 2	0.608696	pairwise CK cols 1 & 2	0.659091
pairwise CK cols 2 & 3	0.625	pairwise CK cols 2 & 3	1
krippendorff's alpha	0.693254	krippendorff's alpha	0.795429
$\hat{E}cocc$	158	$\hat{E}cocc$	178
$\hat{E}cnc(nc - 1)$	19382	$\hat{E}cnc(nc - 1)$	30470

SCOPE OF UNCERTAINTY	Reliability 17.csv 420 bytes	SAFE LEVELS OF TOXICANT	Reliability 21.csv 420 bytes
filesize		filesize	
n coders	3	n coders	3
n cases	60	n cases	60
n decisions	180	n decisions	180
average pairwise percent agreement	100%	average pairwise percent agreement	100%
pairwise agreement cols 1 & 3	1	pairwise agreement cols 1 & 3	1
pairwise agreement cols 1 & 2	1	pairwise agreement cols 1 & 2	1
pairwise agreement cols 2 & 3	1	pairwise agreement cols 2 & 3	1
fleiss' kappa	1	fleiss' kappa	1
FK observed agreement	1	FK observed agreement	1
FK expected agreement	0.967222	FK expected agreement	0.935556
average pairwise cohen's kappa	1	average pairwise cohen's kappa	1
pairwise CK cols 1 & 3	1	pairwise CK cols 1 & 3	1
pairwise CK cols 1 & 2	1	pairwise CK cols 1 & 2	1
pairwise CK cols 2 & 3	1	pairwise CK cols 2 & 3	1
krippendorff's alpha	1	krippendorff's alpha	1
$\hat{E}cocc$	180	$\hat{E}cocc$	180
$\hat{E}cnc(nc - 1)$	31158	$\hat{E}cnc(nc - 1)$	30132

QUESTION VALIDITY OF EXPOSURE/SAFE LEVELS	Reliability 22.csv 420 bytes	ENVIRONMENTAL JUSTICE	Reliability 28.csv 420 bytes
filesize		filesize	
n coders	3	n coders	3
n cases	60	n cases	60
n decisions	180	n decisions	180
average pairwise percent agreement	98.89%	average pairwise percent agreement	100%
pairwise agreement cols 1 & 3	1	pairwise agreement cols 1 & 3	1
pairwise agreement cols 1 & 2	0.983333	pairwise agreement cols 1 & 2	1
pairwise agreement cols 2 & 3	0.983333	pairwise agreement cols 2 & 3	1
fleiss' kappa	0.851363	fleiss' kappa	1
FK observed agreement	0.988889	FK observed agreement	1
FK expected agreement	0.925247	FK expected agreement	0.967222
average pairwise cohen's kappa	0.861111	average pairwise cohen's kappa	1
pairwise CK cols 1 & 3	1	pairwise CK cols 1 & 3	1
pairwise CK cols 1 & 2	0.791667	pairwise CK cols 1 & 2	1
pairwise CK cols 2 & 3	0.791667	pairwise CK cols 2 & 3	1
krippendorff's alpha	0.852188	krippendorff's alpha	1
Î£cocc	178	Î£cocc	180
Î£cnc(nc - 1)	29798	Î£cnc(nc - 1)	31158

SOURCES	Source coding.csv
filesize	1260 bytes
n columns	10
n variables	5
n coders per var	2

	Percent Agreement	Scott's Pi	Cohen's Kappa	Krippendorff's Alpha	N Agreements	N Disagreements	N Cases	N Decisions
Variable 1 (cols 1 & 2)	95	0.893333	0.893617	0.894222	57	3	60	120
Variable 2 (cols 3 & 4)	91.66667	0.833287	0.833703	0.834676	55	5	60	120
Variable 3 (cols 5 & 6)	86.66667	0.728507	0.731243	0.730769	52	8	60	120
Variable 4 (cols 7 & 8)	95	0.838637	0.83871	0.839982	57	3	60	120
Variable 5 (cols 9 & 10)	96.66667	0.920635	0.920635	0.921296	58	2	60	120

Appendix B
Final Codebook

Final Codebook for Gulf Oil Spill Content Analysis

Name of news outlet:

Date of story:

Author (if print/online):

Domains

Ecology and Economy

1. Does the story mention environmental or ecological effects of the oil spill?

(0) Not present

(1) Present

2. Does the story mention economic impacts of the oil spill (including impacts to local fishermen, fisheries, small businesspeople, etc.)?

(0) Not present

(1) Present

3. Does the story mention the effect of the oil spill on fisheries or the livelihood of fisherman?

(0) Not present

(1) Present

Health

4. Does the story mention human health effects from the Gulf Oil Spill.?

If so, which types of health effects are mentioned?

(0) Not present

(1) Physical

(2) Psychological

(3) Both

5. Does the story speak of the potential time frame of human health effects presenting themselves?

If so, which time frame(s) is/are mentioned?

(0) Not present

(1) Short-term

(2) Long-term

(3) Both

Episodic/Thematic

6. Is the Exxon Valdez or any other previous oil disaster mentioned in the story?

(0) Not present

(1) Present

Risk and Uncertainty

7. Does the story mention any of the following risks relating to the Gulf Oil Spill?

If so, what kind(s) of risk(s) is/are mentioned? (Choose all that apply)

- (0) Not present
- (1) Risk to environment or ecosystem (including organisms other than humans)
- (2) Risk to human health (physical health)

8. Does the story express scientific uncertainty?

- (0) Not present
- (1) Present

9. Which best describes how uncertainty is presented about the scope of potential health effects of the oil spill?

- (0) Not present
- (1) The human health effects seem to be minimal (and will likely remain so).
- (2) The human health effects are large and/or will likely become large and vast

“Four Dog Defense”

10. Does the story indicate that people may have been exposed to the substance(s) emitted and/or used for clean-up during the Gulf Oil Spill, but that this/these substance(s) are not responsible for the health effects seen?

- (0) Not present
- (1) Present

11. Does the story mention that the substance(s) emitted by and/or used for clean-up during the Gulf Oil Spill exist/existed at safe or acceptable levels?

- (0) Not present
- (1) Present

12. If any of the above (24-27) were present, did the story question the validity of those assertions?

- (0) Not present
- (1) Present

Environmental Justice

13. Does the story indicate that any groups of people may be more vulnerable to the effects (economic or health) of the Gulf oil spill?

- (0) Not present
- (1) Present

Sources

14. Which of the following sources are interviewed and/or quoted in the news story? (Check all that apply)

- (0) None present
- (1) Government scientist, official, or other spokesperson from gov't (or gov't group itself)
- (2) Corporate scientist, official, or other spokesperson from corporation (or a corporation itself)
- (3) Expert, group of experts, (such as a scientist, doctor, lawyer, or professor from a university) or person with public power or influence (due to fame, wealth, prestige, and/or career) not from gov't, corporation, nor NGO/non-profit/advocacy organization. (Includes think tanks, trade associations, and industry/corporate lobbying groups.)
- (4) Anyone (scientist, "expert," or other) from a non-governmental/non-profit/advocacy organization (or an organization itself) with environmental, public health and/or social welfare interests
- (5) Any citizen or individual activist, unaffiliated with a larger organization

15. Additional notes: (Also, make note here if nuances in the story might indicate inclusion in qualitative analysis.)

Appendix C Coding Guidebook

Codebook Guide for Gulf Oil Spill Content Analysis

General Notes:

- **The topics/frames must be explicit and not implied. Ambiguous implications which are not overtly stated can be interpreted differently by different people. These will be addressed in the qualitative analysis. If you can, please make a note (in Question #30). If you feel there is an implication of some concept/topic/frame that is not overt and cannot be captured via the quantitative codebook.**
- **If more than one Op-Ed/letter to the editor about the oil spill falls under one title, all of these Op-Eds or letters to the editor will be considered one story. Likewise, if more than one news piece falls together under one title, these pieces will be considered one story.**
- **When asked to specify or explain an answer, write any and all specifications/explanations within the same box in the excel spreadsheet, each separated by a comma.**

Domains

Ecology and Economy

Environmental/Ecological effects

1) Indicate if the story talks about the harms to the greater environment around the Gulf region, to the organisms in the area, and/or to the ecosystem as a whole. The story could mention current harms or potential harms to the environment or organisms.

Examples:

- The story should not just state that the spill is an environmental disaster – as if giving it that name in the title or introduction – but then never mention a specific current or future ecological effect.
- If the story starts with some words that say “the environmental disaster in the Gulf of Mexico continues today as tourism is reeling from the impact of the oil spill,” and the proceeding story is all about the tourism, then the story does not talk about the environment, and environmental/ecological effects should be considered “not present.”
- However, if the story says that the oil spill is an environmental disaster, but the environmental effects are unimportant compared to the economic ones, and then goes on to discuss all of the economic effects, this question (#1) should be answered as “not present,” but questions #3 and #4 (below) should be answered as “present” and “economy,” respectively.

Economic effects

2) Indicate if the story mentions effects to local, national, or global economics, Wall Street, etc. The story might mention economic effects to local communities, local families, fisheries, or fisherman. It may talk about the effects on tourism – i.e., hotels, motels, restaurants, recreational activities. It may also talk about the oil and or energy industry as a whole. The

story should not just mention the oil spill as an economic disaster – as if giving it that title - but then not mention any specific reasons why.

Example:

- If the story says “The Gulf oil spill has proven to be an economic disaster for the local communities, but people in the community are now more concerned with the health of the environment,” and the rest of the story is about the environment, then this question (#2) would be answered as “not present.”

Effects on Fisheries

3) Indicate if the story mentions effects to livelihoods of fisherman in the area who may be affected.

Example:

- This could include mentions of loss of fish, inability of fisherman to fish due to the toxicity of the animals, and the need for fisherman to find other work or be compensated for their financial losses.

Health

Type of Human Health Effects

4) Indicate if health effects on humans are mentioned, including physical effects from exposure to the contaminants from the oil spill (or the contaminants in the cleanup products) and psychological distress due to displacement, loss of livelihood, physical injuries, etc. Psychological effects should not be inferred; someone in the story should mention significant/clinical (meaning medically diagnosed or having the potential in scope to be defined medically, and usually of a chronic nature) psychological stresses related to the disaster such as anxiety and depression.

Example:

- The story might state that doctors are concerned about the many complaints of lack of sleep among the residents, which could indicate that residents are demonstrating higher rates of anxiety.
- The story might quote a psychologist or scholar who says that cases of depression rise dramatically in the aftermath of disasters.
- If the story merely states that people are worried or fearful or feeling anxious, that would not indicate a health effect, as yet, and thus should be labeled, “not present.”

Time Frame of Health Effects

5) Indicate if the story mentions short term health effects and/or long-term effects from exposures to the oil, its breakdown products, and/or the dispersants used. In this case, a time frame should be explicitly mentioned, not inferred.

Examples:

- If the story merely lists some health effects that are currently being seen among residents, but does not explain whether they are short or long term, then this should be coded, “not present.”
- The story might state that cancers, neurological syndromes, and/or reproductive issues may result in the future from exposures to chemicals associated with the oil spill. This would be coded as “long term” effects.

*Episodic/Thematic***Previous Oil Spills**

6) Indicate specifically if the Exxon Valdez (1989) or previous oil disasters such as the one off the coast of Santa Barbara (1969) are mentioned in the story.

*Risk and Uncertainty***Risk**

7) Indicate any health or environmental risks mentioned. Risks, by their nature, indicate future effects. So, if the story talks about people suffering health implications presently, but does not discuss further possible future health effects, then health “risks” would not be mentioned (just present health effects). Words like “threat,” “threaten,” and “may harm” or “might harm” would indicate risk. The distinction between “livelihood” and “local economy” mainly has to do with extent.

Examples:

- A story might indicate a threat to human health in that a doctor might state that she expects an increased rate of some disease in the future.
- If the story indicates a risk to human psychological health, please put that as “other” and specify.

Uncertainty

8) The purpose of this question is to capture the possible rhetoric used by either those who do not want action and who use the guise of scientific uncertainty to delay or excuse action, or contrarily, by those who want action taken and use scientific uncertainty to promote precaution or to demonstrate that more should be done to be careful because there is not enough scientific information. So, the purpose of capturing scientific uncertainty is to determine if it is being used as a rhetorical device – e.g., as an escape, to manufacture controversy, or to delay action.

Indicate if the story mentions any type of scientific uncertainty about future or current scenarios where something about the spill is known, but more information may be needed. Scientific uncertainty would not be indicated if someone demonstrates worry about possible future risks, unless a scientist or official also explicitly states that research and/or test need to be conducted to account for that risk. Scientific uncertainty is not about hypothetical/possible situations, but indicates uncertainty or lack of knowledge about known situations. This could be shown through words such as “unknown,” “disputed,” “contested,” “challenged,” and “questioned” or similar. Scientific uncertainty is not about future possible scenarios that are completely unknown as of yet.

Examples:

- The story might indicate that dolphins and other marine mammals seem to be dying in higher numbers than usual, but research needs to be done to be sure that their increased death rate is due to the oil spill.
- The story might indicate that tar balls are showing up, but they need to test the tar balls to see if they are from this particular oil spill.
- The story might indicate that the extent of the spill (spatially) is not yet known and needs to be measured. (The spill is known, it is just not known how far or wide it may be.)

- A story that states hypothetical situations – such that some human or animal could potentially be harmed, but gives no indication that there is any current knowledge about exposure(s) which might produce harm, is not scientific uncertainty; it would instead be considered “risk.” It would be uncertainty if a scientist states that oily birds have been found, but scientists are not yet sure about the extent of the exposure or threat to water birds.

Another instance of scientific uncertainty could arise if different people dispute the science or research or conclusions of a scientist, engineer, doctor, or other expert. One scientist may state his/her conclusion about a certain event, incident, or effect and then another person (a different expert, a spokesperson, a reporter, etc.) may infuse doubt that the science is certain. So, the uncertainty arises due to a “controversy” or just due to differing opinions about the results/conclusion. One person may question the scientific conclusions of another or dispute the scientific claim – i.e., the science is challenged. The science being questioned cannot be a matter of someone just saying that he/she does not believe the science, however. (Someone saying “I don’t believe in climate change” is not scientific uncertainty about climate change). Challenges to science might be accomplished using words such as “doubtful,” “unsure,” “inconclusive,” “unsettled,” “dubious,” “indeterminate,” “ambiguous,” or “uncertain.”

Examples:

- A story might quote a biologist who says that dolphins are showing signs of extreme trauma and exhibiting health effects due to their exposure to the crude oil, then the story might also quote a BP official who says that the effects of oil on marine mammals is, as yet, undetermined.
- A story might say that the oil spill seems to be spreading to marshlands and will likely be affecting the ecosystem there for decades to come, but then another source might claim that it cannot be known that the marsh will suffer any long-term effects at all, or it is too soon to tell.

Uncertainty about Scope of the Human Health Effects

- 9) Indicate if the story mentions uncertainty about the scope of the potential human health effects.

Example:

- The story might have a doctor or scientist stating that he/she expects to see future rates of cancer or other diseases to increase dramatically in the aftermath of the spill. (Choice #2)

Four Dog Defense

The “Four Dog Defense” is pretty explicit. It is meant to demonstrate if the story employs the PR strategies commonly used by corporations to deny responsibility for human health and/or ecological effects. First, deny any harm from the pollutant. (Deny that the pollutant is harmful at all.) Second, deny exposure to the pollutant.

- 10) Third, deny connection between exposure and health effects.

- 11) Fourth, state that the pollutant/contaminate was at safe or acceptable levels as per law.

Question the Validity of the Four Dog Defense

- 12) Indicate if the four dog defense was challenged by the media outlet – i.e., the story may have quoted one or more parts of the “Four Dog Defense,” but then challenged it.

Environmental Justice

13) Indicate if the story mentions groups such as people of color, lower socio-economic groups, pregnant women, children, elderly or any other groups of people who might need special consideration in terms of the economic or health effects of the oil spill. If the story mentions merely “shrimpers” or “anglers” or “fisherman” or “hotel owners” but does not indicate their specific minority ethnicity or socio-economic status, then the answer to this question would be “not present.”

Examples:

- The story might mention that a particular group of immigrants who have always relied on fishing are facing a troubled future.
- The story might mention that pregnant women and their offspring are particularly vulnerable to the potential toxic effects of the oil breakdown products and/or the dispersants.

Sources

14) Sources include people and groups of people who have a voice in the story. Sources must be specifically named, except when it is a citizen who is directly quoted but the reporter did not obtain his/her name. Sources are people who speak themselves/are quoted in the story or whose quotation or paraphrased message is read/written by the reporter. Reporters are not sources. A source will usually be an individual, but might be a group if there is a statement quoted or paraphrased from a group. If the source is not directly quoted, most likely a paraphrased statement will be indicated by the words, “he said,” or “X stated,” Note that documents are not sources. If a story indicates that court documents show [XXX], those court documents would not be a source; however, if a person or organization is quoted from those court documents, that individual or organization is a source. If ambiguous, how the news stories identifies the source’s affiliation/position is how the source should be coded.

Examples:

- The story might state that citizens are feeling worried. This is not a quotation or paraphrase of their statement but merely a summation of the situation, so “citizens” would not be a source.
- The story might state that “BP said today that it is prepared to take full responsibility for the cleanup.” In this case, “BP” is the source because it’s company’s statement was paraphrased by the reporter.
- An oil rig worker could be identified as a company spokesperson or expert (2) if specifically named as such, as a non-affiliated expert (3) if the person’s expertise is mentioned but not who he/she worked for (since contract workers were employed on the rig), or as a citizen if the worker is simply identified as a worker, with no particular corporate affiliation or expertise noted.

Notes

15) If you feel like something was inferred in a story, but you could not capture it in the quantitative questions above because it was not explicit, please indicate that here. If you notice anything in the story which is notable, which indicates a certain “slant” in the valence or perspective of the piece, or anything else that you find interesting or important that makes the piece unique or biased or noteworthy, or if you notice anything was not covered within the coding questions, please make a note in #30.

Appendix D Chi-Square Tests

	Environmental Effects	No Environmental Effects	<i>Marginal Row Totals</i>
Corporate	36 (42) [0.86]	264 (258) [0.14]	300
Independent	48 (42) [0.86]	252 (258) [0.14]	300
<i>Marginal Column Totals</i>	84	516	600 (Grand Total)

The Chi-square statistic is 1.9934. The P value is 0.15799. This result is *not* significant at $p < 0.05$.

	Environmental Risks	No Environmental Risks	<i>Marginal Row Totals</i>
Corporate	34 (45.5) [2.91]	266 (254.5) [0.52]	300
Independent	57 (45.5) [2.91]	243 (254.5) [0.52]	300
<i>Marginal Column Totals</i>	91	509	600 (Grand Total)

The Chi-square statistic is 6.8525. The P value is 0.008852. This result is significant at $p < 0.05$.

	Total Environment	No Environment	<i>Marginal Row Totals</i>
Corporate	70 (87.5) [3.5]	230 (212.5) [1.44]	300
Independent	105 (87.5) [3.5]	195 (212.5) [1.44]	300
<i>Marginal Column Totals</i>	175	425	600 (Grand Total)

The Chi-square statistic is 9.8824. The P value is 0.001669. This result is significant at $p < 0.05$.

	Physical Health Effects	No Physical Health Effects	<i>Marginal Row Totals</i>
Corporate	4 (15) [8.07]	296 (285) [0.42]	300
Independent	26 (15) [8.07]	274 (285) [0.42]	300
<i>Marginal Column Totals</i>	30	570	600 (Grand Total)

The Chi-square statistic is 16.9825. The P value is 3.8E-05. This result is significant at $p < 0.05$.

	Mental Health Effects	No Mental Health Effects	Marginal Row Totals
Corporate	2 (4.5) [1.39]	298 (295.5) [0.02]	300
Independent	7 (4.5) [1.39]	293 (295.5) [0.02]	300
Marginal Column Totals	9	591	600 (Grand Total)

The Chi-square statistic is 2.8201. The P value is 0.093092. This result is *not* significant at $p < 0.05$.

	Long Term Health Effects	No Long Term Health Effects	Marginal Row Totals
Corporate	2 (4.5) [1.39]	298 (295.5) [0.02]	300
Independent	7 (4.5) [1.39]	293 (295.5) [0.02]	300
Marginal Column Totals	9	591	600 (Grand Total)

The Chi-square statistic is 2.8201. The P value is 0.093092. This result is *not* significant at $p < 0.05$.

	Total Health Effects	No Health Effects	Marginal Row Totals
Corporate	6 (19.5) [9.35]	294 (280.5) [0.65]	300
Independent	33 (19.5) [9.35]	267 (280.5) [0.65]	300
Marginal Column Totals	39	561	600 (Grand Total)

The Chi-square statistic is 19.9918. The P value is 8E-06. This result is significant at $p < 0.05$.

	Health Risks	No Health Risks	Marginal Row Totals
Corporate	7 (16.5) [5.47]	293 (283.5) [0.32]	300
Independent	26 (16.5) [5.47]	274 (283.5) [0.32]	300
Marginal Column Totals	33	567	600 (Grand Total)

The Chi-square statistic is 11.5761. The P value is 0.000668. This result is significant at $p < 0.05$.

	Total Health Risks and Effects	No Health	Marginal Row Totals
Corporate	13 (36) [14.69]	287 (264) [2]	300
Independent	59 (36) [14.69]	241 (264) [2]	300
Marginal Column Totals	72	528	600 (Grand Total)

The Chi-square statistic is 33.3965. The P value is 0. This result is significant at $p < 0.05$.

	Economic Effects	No Economic Effects	Marginal Row Totals
Corporate	90 (72) [4.5]	210 (228) [1.42]	300
Independent	54 (72) [4.5]	246 (228) [1.42]	300
Marginal Column Totals	144	456	600 (Grand Total)

The Chi-square statistic is 11.8421. The P value is 0.000579. This result is significant at $p < 0.05$.

	Effects on Fisheries	No Effects on Fisheries	Marginal Row Totals
Corporate	43 (37.5) [0.81]	257 (262.5) [0.12]	300
Independent	32 (37.5) [0.81]	268 (262.5) [0.12]	300
Marginal Column Totals	75	525	600 (Grand Total)

The Chi-square statistic is 1.8438. The P value is 0.174505. This result is *not* significant at $p < 0.05$.

	Total Risks	No Risks	Marginal Row Totals
Corporate	41 (62) [7.11]	259 (238) [1.85]	300
Independent	83 (62) [7.11]	217 (238) [1.85]	300
Marginal Column Totals	124	476	600 (Grand Total)

The Chi-square statistic is 17.9317. The P value is 2.3E-05. This result is significant at $p < 0.05$.

	Scientific Uncertainty	No Sci Uncertainty	Marginal Row Totals
Corporate	48 (40) [1.6]	252 (260) [0.25]	300
Independent	32 (40) [1.6]	268 (260) [0.25]	300
Marginal Column Totals	80	520	600 (Grand Total)

The Chi-square statistic is 3.6923. The P value is 0.054664. This result is *not* significant at $p < 0.05$.

	Corporate Sources	No Corporate Sources	Marginal Row Totals
Corporate	142 (124.5) [2.46]	158 (175.5) [1.75]	300
Independent	107 (124.5) [2.46]	193 (175.5) [1.75]	300
Marginal Column Totals	249	351	600 (Grand Total)

The Chi-square statistic is 8.4097. The P value is 0.003732. This result is significant at $p < 0.05$.

	Other Expert Sources	No Expert Sources	Marginal Row Totals
Corporate	119 (121.5) [0.05]	181 (178.5) [0.04]	300
Independent	124 (121.5) [0.05]	176 (178.5) [0.04]	300
Marginal Column Totals	243	357	600 (Grand Total)

The Chi-square statistic is 0.1729. The P value is 0.67754. This result is *not* significant at $p < 0.05$.

	Advocate Sources	No Advocate Sources	Marginal Row Totals
Corporate	43 (47.5) [0.43]	257 (252.5) [0.08]	300
Independent	52 (47.5) [0.43]	248 (252.5) [0.08]	300
Marginal Column Totals	95	505	600 (Grand Total)

The Chi-square statistic is 1.013. The P value is 0.314179. This result is *not* significant at $p < 0.05$.

	Citizen Sources	No Citizen Sources	Marginal Row Totals
Corporate	92 (78) [2.51]	208 (222) [0.88]	300
Independent	64 (78) [2.51]	236 (222) [0.88]	300
Marginal Column Totals	156	444	600 (Grand Total)

The Chi-square statistic is 6.7914. The P value is 0.00916. This result is significant at $p < 0.05$.

	Exxon Valdez	No Exxon Valdez	Marginal Row Totals
Corporate	30 (42) [3.43]	270 (258) [0.56]	300
Independent	54 (42) [3.43]	246 (258) [0.56]	300
Marginal Column Totals	84	516	600 (Grand Total)

The Chi-square statistic is 7.9734. The P value is 0.004747. This result is significant at $p < 0.05$.

	Articles in Corporate Media	No articles in Corporate Media	<i>Marginal Row Totals</i>
Health effects	6 (48) [36.75]	294 (252) [7]	300
Economic effects	90 (48) [36.75]	210 (252) [7]	300
<i>Marginal Column Totals</i>	96	504	600 (Grand Total)

The Chi-square statistic is 87.5. The P value is 0. This result is significant at $p < 0.05$.

	Articles in Independent Media	No articles in Independent Media	<i>Marginal Row Totals</i>
Health effects	33 (43.5) [2.53]	267 (256.5) [0.43]	300
Economic effects	54 (43.5) [2.53]	246 (256.5) [0.43]	300
<i>Marginal Column Totals</i>	87	513	600 (Grand Total)

The Chi-square statistic is 5.9286. The P value is 0.014897. This result is significant at $p < 0.05$.

	Articles in Corporate Media	No articles in Corporate Media	<i>Marginal Row Totals</i>
Environmental Effects	36 (63) [11.57]	264 (237) [3.08]	300
Economic Effects	90 (63) [11.57]	210 (237) [3.08]	300
<i>Marginal Column Totals</i>	126	474	600 (Grand Total)

The Chi-square statistic is 29.2948. The P value is 0. This result is significant at $p < 0.05$.

	Articles in Independent Media	No articles in Independent Media	<i>Marginal Row Totals</i>
Environmental effects	48 (51) [0.18]	252 (249) [0.04]	300
Economic effects	54 (51) [0.18]	246 (249) [0.04]	300
<i>Marginal Column Totals</i>	102	498	600 (Grand Total)

The Chi-square statistic is 0.4252. The P value is 0.514339. This result is *not* significant at $p < 0.05$.

	Context of Exxon Valdez	No Mention of Exxon Valdez	<i>Marginal Row Totals</i>
Corporate	30 (42) [3.43]	270 (258) [0.56]	300
Independent	54 (42) [3.43]	246 (258) [0.56]	300
<i>Marginal Column Totals</i>	84	516	600 (Grand Total)

The Chi-square statistic is 7.9734. The P value is 0.004747. This result is significant at $p < 0.05$.