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**TOWARD THE GREENING OF NUCLEAR ENERGY: A CONTENT ANALYSIS
OF NUCLEAR ENERGY FRAMES FROM 1991 TO 2008**

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by

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ABSTRACT

Framing theory has emerged as one of the predominant theories employed in mass communications research in the 21st century. Frames are identified as interpretive packages for content where some issue attributes are highlighted over other attributes. While framing effects studies appear plentiful, longitudinal studies assessing trends in dominant framing packages and story elements for an issue appear to be less understood.

Through content analysis, this study examines dominant frame packages, story elements, headline tone, story tone, stereotypes, and source attribution for nuclear energy from 1991-2008 in the *New York Times*, *USA Today*, the *Wall Street Journal*, and the *Washington Post*. Unlike many content analysis studies, this study compares intercoder reliability among three indices – percentage agreement, proportional reduction of loss and Scott's Pi.

The newspapers represented in this study possess a commonality in the types of dominant frames packages employed. Significant dominant frame packages among the four newspapers include human/health, proliferation, procedural, and marketplace. While the procedural frame package was more likely to appear prior to the 1997 Kyoto Protocol, the proliferation frame packaged was more likely to appear after the Kyoto Protol. Over time, the sustainable frame package demonstrated increased significance. This study is part of the growing literature regarding the function of frames over time.

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CHAPTER 1: INTRODUCTION

Background

Planetary stewardship invites us to envision our collective human footprint on the earth – globally, nationally, and locally. Environmental sustainability, the United States’ increasing dependence on foreign oil, and the effects of global warming have aroused renewed interest in nuclear energy as an alternative energy source to fossil fuels (*Nuclear Power*, 2007). Alternative energy sources are defined as emissions-free energy sources that do not emit sulfur dioxide, nitrogen oxide, and mercury (Nuclear Energy Institute, 2008). As policies are enacted to lower greenhouse gas emissions associated with global warming, media coverage on nuclear energy can be expected to increase since nuclear energy represents 73 percent of all U.S. emissions-free generation (Nuclear Energy Institute, 2008). With future generation energy demands projected to increase from 40 to 45 percent by 2030, nuclear energy is the single most effective strategy for meeting those demands while decreasing greenhouse gas emissions (*Nuclear Energy*, 2007). Public discussions on nuclear energy in the United States decreased in the 1990s as funding disappeared. However, restored interest in nuclear energy in the United States became evident with passage of the Energy Policy Act of 2005, the first energy policy to collectively recognize nuclear energy’s contribution to electricity generation, the nation’s energy security, and zero contribution to greenhouse gas emissions. While the act sets forth energy research and development for all forms of generation, nuclear energy appears as the “low-hanging fruit” – no carbon emissions, yet abundant capacity. In 2008, 46.59 percent of the public was more likely to vote for a political candidate who supported building more nuclear power plants while 40.9 percent were not (Gallup, 2009).

Historically, the public has been divided on whether the benefits of nuclear energy exceed possible risks. Some people have cited insurmountable health risks from a terrorists-induced nuclear meltdown, or long-term nuclear waste disposal. Others have cited the cost-effectiveness and zero greenhouse gas emissions, particularly as demand for electricity generation increases and the need to reduce greenhouse gas emissions also increases. Such a dichotomy presents competing framing packages for nuclear energy that are either anti-nuclear or pro-nuclear.

Gallup polling questions for nuclear power first appeared in 1957, again in 1965, and then regularly from 1976. Public opinion polls demonstrate the complexity of the nuclear energy debate as opinions fluctuate given the context of the question – proximity to home, environment, energy demand, dependence on foreign oil, or nuclear expansion. While favor towards nuclear energy may be increasing in the United States, support for nuclear plants within individual communities remains significantly lower than in other countries. For instance, a 2007 Gallup poll found 62.59 percent of Americans do not want a nuclear energy plant constructed within 20 miles of their home. However, a 2007 UPI international poll found 63.1 percent would support the construction of a nuclear plant in their community (Lando, 2007).

Using Gallup public opinion polls as a baseline, favorable opinion regarding the proximity of nuclear plants to a residence has only increased 7.29 percent since 1986. The timeline of the polling suggests that Three Mile Island (TMI) plays a significant role in public opinion towards nuclear plant construction nearby residences. In 1976, 45.22 percent favored construction within 5 miles of their home and 42.28 percent were opposed. In the immediate aftermath of the Three Mile Island (TMI) incident, 66 percent said nuclear operations should be “cut back until stricter regulations could be put into practice.” Prior to TMI, 39.48 percent felt

nuclear plant operations should be reduced until stricter regulations could be enforced, yet 56.45 percent recognized that an energy shortage resulting from the elimination of nuclear plants could be a greater risk.

Public trust for nuclear energy as a viable solution to the United States' energy demands has been affected by both TMI and Chernobyl (Wahlstrom, 2005). Unlike the Chernobyl disaster in the Ukraine, many in the United States do not realize that throughout the TMI crisis no lives were lost, no physical injuries occurred, and radiation exposure was about one millirem, or 1/6 of the radiation a person receives from a full set of chest x-rays (Walker, 2000). TMI media coverage focused more on what could have happened, or the worst case scenario, instead of on the facts of the crisis (Walker, 2000). Because of the way the media highlighted – or framed – nuclear energy throughout the TMI incident, many sensational and incorrect attributes were transferred from the media agenda to the public agenda. Some of the negative attributes transferred include nuclear energy's harm to the environment, human safety, vulnerability to terrorists' attack, waste problems, expensive construction, and stagnant technology (Herbst & Hopley, 2007).

The last and perhaps the only longitudinal study on nuclear energy and public opinion appeared in 1994. Rosa and Dunlap's (1994) *Nuclear Power: Three Decades of Public Opinion*, an analysis of polling trends from 1975-1990, demonstrated declining public support for nuclear power with increasing opposition. The most recent Gallup opinion poll found 59 percent in favor of using nuclear energy as one of the ways to provide electricity in the United States, a 3.1 percent increase from 2006 (Gallup 2009). In the last decade, pro-nuclear energy editorials have appeared in the *Baltimore Sun*, the *Chicago Sun-Times*, the *Boston Globe*, the *New York Times*, the *Wall Street Journal*, and the *Washington Post* (NEI, 2005).

Given the agenda-setting function of the media and the media's subsequent framing of issue attributes, the media influence public opinion through frames (Cohen, 1963). This study seeks to identify whether the media's framing of nuclear energy has changed within nuclear energy news articles from 1991 through 2008. Such a study is significant given that the last analyses of nuclear energy frames occurred with Gamson and Modigliani's (1989) study. Gamson & Modigliani (1989) focused on the culture of nuclear power across mediums – television, news magazines, editorial cartoons, and syndicated opinion columns. Specifically, this study seeks to understand the specific attributes the news media use in creating competing nuclear energy frames, either anti-nuclear or pro-nuclear, and what, if any, domestic and international events and/or political affiliations are associated with the use of these competing frames, particularly in light of the demand to reduce fossil fuel emissions, reverse global warming, and decrease the United States dependency on foreign oil.

CHAPTER 2: LITERATURE REVIEW

This chapter begins with literature on agenda setting, the precursor to framing research. From agenda setting research, framing theory emerges as the framework for this study. The review of framing theory literature includes types of frames, framing effects and public opinion, and interpretative schemas. Applying framing theory to explain public opinion on nuclear energy is then discussed. Finally, research questions are posited to establish the direction of this study.

Agenda setting

Lippman (1922) believed people respond to their environment according to how they believe the world to be and these beliefs are often formed based upon information provided by the media. Similarly, Cohen (1963) posited that while the media may not influence how the public thinks, they inform the public what to think about. This process, called agenda setting, is a byproduct of reporting. Although Lippman (1922) and Cohen (1963) laid the foundation for agenda setting, McCombs and Shaw's (1972) landmark study analyzing the transference of salient political issues from the media's agenda to the public's agenda solidified agenda setting as a media effect concerned less with attitude change and more with cognitive effects, primarily issue salience.

McCombs and Shaw (1972) defined agenda setting as the transfer of salience from the media agenda to the public agenda. Salience is the relevance given to an issue through repeated media coverage, thereby influencing the perceived importance of the issue by the public as the information is readily accessible (Dearing & Rogers, 1996; Funkhouser, 1973; Iyengar & Kinder, 1987; D. M. McLeod, Kosicki, & J. M. McLeod, 2002; Petty, Priester, & Brinol, 2002).

While salience includes both relative importance and accessibility, some argue that importance carries more influence than accessibility when recalling an issue (Nelson et al., 1997; Takeshita, 2006).

Salience may be transferred through three types of agendas: media, public, and policy (Dearing & Rogers, 1996). The media agenda is guided by the newsworthiness criteria set by reporters, editors, and producers of the news through the daily selection of news (Dearing & Rogers, 1996; Lasorsa, 1997; McCombs, 1997). News is identified as hard, significant and timely, or soft, lacking urgency (Nelson, 1984). Conflict is a mainstay of the news production cycle, where human interest and in-depth story angles are favored reporting strategies producing common themes reinforcing common values. McCombs' (1997) passive-to-active continuum for the media's role in agenda setting begins with professional detachment where the media reflect society and serve as the window on the world. Further along the continuum, target involvement and boosterism behave as the watchdog for society through investigative reporting of government wrongdoings or as the issue advocate favoring one political ideology over another. Lastly on McComb's continuum, the media proactively set the agenda by actively building community consensus, and view this role as the media's responsibility to society.

According to Turk (1986), the media do not serve as a reflection of reality, but as a reflection of their own construction of reality. Public information officers and public relations practitioners often fill the role of first source for media accounts and therefore help to shape the media's agenda setting process. Intermediate agenda setting occurs when media outlets influence one another. National news agencies, particularly the wire services, influence one another to the point of standardizing how an issue is reported (Roberts, 1997).

The public agenda is constructed through either a top-down or a bottom-up approach. The

top-down approach reflects the proactive agenda-setting function of the media, whereas the bottom-up approach reflects public influence on the media (McCombs, 1997). The policy agenda reflects collective political behavior and the power of society's elites (Berger, 1962; Dearing & Rogers, 1996). A symbiotic interrelationship exists between policymakers, the gatekeepers of information, and journalists, the providers of information to the public (Dearing & Rogers, 1996; Takeshita, 2006). Gandy (1982) asserted that too much focus is given to the media's role in agenda setting and too little to other societal forces such as capitalism and media ownership. Information subsidies are the means by which policy makers and elite decision makers influence the economy by increasing or decreasing the prices of information critical to public decision making; hence the lower the price, the higher the consumption (Gandy, 1982).

The media's agenda influences public discourse on events, activities, or authority figures surrounding an issue. McCombs (2004) characterized public response to salient issues as alarmed discovery, which is the initial stage of the issue attention cycle. In order to effectuate change public attention must generate political pressure (Downs, 1972). Downs' issue attention cycle asserted that once public interest is heightened, increasing boredom ensues. The five phases of the Downs' issue attention cycle are the pre-problem stage, alarmed discovery and euphoric enthusiasm, the cost of significant progress, the gradual decline of intense public interest, and the post-problem stage in which public attention wanes or fixates on new issues, thereby returning to the pre-problem stage.

Individual interest and regular exposure to media coverage facilitate the agenda setting process (Schoenbach, 1982). Interests, amount of cognitive effort, and uncertainty about the subject determine an individual's willingness to attend to the message (Weaver, 1977). The stronger the individual preference for the issue, the more the message reinforces individual intent

in regard to the issue. On the other hand, the weaker or more uncertain the individual is about the issue, the stronger the effect of the media's role (Weaver, 2007).

A cause-and-effect relationship between the media agenda and the public agenda has been demonstrated in numerous time-order agenda setting studies (Brosius & Kepplinger, 1990; Funkhouser, 1973; Iyengar & Kinder, 1987; MacKuen & Coombs, 1981). However, agenda setting studies do not identify variables that strengthen or weaken the relationship between media content and issue salience (Hill, 1985; Iyengar, 1991). Exposure, education, personal characteristics, and viewing habits affect individuals' news recall, comprehension, and emotion. Emotion is a product of cognitive evaluations of an event, thereby reflecting information and beliefs accessible to the person and how the situation fits with their values and goals (Iyengar, 1991). With the advent of the Internet, the public can individualize their news coverage through a variety of online media outlets. Communication technologies lend themselves to the public's selecting of media outlets they know to reinforce their values and opinions (Shaw & Hamm, 1997). Therefore, quantity and quality of news viewing influence agenda setting (Hill, 1985).

Agenda setting effects appear earlier within the public agenda when promoted by national newscast rather than through newspapers. Readers possess better content memory than television viewers, suggesting that the more effort needed to process the information, the more information is gained (McCombs, Shah, & Weaver, 1997). The agenda setting influence of television is more effective among people who also read newspapers, suggesting agenda setting effects from newspapers are more long lasting than broadcast mediums (Hill, 1985). Although the public and organizations may first turn to the Internet for information during a crisis, traditional mediums, such as newspapers, are still preferred (Perry, Taylor, & Doerfel, 2003). Network news programs shape the public's agenda through the amount of network coverage on an issue in a framing

process that overlooks some attributes in order to emphasize others (Iyengar, 1991). Overall, individuals who rely on the media as their primary source for information adopt the media's agenda more readily than individuals who receive information from sources other than the media (Yang & Stone, 2003).

Proximity and timeliness shape news value (Price & Tewksbury, 1997). The lead time for agenda setting effects – the time between the media's focus on an issue and the public's response – varies greatly from issue to issue, and geographic proximity greatly affects the agenda setting process. National problems are more prone to the effects of the agenda setting process than local issues reported by local media, which typically have an insignificant influence on setting local issue salience (Palmgreen & Clarke, 1977). However, a significant correlation exists between local newspaper content and community identification of topics.

The first level of agenda setting hypothesizes that the importance of an issue transfers from the media agenda to the public agenda (McCombs et al., 1997). Operationally this is defined as perceived importance (Weaver, 2007). The second level of agenda setting is determined by how the media characterizes the issue through structural bias (McCombs et al., 1997). Attributes or frames reinforce issue salience within the public agenda causing some researchers to view agenda setting as a variant of framing (Price & Tewksbury, 1997).

As agenda setting research matured, different levels and models of the agenda setting process were conceptualized. Benton and Frazier (1976) conceptualized three levels of information holding within agenda setting. Level one names the major issues, level two proposes issue remedies, and level three suggests rationales for these remedies. Cook & Skogan's (1990) converging voice model also consists of three stages. In the first stage, the issue must be posited in an environment where the issue may take root. Secondly, the concern for the issue must be

present in various media forms. Thirdly, the issue must be legitimized. Public policies and outreach programs are then designed to resolve the problem/issue.

Framing

Agenda setting and framing are interconnected, but not identical; framing definitions vary more than definitions of agenda setting (Jasperson et al., 1998; Weaver, 2007). Framing is referred to by some as the second-level of agenda setting, or as attribute setting (Iyengar & Kinder, 1987; Kim, Scheufele, & Shanahan, 2002; McCombs, 2004; Scheufele, 2004). Frames are defined as interpretive packages for content that supplies a context and suggests the importance of an issue through selection, emphasis, exclusion, and elaboration (Gamson & Modigliani, 1989). Gamson and Lasch (1983) defined framing as “the a central organizing idea for understanding events related to the issue in question” (p. 398). Frames organize information in order to perpetuate understanding through the use of narratives and may be identified through the headline, lead, quotes, and paragraph within the body of a news story (Entman, 2007; Gamson, & Modigliani, 1989). Historically, the origins of framing lie in psychology and sociology, and are often credited to sociologist Goffman (1974).

Through agenda setting, the media bring salience to an issue. Salience is the relevance given to an issue through repeated media coverage, thereby influencing the perceived importance of the issue by the public as the information is readily accessible (Dearing & Rogers, 1996; Funkhouser, 1973; Iyengar & Kinder, 1987; D.M. McLeod, Kosicki, & J. M. McLeod, 2002; Petty, Priester, & Brinol, 2002). However, through framing, the media influence how individuals think about an issue by highlighting certain issue aspects over other aspects (Ghanem, 1997; Kim et al., 2002; McCombs, 2004; McCombs & Ghanem, 2003; Scheufele, 2004).

Types of frames

The type of frame used in conjunction with the issue is a main factor in generating framing effect outcomes. Major frame types include equivalency framing, emphasis framing, advocacy framing, and responsibility framing. Equivalency framing effects focus on either gains or losses with equal outcomes (Kahnemann & Tversky, 1984). Loss frames produce greater effects when individual issue involvement is high, and gain frames can be more effective when individual issue involvement is low. However, counter-effects result when the level of source credibility is too high. Messages with low efficacy cause the individual to process the message more so than messages with high efficacy since the higher the efficacy the less the individual questions the information within the message. Prospect theory posits that individuals assess how much is at stake with an issue in order to avoid losses (Kahneman & Tversky, 1982; De Dreu & McCusker, 1997). For disease detection, frames emphasizing potential losses motivate attitudes and beliefs; however for prevention behaviors maximum benefit is achieved through potential gain frames (Cox & Cox, 2001). As Cox and Cox (2001) affirmed, the inconvenience of undergoing early detection is offset by the stronger arguments presented in potential health loss frames.

Although gain and loss frames are associated with health message strategies, they can also influence sociopolitical issues such as unemployment. For instance, a loss frame refers to the negative – 5% unemployment, compared to a gain frame – 95% employment. Gain and loss frames imply to the individual the level of risk, low or high, associated with the issue (Kahneman & Tversky, 1982; Salovey, Schneider, & Apanovitch, 2002). Equivalency framing effects are not pervasive, and are only predictable with specific individual level variables, such as political context, gender, ability, attitude strength, and level of personal involvement (Druckman, 2001b).

Individuals are greatly influenced by perceptions of risk, even when the outcomes of either risk aversion or risk-seeking frames are identical. Frames that provide certainty and mitigate risk are favored over risk-seeking frames. In the absence of certainty, individuals favor frames with positive outcomes over negative outcomes as exhibited in Tversky and Kahneman's (1981, 1987) studies in which groups chose the risk-aversion scenario over the risk-seeking one, even though the potential outcomes were equivalent.

Emphasis framing effects alter individual consideration by directing focus to specific issue attributes, such as framing low-income housing as assistance to the economically disadvantaged instead of higher taxes (Druckman 2001b). Stories favoring individual values cue conservative preferences; conversely, egalitarian frames cue liberal preferences (Kellstedt, 2000). Emphasis framing effects lack consistency because individuals may agree with the principle, but later oppose policies to implement the principle, as experienced with equal employment opportunity (Fine, 1992).

Emphasis framing effects are explained through moderators such as individual predispositions, citizen deliberation, political information, source credibility, and competition (Druckman, 2001b). Predispositions evoke comparison of frames to personal counter-arguments. For instance, the manner in which individuals deliberate indicates that frames have less influence when the individual holds a strong opinion on the issue (Brewer, 2000; Gross, 2000; Price & Na, 2000). Aside from predispositions and deliberation, an individual's level of political knowledge may increase or decrease susceptibility to message frames. An individual possessing a low level of political information has an increased susceptibility to message frames. Individuals with a high level of political knowledge are better able to process competing frames (Kinder & Sanders, 1990). Source credibility influences framing effects directly and indirectly (Nelson et al., 1997;

Druckman, 2001c). Lastly, direct framing effects are moderated through the perceived level of credibility attributed to the media source, such as the *Wall Street Journal* or *People Magazine*, or the source attribution, such as President George W. Bush versus Senator Hillary Clinton (Druckman, 2001b). Indirectly, individuals seek credible sources to guide their opinions.

Advocacy frames include issue advocacy, marketplace advocacy, and value advocacy, the most popular of the three. Issue advocacy covertly persuades by informing the public; marketplace advocacy seeks to protect business interests; and value advocacy adopts accepted societal values (Bostdorff & Vibbert, 1994; Sethi, 1979). In experimental studies, exposure to value frames caused individuals to describe their thoughts about the issue using the same value (Shah, Domke, Wackman, 1996; Brewer & Gross, 2005). Value frames achieve effect by focusing and narrowing an individual's thoughts on an issue. However, the indirect effect is a reduction in overall thought on the issue, and moderating variables can confound support for or against an issue (Brewer & Gross, 2005). Therefore, the weight an individual assigns to certain attributes of an issue is more influential than the accessibility of different arguments or counter-frames (Nelson et al., 1997). Value frames connect issues with core beliefs, often offering the issue as the right position for the connecting value (Brewer & Gross, 2005).

How social problems are framed influences the extent to which the individual at the center of the issue or conflict is deemed responsible or blameworthy (Iyengar, 1991). Framing identifies causes and effects, and responsible agents (Kensicki, 2004). Iyengar (1991) identified framing of sociopolitical issues as either thematic or episodic. Thematic frames focus on social risk and emphasize figures and commentary, usually from public officials, to provide a more in-depth view of the issues. Episodic frames emphasize a specific example, a case study, or an event with an individual as the example. Episodic frames are favored by journalists, partisans,

and issue advocates because individuals are remembered more readily than in-depth thematic frames. Thematic framing reinforces collective action and emphasizes societal responsibility; episodic framing places responsibility on the individual (Iyengar, 1991; Shah, Kwak, Schmierback, & Zubric, 2004; Luther & Miller, 2005). While episodic framing places a face with the frame, the resulting effect may be negative. Changes in perception towards individual responsibility may extend to public policy, materializing in less public support to federal assistance programs.

Other frame types include substantive and procedural frames, and conflict-reinforcing and conflict-displacing frames (Entman, 1993, 2004, 2007; Dardis et al., 2008). Substantive frames define effects or conditions, identify causes, convey a moral judgment, and endorse remedies or improvements (Entman, 2004). Procedural frames, also referred to as the horse-racing frame, focus on evaluation of political actors (Entman, 2004). In later research, Entman (2007) distinguished three types of bias within frames: distortion bias – falsifying reality; content bias – lack of equal treatment to both sides of the argument; and decision-making bias – motivations of the media.

Conflict-reinforcing frames bolster the status quo by presenting the same opposing considerations that have occurred over time (Dardis et al., 2008). In fact, conflict-reinforcing frames may be also thought of as the common frame amplified over time. Conflict-displacing frames present new considerations without the intent of challenging the common frame (Dardis et al., 2008).

Traditionally, framing effects have been evaluated based upon framing contrast – one frame's ability to influence opinion over an alternative frame (Iyengar, 1991; Nelson et al., 1997). Exposure to a specific frame produces a classic framing effect – the individual thinks

about the issue by incorporating the considerations offered within the respective frame.

However, such effects are short-lived (Druckman, 2001c). Sometimes, competing frames may influence opinion in the same direction because both frames possess similar strength, or because one frame produces a counter-effect.

Successful frames are described as having salience, resonance, and persistence. Salience refers to the frequency of use of the frame, resonance corresponds to the number of individual arguments represented, and persistence is the endurance or amplification of the frame throughout media outlets (Entman, 1993; Baumgartner, De Boef, Boydston, 2008).

Framing effects and public opinion

Functionally, media framing effects are explained to occur through changing or shifting the narrative, the tone, or the strength of the argument, and establishing unique connections between constructs. Cognitively, media framing effects are explained through either passive or deliberate information processes, interpretative schemas, levels of knowledge, personal preference, and influence by elites.

Frames define the problem and suggest a remedy. Individuals then construct their own counter-frames even when elites impose their influence over media outlets. Effects are often confounded by frame parity, which occurs when a counter-frame with a complete alternative narrative receives equal play in the media (Entman, 2004). Framing effects are dependent upon the reach of the medium delivering the frame (Fan et al., 2002).

Frames change over time in order to maintain public interest (Chyi & McCombs, 2004). Typically, frame narratives shift across five levels: individual (micro), community, regional, societal, and international (macro). During this process, frames may shift from the specific to the general, the past to the future, and the local to the societal. After a significant time, frames

become historical in nature and serve as a backdrop for preventive frames, and provide insight on how the public constructs and negotiates discourse on public policy (Pan & Kosicki, 1993). For example, frames were shown to establish the tone of the debate on the death penalty resulting in significant influence on public opinion and public policy over time (Baumgartner et al., 2008).

Journalists incorporate frames into accounts for efficiency of comprehension (Luther & Miller, 2005). Eventually dominant frames push weaker frames aside, indirectly promoting content bias (Entman, 2007). Frame strength is a result of how frequently a frame is used within the media and the level of source credibility (Cappella & Jamieson, 1997; Chong, 1996; Chong, 2000; Domke, Shah, & Wackman, 1998; Druckman, 2001A; Edy & Meirick, 2007; Iyengar, 1991). Amplified frames, frames that survive the test of time, become part of the public vernacular once shared by political elites and journalists (Shah, Watts, Domke, & Fan, 2002).

Framing provides an alternative paradigm to the objectivity and bias paradigm, thereby exposing hidden assumptions, assisting with the understanding of mass communication effects, and providing information for communications practitioners (Entman, 2007; Reese, 2003). Frames serve as connectors among a series of events within a story line, guiding thoughts to predictable conclusions by provoking inferences, ideas, and judgments regarding issues (Williams, Shaprio, & Cutbirth, 1983; Gamson & Modigliani, 1989; Cappella & Jamieson, 1997).

Frames influence issue interpretation and understanding because individuals remember general impressions more easily than specific attributes of an issue, (Hwang, Gotlieb, Nah, & D. M. McLeod, 2007; Kensicki, 1998). Framing effects on opinion can be explained as a passive, automatic, and accessibility-driven psychological process (Chong, 1996; Iyengar, 1991; Entman, 1993; Brewer & Gross, 2005). This approach is sometimes referred to as the top-of-the-head

model where exposure to the frame makes the idea accessible for future decision making. Nelson et al. (1997), Druckman (2001), and Brewer (2005) challenge this view on information processing by asserting that the processing of frames is not mindless. Instead, the processing of framing effects is a deliberate process where the importance an individual attaches to a value is more of a driving force than the individual's accessibility of values in memory. Framing effects are not "one size fits all." Individuals will resist framing effects by evaluating source credibility, by forming negative cognitions or emotions to the issues, by exposure to counter-frames either through media or with conversations with others. Incidentally, counter-frames weaken framing effects, but do not neutralize framing effects (Brewer & Gross, 2005).

Interpretative schemas

The locus of effect in framing lies with issue description and the underlying interpretative schemas (Scheufele & Tewksbury, 2007). Schemas are cognitive structures that individuals utilize to organize thoughts throughout the interpretive process, recalling and connecting knowledge networks in long-term memory (Entman, 2004). Frames assist in understanding through cognitive schemas; the more knowledgeable the individual the greater the likelihood that alternative frames will be considered (Shah, Domke, & Wackman, 1996; Hwang et al., 2007). Stronger framing effects are realized when the frame is consistent with individual issue schemas, a predictor of individual issue attitudes (Shen, 2004). Issues may be framed through conflict, personalization, values, consequences, or responsibility (Price & Tewksbury, 1997). Most often issue interpretation is shaped through values in frames, which focus on morality, ethics, individual rights, and equality to define issues.

A primary goal of framing is to take factual information and incorporate value-laden attributes. Individual-based variables are influenced by media frames through manipulation of

attributes and activation of schemas rather than the addition of new knowledge. Individuals are conflicted by value considerations, and eventually give more weight to some values over others. Nelson et al. (1997) posit framing as reliant upon the change in weight an individual places upon the value. Here, individual attitude equals the sum of the framed value magnified by the weight given to the value. Cognitive processing weighs and sums the value of attributes in what's referred to as the compensatory model (Shah et al., 1996). Price & Tewksbury's (1997) model of knowledge activation suggests that individuals possess a knowledge store subject to activation by salient attributes of issues and accessible information. Instead of values, their model establishes ideas and feelings about the issue as the precursor for both immediate and future evaluation.

Frequency and recency of information use determine which schema is activated. Accessible schemas influence specific considerations through cognitive (gains/losses), motivational (self-concept), or chronically accessible (values) frames, which then drive opinion formation (Shah et al., 1996). Framing is a dynamic process where individuals discard irrelevant information as their priorities, conceptualizations, value weight, receptiveness, and interpretation make some information more relevant than other information (Chong, 1996). The level of knowledge held by the individual seems to produce mixed results. At times, framing effects are stronger among individuals possessing more knowledge on the issue. Other times, those with less knowledge appear to be more susceptible to framing effects. What is clear is that high levels of political knowledge do not inoculate the individual from framing effects.

Applying framing theory to explain public opinion on nuclear energy

Media frames influence interpretations of issues, individual decision-making, and subsequent changes in public policy (Iyengar, 1991; Jasperson, Shah, Watts, Faber & Fan, 1998). Framing theory explains effects on public opinion through the functions of frames. Frames tell us

what the communication is about, signal which information counts and which information can be ignored, offer or imply missing information, and ultimately influence decision outcomes (*Framing*, 2008). For example, ethical frames foster ethical interpretations, and material frames foster interpretations based on economic or practical criteria. Frames define problems in terms of cultural values, diagnose causes by identifying the source of the problem, pose moral judgments, and offer remedies through a schemata or a clustering of ideas to guide the information process (Entman, 1993). Therefore, policy direction and implicit answers to social issues, such as nuclear energy and global warming, may be best explained through framing theory (Gamson & Modigliani, 1989).

Association among frames relies upon personal preference and information and cues from opinion leaders. The byproduct is a common frame of reference, or rather a popular issue interpretation often set into motion by elites (Chong, 1996). The hope by elites, and a goal of framing in general, is that this common frame of reference, or issue frame, is applied to future political discourse and subsequent public opinion formation.

Individuals are serial information processors attending to select elements at any time and relying on informational shortcuts in their decision making process (Baumgartner & Jones, 2002). Framing requires the individual to connect constructs resulting in an applicability effect – the individual must attend to the message (Price & Tewksbury, 1997; Scheufele, 2000; Scheufele & Tewksbury, 2007). Different framing techniques for an issue influence different evaluations and subsequently affect public opinion (Kahneman, 2003; Kahneman & Tversky, 1984). Application of framing theories may be intentional or unintentional. If an activist group desires to promote the effects of nuclear energy on individual health, then equivalency frames may be the message strategy used.

Altheide (1997) noted more than anything else, frames focus on what is not discussed. Therefore the framing of nuclear energy is important because emphasizing certain attributes can strengthen or weaken arguments, and silence others (Reese, 2003). Intentional emphasis of one frame over another can even predict outcomes. Rosa and Dunlap's (1994) analysis of trends in nuclear energy polling found that by varying the amount of assurance of safety within survey questions support for nuclear energy could be influenced by as much as 40 percentage points. This appears to reinforce effects found in equivalency framing studies.

Studying framing effects over time can demonstrate how the media frame nuclear energy now versus how the media framed nuclear energy around the time of TMI and Chernobyl. No doubt some media accounts address nuclear energy as an alternative emission-free energy source, and subsequently a solution to global warming. Yet some media may still amplify frames from decades ago, frames evident in Gamson & Modigliani's (1989) study. Media frames influence public understanding of nuclear energy in the context of today's global warming environment. How the media define the benefits and risks of nuclear energy, as well as the demand to reduce fossil fuel emissions and U.S. dependency on foreign oil, may emerge within these frames.

Many agree on the economic benefits of nuclear energy, but disagree on the importance of the benefits in relation to the risk. Framing research indicates the success of frames is dependent upon evoking schemas consistent with the framing considerations rather than attempting to add to the individual's knowledge base (Nelson et al., 1997). Framing effects occur when the weight of a belief increases either through acceptance of a new belief or reassessment of an existing belief (Chong & Druckman, 2007). Therefore, the weighting of some considerations over others is critical in establishing the dimension of the nuclear energy debate in

2009.

Only one content analysis study has been conducted focusing on media framing and nuclear energy. Gamson & Modigliani's (1989) study analyzed the culture of nuclear energy across media frames from 1945-1989. Through the use of quantitative content analysis, this study seeks to answer how media framing of nuclear energy differs in the 21st century from media framing in the last decade of the 20th century, particularly before and after the Kyoto Protocol adopted in 1997. Using four major U.S. newspapers, the *New York Times*, *USA Today*, the *Wall Street Journal*, and the *Washington Post*, this study seeks to analyze the coverage of nuclear energy through the identification of framing shifts, story elements, and dominant tone of headlines and articles.

Specifically, this study seeks to find:

RQ1: How does the framing of nuclear energy differ in the news coverage of nuclear energy from 1991 to 2008 in use of story elements, source attribution, political party affiliation and reinforcement of nuclear energy stereotypes?

RQ2: What is the dominant frame package over time?

RQ3: Is the dominant tone of news coverage from 1991 to 2008 pro-nuclear or anti-nuclear, and does the tone of the news coverage change over time?

RQ4: Which story elements most often align with an anti-nuclear energy tone versus a pro-nuclear energy tone?

RQ5: Which dominant frame most often aligns with an anti-nuclear energy tone versus a pro-nuclear energy tone?

RQ6: How does the tone of the quotes reported from political officials within the

news articles differ from 1991 to 2008?

In addition, studies have shown that headline tone highly influences a reader's perception on an issue (McCombs & Shaw, 1972; Pfau, 1995; Blood & Phillips, 1997; Andrew, 2007). Therefore, this study also seeks to compare headline tone with the tone of the news article it summarizes.

RQ7: Does the tone of the headline match the tone of the article?

CHAPTER 3: RESEARCH METHODS

Content analysis

The purpose for this study is two-fold: first to advance framing theory through sampling technique, and second to garner information on media reporting of nuclear energy, an area lacking scholarly study over the last two decades. Through the use of quantitative content analysis this study allowed for inferences about the relationship between nuclear energy and the types of framing attributes and frame packages employed in the top three U.S. newspapers based upon circulation – *USA Today*, the *Wall Street Journal*, the *New York Times* and the leading newspaper in the nation’s capital, the *Washington Post* (*Top Media*, 2009). Quantitative content analysis provides a formal system for examination of content through the use of systematic, replicable, and reductionistic procedures (Riffe, Lacy & Fico, 2005). Content analysis not only allows for inferences to be made about relationships between important variables within this study, but also for the identification of primary dimensions of the nuclear energy debate.

Sampling

USA Today, the *Wall Street Journal*, and the *New York Times* were selected for this study based upon their daily circulation. According to the Audit Bureau of Circulations (*Top media*, 2009), *USA Today* is the top-selling U.S. newspaper with a daily circulation of 2,293,310, the *Wall Street Journal* ranks second with a circulation of 2,011,999, and the *New York Times*’ ranks third with a circulation of 1,000,665. The *Washington Post* has the highest circulation of any newspaper originating within Washington, D.C., and ranks seventh in the nation with a circulation of 622,714. In addition, all four newspapers have been consistently ranked among the top 10 newspapers, based upon daily circulation, for the time period of this study, 1991-2008

(NAA, 2009). Using the search engine *ProQuest*, a search for news articles containing content on either nuclear energy or nuclear power was conducted separately for each newspaper beginning with 1991 through 2008. The search resulted in a total of 4095 news articles with news articles peaking in 1991, and then again in 2006 (see *Figure 1*). When examining the trend of nuclear energy news articles among the four newspapers, the *New York Times* leads with the most news articles with the exception of 1996, 1997 and 2005.

The better a sample represents the population of units studied, the higher the validity of the study (Long, Slater, Bolarsky, Stapel & Keefe, 2005). This study randomly analyzed 15 percent of the news articles from each newspaper, per year, resulting in a sample size of 614 news articles. To obtain a 95 percent level of confidence the recommended random sample size from a finite population of 4095 is 351 (Isaac & Michael, 1997).

This study employed a two-step stratified random selection process. First, news articles for each newspaper were randomly assigned a number from the population of news articles for each year. Random numbering prevented any periodicity that could occur by numbering the news articles chronologically. For example, the *Wall Street Journal* published 122 news articles on nuclear energy in 1991. The first news article randomly selected was assigned as 1, and then numbered so forth. A sample size of 15 percent, or 18 news articles, was then randomly selected from the population using an online random number generator. By entering the sample size (18) and the range of news articles within the population (1-122), a list of random numbers was generated for each newspaper by year (*Figure 2*). From the list of randomly generated numbers, the news articles bearing the randomly assigned numbers were selected for analysis. This process was repeated for each year from 1991-2008.

From the sample of 614 news articles, 10 news articles were identified as duplicates and

deleted from the sample before the news articles were numbered. This resulted in 604 news articles. Using this number, the news articles were numbered and a common sample for intercoder reliability was randomly generated using a sample range of 1 to 604. During the coding process six news articles were identified as beyond the scope of this study and eliminated; one news article was an obituary for a retired nuclear engineer, four other news articles focused on a country as a nuclear power. None of the six news articles was part of the common sample for intercoder reliability. Overall, this resulted in a sample of 599 news articles.

Coding Procedure

The news article, including the headline, served as the unit of analysis. Three undergraduate students from a northeastern university were trained to code the sample of 599 news articles. Coders were provided a codebook separate from an electronic spreadsheet used to enter codes. Changes to the protocol were anticipated and occurred throughout the coder training sessions as conceptual and operational definitions were assessed (See Appendix D).

Each news article was assigned an identification number prior to coding, ranging from 1-599. Coders recorded the identification number, newspaper source, dateline, whether or not the news article was a brief, and whether or not the news article ran with or without a byline.

In order to answer whether headline and news article matched in tone, the tone of the headline and the tone of the story – operationalized as dominant overall tone as perceived by the coder – were coded separately as anti-nuclear (negative), neutral, or pro-nuclear (positive). Story elements chosen for this study were identified through mainstream media and energy trade publications. To identify the types and frequency of nuclear energy story elements, coders were instructed to record direct and indirect reference to story elements. A direct reference occurred only when the news article contained the story element. Direct story elements coded were:

Chernobyl, *The China Syndrome* (the movie), global warming, Marshall Plan, nuclear weapons, Price Anderson Act, Tennessee Valley Authority (TVA), Three Mile Island (TMI), and Yucca mountain.

Other story elements required definition. Coders were instructed to code these story elements according to the definitions provided:

Energy demand/independence: Reference to the United States becoming less dependent upon other countries for oil and natural gas in order to meet our energy needs.

Health risks: Mental or physical risk associated with exposure to radiation, or the possibility or fear of mental or physical risk from nuclear energy such as NIMBY (not in my back yard).

Catastrophic incident: Potential for a nuclear meltdown or holocaust, nuclear plants as terrorists' targets.

Construction Costs: Funding, loan guarantees, cost over-runs, and/or budget cuts in the construction of new nuclear reactors or plants.

Construction licensing process: Combined Operating Licensing Application (COLA), design certification for new reactors, end/or early site permit.

Safety/security: Prevention of nuclear accidents due to human error, or technical/mechanical malfunction.

Economic benefit: Positive outcomes for the economy through increased nuclear energy production. These outcomes include increased revenue or taxes from nuclear energy plants for the communities it serves, and increased employment.

International comparison: Comparing the United States use of nuclear energy with

other countries, such as France or China.

Government review: Inspection or investigation of a nuclear plant by the Nuclear Regulatory Commission (NRC) or the Department of Energy (DOE).

Nuclear waste disposal: The containment or storage of spent fuel rods from a nuclear reactor or plant.

Availability of parts: The supply of reactors, turbines, concrete, or other materials needed for construction.

To identify the type of framing technique employed within the structure of the news article, coders were instructed to first identify the type of frame used – episodic or thematic. Next, coders were instructed to identify the dominant framing package apparent within the news article. Frames were modified as coder training progressed, as described later. Dominant framing packages were defined in the original or first codebook as:

Technology – The news article focuses on technology aspects such as improved safety, efficiency, improved design, and/or international comparison between U.S. nuclear plants and another country.

Human/Health – The news article focuses on negative consequences to life or health from a meltdown due to human error, terrorist attack, technical malfunction, leaks, waste disposal or reluctance to have a nuclear plant in the area.

Global warming – The news article focuses on lower emissions, environment, carbon footprint, cleaner air, and pollution control or pollution reduction.

Procedural – The news article focuses on the licensing and application process for nuclear energy plants, construction time, or the anticipate start date for plant.

Necessity – The news article focuses on nuclear energy as a necessity for energy independence, energy sustainability or meeting energy demands.

If none of the dominant framing packages were apparent, then coders were instructed to interpret what they thought was the intended dominant frame package, and to record this on a separate sheet. Lastly, coders recorded whether the news article overtly reinforced nuclear stereotypes, citing the dangers of nuclear energy, or dispelled nuclear stereotypes, citing energy need or zero carbon emissions.

In order to assess source attribution and source disposition toward nuclear energy, coders were instructed to identify individuals quoted directly within the news article. These individuals included the U.S. president, the U.S. vice president, senator, member of congress, governor, government agency representative, lobbyist, president/CEO of a private company or utility, advocacy group, and/or an individual citizen. All political candidates and elected officials were coded for party affiliation, total number of words quoted, and expressed disposition towards nuclear energy as anti-nuclear, neutral, or pro-nuclear. Agencies and organizations referenced within the news article without a source were also coded.

Coders were instructed to code any reference to the general public's opinion towards nuclear energy as increased public support, decreased public support, or uncertain public support. News articles were coded for inclusion of the following alternative energy sources: wind, solar, hydro, fuel cell, geothermal. Other countries besides the United States referenced within the news article were coded. Lastly, news articles were coded for references to disguising or hiding nuclear weapons or uranium enrichment as part of a nuclear energy facility or program.

Coder training

Coders received 10 hours of training, and four sets of coding packets; two packets during group sessions and two packets to code at home. The first coder-training meeting was held on May 14 in the Moravian College library at 1:30 p.m. Payment for coding, methodology for the dissertation, and the codebook were discussed during the first three-hour training session. Using four news articles from outside of the study sample, coding began as a group effort for the first two news articles and then moved to independent coding for subsequent news articles; discussion focused mostly on interpretation of the codebook and completion of the code sheet. In regards to the code sheet, coders requested the option to enter data electronically rather than by writing codes onto a sheet. Typing the headline of the news article was dropped because of the space requirement on the code sheet and the additional coding time needed.

As for the codebook, several changes and additions resulted for story elements defined and dominant frame package. Definitions for story elements defined were modified by adding or deleting information to assist in understanding and conciseness. Those variables affected within this category were: *health*, changed to any perceived risks to health, *catastrophic incident* to include human error or equipment malfunction, *safety/security* to include training, evacuation plans, maintaining regulatory or industry standards, *global* to exclude contracts for parts and supplies, and adding *delay* to include suspending plant expansion, or a moratorium on increasing nuclear energy. For dominant frame package, using theme instead of frame of the news article was readily more understandable. Two dominant frame packages, global warming and sustainable, were collapsed into one package, sustainable, because of the symbiotic relationship between the two constructs, and a new dominant frame package, *proliferation*, was introduced to reflect news articles focusing on nuclear weapons as a by-product of nuclear energy technologies

(See Appendix C). Due to scheduling conflicts, the next coder-training session was scheduled for June 2.

During the second coder-training session, coders independently coded five news articles from outside of the study sample. These news articles were longer than the news articles from the first session. From session two, the following changes for the codebook emerged: expanded definitions of episodic and thematic frames to include examples for each, and expanded definitions for negative, neutral and positive tone with examples of each. In addition, the requirement of specifying the names agencies and organizations referenced within the news articles was eliminated due to the amount of time this added to the coding process and subsequent coder fatigue.

The third coder training session focused more on quotes, dominant frame packages, and tone of news articles. Coders were provided with the first test packet of 15 news articles to code with a due date of June 8. News articles were selected from the *Chicago Tribune* from the years of 1990, 1993, 1995, 1999, 2004, 2008, and varied from one to three pages in length. Using percent agreement, coders agreed more than 80 percent of the time.

At the fourth meeting on June 11, the discussion on the first test packet revealed the need to number quotes within the news articles for coding because independently coders identified quotes in different order. Indirect quotes were dropped because of the amount of time needed to code. Coders averaged 15 to 20 minutes to code one news article. An additional category, *hiding*, was added to include news articles focusing solely on the enrichment of uranium at nuclear energy plants in order to construct nuclear weapons or to hide nuclear weapons.

Also, the explication on tone confused rather than helped, so this page was eliminated from the codebook. In addition, the following changes were made to the codebook: expanded the

list of countries from 18 to 27, expanded the list of agencies and organizations referenced from 6 to 26, synchronized “99” as code for “other” for all categories, and expanded the list of quote affiliations from 7 to 12.

Coders were provided with the second test packet of 10 news articles from outside of the study sample to code with a due date of June 18; coders B and C submitted their packets a day late. The fifth and final coder-training meeting revealed no additional changes to the codebook or the code sheet and group discussion focused on problematic categories such as dominant frame package, frame type, and tone. Overall, percent agreement was lower for dominant frame package, frame type and tone (77 percent) than other categories (85 to 100 percent).

At the last coder training session, discussion again focused on the most problematic areas: dominant frame package, frame type, and tone. Coders voiced concerns about prolonged training, time needed to code the news articles, and scheduling conflicts surrounding the July 4 holiday. From this discussion, the decision to proceed with the data analysis required much deliberation, and after reflecting on the schedule requirements of the coders and the researcher the decision was made to proceed with the content analysis.

Rather than provide coders with the entire quantity of news articles to code, coding packets were divided over nine days beginning on June 25 and concluding on July 3. Hard copies of the news articles were delivered each day to the coders. Coders were required to complete coding for one packet and submit their code sheet electronically before they received the next packet. This distribution of the news articles was designed to facilitate the coding process by decreasing the opportunity for procrastination and subsequent coder attrition from the study.

After the coding of the common sample, the news articles within the coding packets were balanced so as not to include all long or short news articles within a packet in hopes of reducing

coder fatigue. In addition to payment of \$600 each, coders were provided with a flash drive for saving electronic code sheets, lunch during one training session, and reimbursement for transportation expenses throughout the coding process.

Intercoder reliability

The following formula was used to determine the minimum size of the common sample needed for intercoder reliability assessment (Riffe et al., 2005):

$$n = \frac{(N-1)(SE)^2 + PQN}{(N-1)(SE)^2 + PQ}$$

$$n = \frac{(614-1)(.03)^2 + .09(614)}{(614-1)(.03)^2 + .09}$$

$$n = 92.$$

The common sample size was rounded up to 100. Out of the 100 randomly chosen news articles, one news article was inadvertently placed within the regular sample of news articles. The remaining 99 randomly chosen news articles represented the common set of news articles analyzed by all three coders in order to assess intercoder reliability. When coders did not reach agreement for a category, the news article was excluded from the data analysis for the specific category. For example, within the common sample when coder agreement did not occur for a category, the data for this category was coded as missing.

Intercoder reliability may be reported by category or as an average of intercoder reliability across categories. Generally, the accepted level of intercoder reliability for a study is 85 percent. Reporting an average of intercoder reliability allows categories with high intercoder reliability to offset categories with low intercoder reliability. Typically, 70 percent is the minimum acceptable level of intercoder reliability. This study sought the accepted level of 85 percent intercoder reliability and reports intercoder reliability for each category.

Intercoder reliability indices correct for chance agreement by taking into consideration the effect of the number of coders and categories, or the number of coders and coder use of a specific category. Typically, fewer categories and fewer coders will increase the amount of agreement, or rather reliability (Scott, 1955). The concern with intercoder reliability indices is whether chance-corrected agreement is either too conservative or too liberal (Krippendorff, 2004). Therefore, this study incorporated three intercoder reliability indices: percentage agreement, Cooil & Rust (1995) proportional reduction of loss (PRL) and Scott's Pi.

High percent agreement is a strong indicator of intercoder reliability. For categories where percentage agreement ranged from very high to perfect agreement, 95 to 100 percent, an intercoder reliability indices calculating for chance agreement was not applied. This included categories such as newspaper, story elements, and countries. For other categories, PRL and Scott's Pi were calculated to account for chance agreement. Proportional reduction in loss "assumes that the ratio of chance agreements to the total number of judgments will be proportionate to the ratio of possible ways in which they could agree to the possible number of combinations" (Taylor and Watkinson, p. 60, 2007). The PRL index has established minimum levels of percent agreement needed to achieve critical values of .80, .90, and .95 for intercoder reliability. The index is based upon the number of coders and categories. Scott's Pi also considers chance agreement dependent upon the sum of category use. Scott's Pi was manually calculated using the following formula (Scott, 1955):

$$\frac{PAo - PAe}{1 - PAe}$$

Coders identified both manifest and latent content. Manifest content has concepts with shared common meanings while latent content has embedded meanings open to subjective

interpretation (Lombard, Snyder-Duch, & Bracken, 2002; Riffe, Lacy, & Fico, 2005). Manifest content categories for this study were dateline, newspaper, alternative energy headline, brief, byline, story elements, public opinion, alternative energy sources, alternative energy story, quote affiliation, agencies and organizations, and country. Latent categories included story elements defined, dominant frame package, frame type, stereotypes, headline tone, story tone, quote tone, and hiding nuclear weapons.

Percent agreement for latent content was higher (95.5%) than for manifest content (89%). Using the PRL Index for intercoder reliability, one category – frame type – failed to meet the minimum critical value of .70. Using Scott's Pi, four categories failed to meet the minimum critical value of .70 (see Table 1).

Lower percentages for intercoder reliability may be acceptable (Nunnley 1978). As the coding process requires a more sophisticated level of discrimination among categories, intercoder reliability dropped below the accepted level of .70. However, this should not be interpreted as an indication of a problem with the coding process or compromised findings. A detailed coding process may produce lower intercoder reliability, but possesses increased validity (Brossard, Shanahan & McComas, 2004; Dardis, 2006).

When correcting for chance agreement, Scott's Pi favors polychotomous over dichotomous categories. With sufficient coder training, dichotomous coding of a variable should result in high percent agreement. If two coders agree 97 percent of the time, but one coder employs only one of the two coding categories and the other coder employs both categories, then the Scott's Pi technique will produce an intercoder reliability near zero (Krippendorff, 2004).

CHAPTER 4: RESULTS

The purpose of this study was to analyze news articles on nuclear energy from 1991 through 2008. A content analysis was conducted to answer the research questions. Research questions 1-7 are discussed below as well as general exploratory findings.

Statistical Analysis

In order to answer the proposed research questions, general descriptive statistics and cross tabulations were run between the appropriate categorical variables: story element, dominant frame packages, headline tone, story tone, quote tone, quote affiliation, and agency/organizations referenced. The strength of the relationship between the categorical variables was statistically analyzed using Pearson's Chi-square and Cramer's *V*. While Pearson's Chi-square revealed any relationships between categorical variables, Cramer's *V* signified the strength of the relationship between the variables in order to ascertain the importance of the relationship within the population of news articles (Riffe, Lacy, Fico, 2005). In addition, Spearman's rank correlation coefficient, also known as Spearman's Rho, was used to assess changes among category variables over time. Spearman's rho measures the strength of relationships between variables based on ranked data (Elliott & Woodward, 2007). With year as the ranked variable, the relationship between year and each category variable was tested.

General Exploratory Findings

News article characteristics. Thirteen percent ($n = 78$) of news articles were three paragraphs or less, 75% ($n = 449$) were published with a byline, 21% ($n = 127$) without a byline, and 3.3% ($n = 20$) ran as Associated Press wire stories.

Frame type. Most news articles focused on singular nuclear energy events rather than

nuclear energy trends over time with 82% (n = 491) of news articles identified as presenting episodic frames and 17.5% (n = 105) as presenting thematic frames.

Dominant frame packages were proliferation (n = 148, 24.7%), human/health (n = 134, 22.4%), procedural (n = 116, 19.4%), and marketplace (n = 100, 16.7%). Thirty-eight news articles (6.3%) were dropped from this analysis; 15 (2.5%) because the coders did not reach agreement within the common sample, 14 (2.3%) coded as “other,” and nine (1.5%) missing data.

The *New York Times* and *USA Today* shared the same dominant frame packages in order of frequency – human/health (n = 69, n = 9), proliferation (n = 68, n = 8), procedural (n = 46, n = 4) and marketplace (n = 25, n = 2) (See *Figure 3*). Frame packages for the *Washington Post* were the same, but differed in order of frequency with proliferation (n = 56), human/health (n = 33), procedural (n = 22), and marketplace (n = 12) (See *Figure 4*). Although the top dominant frame package for the *Wall Street Journal* was marketplace (n = 61), procedural (n = 44), human/health (n = 23), and proliferation (n = 16) followed in importance (See *Figure 5*). The necessity frame package was identified as the least dominant frame package (n = 19, 3.4%) among the four newspapers (See Table 2).

Alternative energy headlines and stories. No headlines were identified as presenting nuclear energy as an alternative energy source. Eight news articles (1.3%) identified nuclear energy as an alternative energy source over natural gas or coal-fired electricity generation.

Story elements. Nuclear weapons were directly referenced in 31% (n = 186) of news articles on nuclear energy. Ten percent (n = 60) of news articles directly referenced Chernobyl, 6.8% (n = 41) Three Mile Island, 3.5% (n = 21) Yucca mountain, and 3.2% (n = 19) global warming. All other story elements were referenced in less than one percent of the news articles.

Story elements defined. From the 13 defined story elements the variable “government” was identified 42% (n = 251) of the time followed by “safety/security” 32.7% (n = 196), “global” 22.4% (n = 134), “energy” 17% (n = 102), catastrophic incident 13% (n = 78), “health” 11.5% (n = 69), “nuclear waste” 8.5% (n = 51), “plant financing” 8.2% (n = 49), “licensing process” 8.2% (n = 49), “negative economic consequence” 8% (n = 42), “positive economic consequence” 7% (n = 42), “parts” 4.3% (n = 26), and “delay” .5% (n = 3).

Stereotype and Public Opinion. Four hundred and ninety-six news articles (82.8%) neither reinforced nor dispelled nuclear energy stereotypes. However, when a stereotype was identified, the stereotype reinforced nuclear energy as unsafe for humans, health, and environment seven times more often (n = 90) than the stereotype of promoting nuclear energy as a safer, better technology, or more reliable energy source (n = 13). Less than 2% (n = 10) of the news articles referenced public opinion. Public opinion opposing nuclear energy (n = 5) narrowly lead over favorable public opinion (n = 4).

Alternative energy sources. Collectively, alternative energy sources other than nuclear energy were referenced within 6.8% (n = 40) of the news articles: Wind in 3.0% (n = 18) of all news articles, solar energy was referenced in 1.7% (n = 18), and fuel cells in 1.2% (n = 7). Hydro and geothermal energy sources were mentioned less than one percent (n = 4, n = 1).

Agencies and organizations referenced. Energy companies were referenced most often (n = 310) followed by the *Nuclear Regulatory Commission* (n = 142), advocacy groups (n = 120), corporations other than energy companies (n = 108), a foreign nuclear energy ministry or department (n = 78), the *International Atomic Energy Association* (n = 70), the *U.S. Department of Energy* (n = 66), research institutes (n = 61), university, college or higher education affiliation (n = 52), media (n = 48), federal or U.S. courts (n = 40), lobbyist groups (n = 32), the *Nuclear*

Energy Institute (n = 30), the *Federal Bureau of Investigation*, *Central Intelligence Agency*, or *the Pentagon* (n = 25), public service or utility commissions (n = 18), and nuclear energy laboratories (n = 10). Four agencies and organizations were referenced less than one percent: *Institute for Nuclear Power Operations*, nuclear reservation, the *North Atlantic Treaty Organization*, unions, the *Nuclear Energy Agency*, the *United States Council for Energy Awareness*, and the *U. S. Department of Health*. Three agencies/organizations were never referenced: *Construction/building trades council*, *Environmental Law and Policy Center*, and the *International Commission on Radiological Protection*.

Other countries. Russia (n = 122) lead as the country most often referenced within the news articles followed by China (n = 90), France (n = 91), Iran (n = 84), Germany (n = 76), Great Britain (n = 69), Japan (n = 67), India (n = 54), North Korea (n = 48), Iraq (n = 33), Ukraine (n = 31), South Korea (n = 30), Switzerland (n = 20), Austria (n = 16), Afghanistan (n = 15), Spain (n = 13), Canada (n = 12), Belarus (n = 10), and Czechoslovakia (n = 7). Bulgaria, Hungary, Indonesia, Poland, Portugal, Romania, and Saudi Arabia were referenced less than one percent.

Hiding. One hundred and eleven news articles (18.5%) made allegations that a country or countries were hiding or disguising expansion of nuclear weapons within the country's nuclear energy program.

Research Question 1

To identify changes within the categories over time, three databases were created using year as a variable. For one database the years of the study years were organized as two variables, *Before the Kyoto Protocol* (1991-1997) and *After the Kyoto Protocol* (1998-2008); for the next database trends among categories were compared between the separate years of 1991 and 2008;

and for the final database, year was organized as one variable with the proportion of a particular category identified for each year as the second variable.

The analysis of changes over time for story elements, story elements defined, source attribution, political party affiliation, and reinforcement of nuclear energy stereotypes is as follows:

Story elements. Story elements were analyzed using chi squares and Cramer's V for before and after the adoption of the Kyoto Protocol, and between the separate years of 1991 and 2008. Before the Kyoto Protocol, two story elements, global warming ($r(599) = .146, p < .001$; $\chi^2(2) = 12.76, p < .001$) and nuclear weapons ($r(599) = .128, p = .002$; $\chi^2(2) = 9.75, p = .002$) were more prevalent than after the Kyoto Protocol. None of the story elements were more prevalent in the years after the Kyoto Protocol; none of the story elements were more prevalent when comparing 1991 to 2008. Correlating the variable of year, 1991-2008, with each story element revealed a positive correlation between year and global warming ($r(18) = .638, p = .004$).

Story elements defined. Story elements were analyzed using chi squares and Cramer's V for before and after the adoption of the Kyoto Protocol, and between the separate years of 1991 and 2008. After the Kyoto Protocol, negative economic impact ($r(599) = .165, p < .001$; $\chi^2(2) = 16.25, p < .001$) and parts ($r(599) = .097, p = .018$; $\chi^2(2) = 5.58, p = .018$) were more prevalent in news articles than before the Kyoto Protocol. None of the defined story elements was more prevalent in the years before the Kyoto Protocol. For 2008 references to safety and security were more prevalent than in 1991 ($r(87) = .243, p = .023$; $\chi^2(2) = 5.15, p = .023$). Correlating the variable of year, 1991-2008, with each defined story element revealed a positive correlation between year and energy ($r(18) = .527, p = .025$). A negative correlation was revealed for

negative economic impact, $r(18) = -.499, p = .035$, and parts, $r(18) = -.618, p = .006$ (Figure 6).

Agencies and organizations referenced. Agencies and organizations referenced were analyzed using chi squares and Cramer's V for before and after the Kyoto Protocol, and for 1991 and 2008 exclusively. Before the Kyoto Protocol, reference to federal or U.S. courts was more prevalent than expected, $r(599) = .113, p = .006$, and $\chi^2(2) = 7.62, p = .006$. References to the Foreign Nuclear Energy Ministry were also more prevalent, $r(599) = .104, p = .011$; $\chi^2(2) = 6.51, p = .011$. After the Kyoto Protocol, four story elements were revealed more prevalent than expected: media, $r(599) = .112, p = .006$; $\chi^2(2) = 7.62, p = .006$; the Nuclear Energy Institute, $r(599) = .107, p = .009$; $\chi^2(2) = 6.84, p = .009$; advocacy groups, $r(599) = .122, p = .003$; $\chi^2(2) = 8.9, p = .003$; and the International Atomic Energy Association, $r(599) = .113, p = .006$; $\chi^2(2) = 7.58, p = .006$. For 1991, references to the following agencies and organizations were more prevalent: the Nuclear Regulatory Commission, $r(87) = .253, p = .018$; $\chi^2(2) = 5.55, p = .018$; energy companies, $r(87) = .211, p = .049$; $\chi^2(2) = 3.88, p = .049$; and higher education affiliation, $r(87) = .221, p = .039$; $\chi^2(2) = 4.24, p = .039$. None of the agencies and organizations was more prevalent in 2008. Correlating the variable of year, 1991 through 2008, with each agency or organization referenced revealed a positive correlation between year and media, $r(18) = .593, p = .01$; and a negative correlation between year and federal courts, $r(18) = -.566, p = .014$.

Stereotype. This variable was recoded to make it ordinal; "reinforces nuclear stereotypes" was recoded to '00', "neither reinforces nor dispels any stereotypes" to '01', and "dispels nuclear stereotypes" to '02'. As the numbers increase, the stereotypes move from negative to neutral to positive. Spearman's rho correlation revealed that older news articles were more likely to contain negative stereotypes about nuclear energy, and more recent news articles were more likely to

contain positive stereotypes about nuclear energy, $r(599) = .14, p < .001$.

Research Question 2

To identify changes in dominant frame packages over time, three databases were created using year as the independent variable. For one database the years of the study were organized as two variables, *Before the Kyoto Protocol* (1991-1997) and *After the Kyoto Protocol* (1998-2008) to analyze dominant frame packages; for the next database dominant frame packages were compared between 1991 and 2008 exclusively; and for the final dominant frame package database, year was organized as one variable with the proportion of dominant frame packages identified per year as the second variable.

Cramer's V and chi square test for independence revealed a significant change in the dominant frame package of news stories before and after the Kyoto Protocol, $r(561) = .28, p < .001$; $\chi^2(7) = 45.14, p < .001$. Specifically, the procedural frame package was more likely than expected to be present before the Kyoto Protocol, and the sustainable or proliferation frame package was more likely than expected to be present after the Kyoto Protocol.

Cramer's V and chi square test for independence revealed a significant change in the dominant frame package of news articles in 1991 compared to 2008, $r(81) = .47, p = .01$; $\chi^2(6) = 17.90, p = .01$. Specifically, in 1991 the procedural frame package was more likely than expected to be the dominant frame package, and in 2008 sustainable and proliferation frames were more likely than expected to be the dominant frame package.

Pearson correlations between year and the proportion of news stories with each particular dominant frame package revealed significant changes over time in the proportion of certain frames. Sustainable frames increased over time ($r(18) = .59, p = .01$) as did proliferation frames ($r(18) = .46, p = .055$). Procedural frames decreased over time ($r(18) = -.728, p = .001$). No

significant relationships were found for any other dominant frame packages. Headlines from stories with the sustainable dominant frame package include: “U.S. News: Carbon Caps May Give Nuclear Power a Lift,” “Working to Reactivate Indian Point 2,” and “In S.C., Rethinking an Atomic Waste Welcome Mat: Task Force Plan Worries a Town.”

Comparing frame packages with the four newspapers revealed four significant frame packages: human/health, $r(561) = .154, p = .004; x^2(2) = 13.299, p = .004$; procedural, $r(561) = .119, p = .046; x^2(2) = 7.988, p = .046$; marketplace, $r(561) = .330, p < .001; x^2(2) = 61.211, p < .001$; and proliferation, $r(561) = .249, p < .001; x^2(2) = 34.686, p < .001$ (See Table 3 and Figure 7).

Examples of stories identified as exhibiting attributes from one of the four significant dominant frame packages provide additional insight. For instance, a story from *USA Today* coded as a human/health frame package had the following quote “. . .(anti-radiation pill) distribution could undermine public confidence in the safety of the nation’s nuclear plants.” Stories coded as procedural and marketplace frame packages included the *New York Times*’ “Shoreham Board Begins a Hunt for Alternatives” and the *Wall Street Journal*’s “GE Sees \$100 Billion in 1998 Revenue Due to Quality Control, Asia investment.” Lastly, a *Wall Street Journal* story coded as a proliferation frame package relates to recent political activity – “Leading the news: Bush spells out reasons Iraq is still a threat . . .has yet proven it has given up its quest for nuclear power”.

Research Question 3

Spearman’s rho correlation revealed that the story tone of news coverage was unrelated to any specific time period, $r(595) = .02, p = .62$.

Dominant story tone of news coverage from 1991 through 2008 was neutral (n = 402,

67.5%). When a story was not identified as neutral, it was eight times more likely to be identified as anti-nuclear ($n = 172, 28.7\%$) rather than pro-nuclear ($n = 21, 3.5\%$).

Research Question 4

Cramer's V and chi square test for independence revealed significant relationship between story tone and the following story elements: nuclear weapons, $r(595) = .21, p > .001; \chi^2(2) = 24.98, p < .001$; the Price Anderson Act, $r(595) = .148, p = .002; \chi^2(2) = 12.95, p = .002$, and global warming, $r(595) = .180, p > .001; \chi^2(2) = 19.37, p > .001$. Story tone was more likely to be negative when the story element nuclear weapons was present. Story tone was more likely to be positive when either story element Price Anderson Act or global warming was present. As an example, the following quote was featured within a *Washington Post* story coded as positive in tone and containing the story element global warming: "Conservation and renewables are just not going to answer all the questions. You really have to necessarily look at gas, coal or nuclear power."

Cramer's V and chi square test for independence revealed no significant relationship between news article and the following story elements: Chernobyl, $r(595) = .10, p = .07; \chi^2(2) = 5.32, p = .07$; *The China Syndrome*, $r(595) = .06, p = .29; \chi^2(2) = 2.46, p = .29$; Tennessee Valley Authority, $r(595) = .06, p = .38; \chi^2(2) = 1.92, p = .382$; Three Mile Island, $r(595) = .032, p = .74; \chi^2(2) = .617, p = .735$; Yucca mountain, $r(595) = .016, p = .925; \chi^2(2) = .155, p = .925$; Energy Policy 2005, $r(595) = .04, p = .618; \chi^2(2) = .963, p = .618$; and the Nuclear Waste Policy Act, $r(595) = .028, p = .786; \chi^2(2) = .481, p = .786$.

Cramer's V and chi square test for independence revealed significant relationships between story tone and the following defined story elements: Energy, $r(595) = .159, p = .001; \chi^2(2) = 15.13, p = .001$; health, $r(595) = .238, p < .001; \chi^2(2) = 33.61, p = .001$; catastrophic

incident, $r(595) = .175, p < .001; x^2(2) = 18.26, p < .001$; plant financing, $r(595) = .186, p < .001; x^2(2) = 20.58, p < .001$; licensing process, $r(595) = .115, p = .02; x^2(2) = 7.82, p = .02$; and positive economic consequence, $r(595) = .195, p < .001; x^2(2) = 22.71, p < .001$. Story tone was more likely to be negative when the defined story element health or catastrophic incident was present. Story tone was more likely to be positive when defined story element energy, plant financing, licensing process, or positive economic consequence was present.

Cramer's V and chi square test for independence revealed no significant relationship between story tone and the following defined story elements: Safety/security, $r(595) = .04, p = .626; x^2(2) = .937, p = .626$; negative economic consequence, $r(595) = .066, p = .269; x^2(2) = 2.62, p = .269$; global warming, $r(595) = .031, p = .754; x^2(2) = .565, p = .754$; government, $r(595) = .029, p = .911; x^2(2) = .994, p = .911$; nuclear waste, $r(595) = .023, p = .853; x^2(2) = .317, p = .853$; parts, $r(595) = .046, p = .538; x^2(2) = 1.24, p = .538$; and delay, $r(595) = .040, p = .618; x^2(2) = .963, p = .618$.

Research Question 5

Cramer's V and chi square test for independence revealed a significant relationship between story tone and the dominant frame package, $r(557) = .25, p < .001; x^2(14) = 69.98, p < .001$. Stories with a negative tone were more likely than expected to contain either human/health, $r(189) = .175, p < .001; x^2(2) = 5.80, p = .016$, or proliferation, $r(189) = .211, p = .004; x^2(2) = 8.42, p = .004$, as the dominant frame package; stories with a positive tone were more likely than expected to contain either sustainable, $r(189) = .287, p < .001; x^2(2) = 15.59, p < .001$, or marketplace, $r(189) = .316, p < .001; x^2(2) = 18.9, p < .001$, as the dominant frame package (See Table 4).

Research Question 6

Cramer's V and chi square test for independence revealed no significant relationship between quote affiliation and quote tone, $r(79) = .17, p = .32$; $\chi^2(2) = .466, p = .32$.

Research Question 7

Cramer's V and chi square test for independence revealed a significant relationship between headline tone and story tone, $r(595) = .344, p < .001$; $\chi^2(2) = 140.7, p < .001$. Headline tone and story tone corresponded for 67% ($n = 402$) of the articles with 22.6% ($n = 91$) negative, 78% ($n = 314$) neutral, and 1.75% ($n = 7$) positive. When headline and story tone did not correspond, 12.9% ($n = 77$) had a negative headline with a neutral story, 13.5% ($n = 81$) had a neutral headline with a negative story, 2.3% ($n = 14$) had a neutral headline with a positive story, and 1.8% ($n = 11$) had a positive headline with a neutral story. Examples of headline and story tone paired as negative and neutral, positive and positive, and neutral with positive include "Iran Unmoved by Threats Over Its Atomic Program," "Nuclear Plant Gets Good Marks," and "Nuclear Plant at Shoreham is Being Sold Piece by Piece."

CHAPTER 5: DISCUSSION

This study advances framing research by analyzing dominant frame packages, story elements, story tone, source attribution, and stereotypes in news articles regarding nuclear energy within multiple newspapers: the *New York Times*, *USA Today*, the *Wall Street Journal* and the *Washington Post*. These findings were revealed through the frequency in which these variables were employed, as well as significant relationships between the variables.

The thrust of this study focuses on whether or not the newspapers in question employ some dominant frame packages over other dominant frame packages when reporting on nuclear energy. Although differing in frequency of utilization, the newspapers represented in this study possess a commonality in the types of dominant frames packages employed. Significant dominant frame packages among the four newspapers include human/health, proliferation, procedural, and marketplace. While the procedural frame package was more likely to appear prior to the 1997 Kyoto Protocol, the proliferation frame packaged was more likely to appear after the Kyoto Protol. Over time, the sustainable frame package demonstrated increased significance.

Although story tone was unrelated to any specific time period, stories with an anti-nuclear tone were eight times more likely to appear than stories with a pro-nuclear tone. Stories identified as having either the human/health or proliferation frame packages were more likely to have an anti-nuclear tone. Stories identified as having either the sustainable or marketplace frame packages were more likely than expected to be pro-nuclear in tone. No significance existed between story tone and the procedural frame package.

Significant story elements included nuclear weapons, the Price Anderson Act, and global warming. The tone for stories with either the Price Anderson Act or global warming elements was pro-nuclear. The tone for stories with nuclear weapons was anti-nuclear. Several defined story elements were found to be significant: energy, health, catastrophic incident, plant financing, licensing process, and positive economic consequence. The tone of stories was more likely to be anti-nuclear with the defined story elements of either health or catastrophic incident, and more likely to be pro-nuclear with the defined story elements of either energy, plant financing, licensing process or positive economic consequence.

This study found only 6.8% of the news articles referenced alternative energy sources when reporting on nuclear energy. A significant relationship was not found in reporting nuclear energy in conjunction with alternative energy sources, which most often are referred to as “green” energy sources. However, significance was demonstrated for the sustainable frame package overtime as well as the story element global energy. In addition, the pro-nuclear tone identified with the defined story elements of energy, plant financing, licensing process or positive economic consequence lends credence toward the greening of nuclear energy.

While the use of framing as a news reporting tool is acknowledged, the amplification of frames and subsequent creation of dominant frames packages within the news over time is perhaps less understood. This study empirically demonstrates the amplification of frames and subsequent creation of dominant frame packages over time. The findings show that newspapers employ the same types of frames packages, but to varying degrees. This illustrates the pervasiveness of framing packages within the news and strengthens the argument for framing effects. Further more, framing packages for an issue appear to co-exists, creating a rank order of important frames, instead of only one dominant framing package.

The topic of this framing study, nuclear energy, naturally brings comparison to a study conducted by Gamson and Modigliani (1989) on the same topic. Gamson and Modigliani (1989) were interested in the formation of public opinion on nuclear energy through media discourse within television, news magazines, editorial cartoons, and syndicated opinion columns. They applied a mixed-methods approach; an approach seemingly challenging to replicate. The dominant framing packages identified within their study reflected the opinion expressed within the *discourse* of the topic; emerging from the qualitative process of comprehending, synthesizing, theorizing, and recontextualizing.

The significant dominant frame packages revealed in this study reflect objective analysis of news reporting techniques. Attributes of nuclear energy for use in the codebook were identified through extensive research on the topic in energy trade publications, books, professional publications, and consultation with academics who study science, technology and society. While the methodology of this study and Gamson & Modigliani's (1989) differ, some parallels exist between the dominant frame packages defined for this study and the frame packages within the earlier study. For example, technology and the procedural dominant frame packages may be thought of as extensions of Gamson and Modigliani's (1989) progress package. The human/health package lends itself to their public accountability package, and the necessity package coincides with their runaway and energy independence packages. Three frame packages appearing within this study that do not parallel the earlier study include sustainable energy, marketplace, and choice frame packages.

The dominant frame packages for this study are concrete, while the earlier study incorporated overall themes for categories relating to the nature of discourse on the topic. Also, the titles for the frame packages for this study are less value laden. However, this study extends

Gamson and Modigliani's (1989) research on the framing of nuclear energy by analyzing dominant frame packages beyond the scope of their study, and the findings attest to the continued amplification of dominant frame packages on nuclear energy.

Theoretical implications

Successful frames are defined by salience, resonance, and persistence. The dominant frame packages revealed within this study – proliferation, health, procedural, and marketplace – may be deemed successful because of the salience, and endurance or amplification of these frames over 18 years within four media outlets. The theoretical underpinnings of framing are reinforced through the identification of dominant frame packages which occurred independently yet simultaneously among the four newspapers. The majority of news articles originated with the respective reporter's newspaper. Had the majority of news articles been identified as Associated Press wire stories, then presumably it could be argued that the wire service had standardized reporting for nuclear energy. However, given that the four newspapers in this study employ the same dominant frame packages does substantiate the function of intermediate agenda setting, where media outlets influence one another (Roberts, 1997).

The episodic framing technique identified within the news articles is consistent with Iyengar's (1991) findings on the use of frames types, thereby further strengthening the argument that reporters favor in-depth news articles focusing on a particular individual or situation. Therefore, news articles with thematic frames – focusing on nuclear energy over time, collective action, or societal responsibility – appear less frequently (Iyengar, 1991; Shah et al., 2004; Luther & Miller, 2005). The result is perhaps a less cohesive understanding of the issues surrounding nuclear energy for consumers of news on the topic.

The results indicate that any framing effects stemming from the four dominant frame

packages may be confounded by frame parity (Entman, 2004). As the sustainable frame package (lower carbon emissions and concern for the environment) increased, so did the proliferation frame package (nuclear energy technology leading to nuclear weapons). The increase in the proliferation frame package appears as a counter-frame or alternative narrative to the sustainable frame package (Entman, 2004).

As Fan (2002) posited, framing effects are dependent upon the reach of the medium delivering the frame. With a combined circulation of more than 5.9 million, the *New York Times*, *USA Today*, the *Wall Street Journal* and the *Washington Post* are at a minimum directing public attention to proliferation, health, procedural and marketplace aspects of nuclear energy over other issue aspects and thereby increasing the perceived importance of these issue aspects.

In this respect, the dominant frame packages may be thought of as emphasis frames; directing attention to specific issue attributes (Fine, 1992; Druckman, 2001b). However, emphasis frames do not equate to direct framing effects. As demonstrated through numerous Gallup polls, individuals may agree with the benefits of nuclear energy, but later oppose efforts to construct a nuclear energy plant within their community.

Nelson (1997) and Druckman (2001c) found the perceived level of credibility attributed to the source is most often associated with direct framing effects. Although the results of this study found four organizations, media, the *Nuclear Energy Institute*, advocacy groups and the *International Atomic Energy Association*, more prevalent within news articles after the Kyoto Protocol, only media emerged as the organization increasing in reference over the span of this study – 18 years. Reporting techniques emphasize objectivity and diversity among sources; media outlets referencing other media outlets within news articles appear to contradict standard reporting techniques. However, this may demonstrate two of the types of bias Entman (2004)

found existing within frames: content bias or lack of equal treatment to both sides of the argument, and decision-making bias including motivation of media outlets.

With amplification of the proliferation, health, procedural, and marketplace frames, other issue aspects that may be arguably more positive and depict current trends within the nuclear industry are not explored. In this respect, these dominant frame packages function as conflict-reinforcing frames (Dardis et al., 2008). Technology, sustainability, necessity, and nuclear energy as an energy choice receive dramatically less attention within news articles. The sustainable frame package exhibits the most potential for serving as a conflict-displacing frame because this frame package increased over time and was positive in story tone.

Although news articles were predominantly neutral in tone, two dominant frame packages were negative – proliferation and human/health. Positive tone alignment with the sustainable frame package and an increase in the use of positive nuclear energy stereotypes in the latter years of this study may be an indication of a framing shift for nuclear energy (Ross & Bantimaroudis, 2006).

Practical implications

The findings of this study parallel nuclear energy trends. The procedural frame package, which focuses on the licensing, application and construction process for nuclear energy plants, decreased over time as the construction of nuclear energy plants declined. The use of defined story elements such as negative economic consequence and parts also declined; perhaps because the decline in construction lessened the focus on the need for plant financing, and therefore the demand for parts. Interestingly, references to two widely known nuclear energy incidents, Chernobyl and TMI, were not found to be prevalent. This should be interpreted as good news for the nuclear energy industry as well as to quell speculation that the media unduly focus on these

incidents. Internationally, the Kyoto Protocol seems to have brought the environmental benefits of nuclear energy in vogue.

The proliferation dominant frame package lends credence to the argument that media do not distinguish the nuclear energy process from nuclear proliferation or uranium enrichment for nuclear weapons. Therefore the fear factor associated with anything nuclear may possibly be perpetuated by this dominant frame package.

As Turk (1986) found, reporters often consult public relations practitioners first and therefore public relations practitioners may influence the media's agenda-setting process. Keeping in mind that advocacy within any industry should be conducted in an ethical manner and through open communication, the findings of this study suggest the nuclear energy industry should consider a strategic public relations campaign incorporating the sustainable energy attributes of nuclear energy. The increase in the use of the sustainable dominant frame package demonstrates that stories focusing on nuclear energy in regards to lower carbon emissions, alternative energy source, carbon footprint, and the environment are generating greater interest among reporters. Stories containing the sustainable dominant frame package were also more likely to be reported in a positive tone. Further more, a positive correlation between year and the story element energy, defined as the United States becoming less dependent upon oil and/or natural gas and future energy needs, suggests increasing attention to the role of nuclear energy for meeting future electric generation needs.

While the story element "positive economic consequences" of nuclear energy was not significant over time, the story element "negative economic consequences" declined over time. Therefore, it is advisable for the nuclear energy industry to focus on the positive economic consequences in conjunction with nuclear energy as a sustainable energy. Upgrading and

expanding the United States nuclear energy infrastructure has been delayed by the current recession, specifically by limitations in the credit and equity markets. Present economic conditions may indicate an opportunity for advocating the positive economic consequences of nuclear energy, namely increased employment and additional tax revenue.

Weaver (2007) noted that the media have a stronger influence upon individuals who lack information on an issue or on those who remain uncertain about an issue. Undoubtedly, Gallup polls demonstrate both a lack of public information on nuclear energy safety and uncertainty about the safety of nuclear energy facilities within close proximity of an individual's residence. The significant dominant frame packages identified within this study appear to coincide with public opinion. The sustainable frame package supports expansion of nuclear energy, but is less prevalent than either the human/health or proliferation frame packages, which align with the expressed reluctance to having a nuclear facility within close proximity.

The influence these dominant frame packages have on public opinion, and subsequently public policy regarding nuclear energy, cannot be determined from this study. Based upon the research of Dearing and Rogers (1996) and Takeshita (2006), we realize the existence of symbiotic interrelationships between policymakers and the media. Therefore, given the prevalence of the dominant frame packages among the four newspapers, it might be prudent to acknowledge that these frames have become to some extent embedded within the public policy discourse for nuclear energy.

Finally, the credibility of the news reporting within the four newspapers cited within this study should not be overlooked. Kahnemann and Tversky (1984) posited that messages with high efficacy are less likely to be questioned. Nelson (1997) and Druckman (2001c) demonstrated that source credibility influences framing effects directly and indirectly. Given these findings, we

can reasonably wonder how many readers dare to question the efficacy of nuclear energy reporting within the highest circulating newspapers in the United States – the *New York Times*, *USA Today*, and the *Wall Street Journal* – as well as the newspaper of our nation’s capital, the *Washington Post*.

Limitations

When conducting framing studies the recommended size of the sample of news articles can be challenging. In examining framing effects related to current issues, often the total population of news articles is then analyzed. However, longitudinal framing studies require sampling. Lacking any empirically proven method for sampling news articles for a framing study, this study erred on the side of caution by employing a two-step random sampling process that exceeded the statistical sample size needed for the total population of news articles.

While a larger sample size may enhance the credibility of a framing study, it also increases the common sample required for assessment of intercoder reliability. Had the sample followed a typical random sampling technique, such as the criterion established by Isaac & Michael (1997), then the sample size would have been 52 percent smaller, resulting in a common sample of 78 news articles. Given the time needed for the extensive coding of the news articles, fewer news articles within the common sample could have resulted in higher intercoder reliability for latent content. Fewer news articles to code overall would have resulted in less coder fatigue, the chief complaint among the three coders.

Arguably the degree to which intercoder reliability was affected by having a larger common sample remains undetermined. Although small common samples are recognized to inflate reliability, a minimum or maximum number of units for a common sample size has not been determined within the social sciences. The solution may be to limit the number of articles each coder analyzes per day.

Beyond sample size, the maturity level of the undergraduate coders influenced the intercoder reliability of this study. Two out of the three coders selected “other” increasingly

more often as the coding process progressed and opined about the complexity of the coding. The third coder possessed research experience and this translated into his dedication to coding the news articles. Therefore, it is recommended coders have some experience or appreciation for academic research.

Directions for Future Research

Framing theory is one of the most utilized theories in mass communication for the 21st century (Bryant & Miron, 2004). However, sampling techniques vary. For instance, *The Framing Institute* selects every 15th story for analysis, while other researchers may use a simple random sample or analyze the total population of articles. The burning question is whether the dominant frames identified within the sample may be generalized to the total population of articles for the time period in question.

The methodology for this study attempts to assuage these concerns by presenting a sound methodology for extending framing research across disciplines. First, this study promotes over-sampling, recommending a sample representing 15 percent of the articles from the total population. Limitations from a large common sample for determining intercoder reliability may be countered by pacing coder analysis; limiting analysis to a maximum number of articles per day. Second, sampling bias, particularly periodicity, is greatly reduced by using stratified random sampling in conjunction with computerized renumbering of the total population of news articles. Next, articles for the sample are randomly selected using computerized random number generation. Finally, the use of multiple content sources is recommended.

To extend framing research within the area of nuclear energy, future studies may assess the degree of individual knowledge on nuclear energy and how the level of individual knowledge translates into the interpretation of nuclear energy frames. Lastly, a framing effects study incorporating the use of equivalency frames for global warming and the sustainable frame packages would provide identify how individuals attribute gains and losses to these variables.

References

- Altheide, D. (1997). The news media, the problem frame, and the production of fear. *The Sociological Quarterly*, 38(4), 647-668.
- Andrew, B. (2007). Media-generated shortcuts: Do newspaper headlines present another roadblock for low-information rationality? *Harvard International Journal of Press/Politics*, 12(2), 24-43.
- Bantimaroudis, P. & Ban, H. (2003). Covering the crisis in Somalia: Framing choices by The New York Times and The Manchester Guardian. In S. D. Reese, O. H. Gandy, Jr., & A. E. Grant (Eds.), *Framing public life: Perspectives on media and our understanding of the social world* (pp. 175_184). Mahwah, NJ: Lawrence Erlbaum Associates.
- Baumgartner, F., De Boef, S., & Boydston, A. (2008). *The decline of the death penalty and the discovery of innocence*. Cambridge, NY: Cambridge University Press.
- Baumgartner, F., & Jones, B. (2002). Positive and negative feedback in politics. In F. Baumgartner & B. Jones (Eds.), *Policy dynamics* (pp. 3-28). Chicago: The University of Chicago Press.
- Benton, M. and Frazier, P. (1976). The agenda setting function of the mass media at three levels of 'information holding'. *Communication Research* 3(3), 261-274.
- Blood, D. & Phillips, P. (1997). Economic headline news on the agenda: New approaches to understanding causes and effects. In M. McCombs, D. L. Shaw, & D. Weaver (Eds.), *Communication in democracy: Exploring the intellectual frontiers of agenda-setting theory* (pp. 3-14). Mahwah, NJ: Lawrence Erlbaum.

- Bostdorff, D. M., & Vibbert, S. L. (1994). Values advocacy: Enhancing organizational images, deflecting public criticism, and grounding future arguments. *Public Relations Review*, 20(2), 141-158.
- Brewer, P. R., & Gross, K. (2005). Values, framing, and citizens' thoughts about policy issues: Effects on content and quantity. *Political Psychology*, 26(6), 929-948.
- Brosius, H., & Kepplinger, H. M. (1990). The agenda setting function of television news: Static and dynamic views. *Communication Research*, 17(2), 183-211.
- Brossard, D., J. Shanahan and K. McComas (2004). Are issue-cycles culturally constructed? A comparison of French and American coverage of global climate change. *Mass Communication and Society*, 7(3); 359-377.
- Cappella, J. N., & Jamieson, K. H. (1997). *Spiral of cynicism: The press and the public good*. New York: Oxford Press.
- Chong, D. (1996). Creating common frames of reference on political issues. In D. C. Mutz, P. M. Sniderman, & R. A. Brody (Eds.), *Political persuasion and attitude change* (pp. 195-224). Ann Arbor: University of Michigan Press.
- Chong, D. (2000). *Rational lives: Norms and values in politics and society*. Chicago: University of Chicago Press.
- Chong, D., & Druckman, J. N. (2007). A theory of framing and opinion formation in competitive elite environments. *Journal of Communication*, 57(1), 99-118.
- Chyi, H. I., & McCombs, M. (2004). Media salience and the process of framing: Coverage of the Columbine school shootings. *Journalism & Mass Communication Quarterly*, 81(1), 22-35.

- Cohen, J.A. (1960). Coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*, 37-46.
- Cooil, B. & Rust, R. (1995), General estimators for the reliability of qualitative data. *Psychometrika 60*(2), 199-220.
- Cook, F. & Skogan W. (1990). Agenda setting and the rise and fall of policy issues: the case of criminal victimization of the elderly. *Environment and Planning C: Government and Policy, 8*(4), 395-415.
- Cox, D., & Cox, A. D. (2001). Communicating the consequences of early detection: The role of evidence and framing. *Journal of Marketing, 65*, 91-103.
- Dardis, F. (2006), Military accord, media discord: A cross-national comparison of UK vs. US press coverage of Iraq war protest. *The International Communication Gazette 68*(5-6), 409-426.
- Dardis, F. E., Baumgartner, F. R., Boydston, A. E., De Boef, S., & Shen, F. (2008). Media Framing of Capital Punishment and Its Impact on Individuals' Cognitive Responses. *Mass Communication and Society, 11*(2).
- De Dreu, C. K. W., & McCusker, C. (1997). Gain-loss frames and cooperation in two-person social dilemmas: A transformational analysis. *Journal of Personality and Social Psychology, 72*(5), 1093-1106.
- Dearing, J. W., & Rogers, E. (1996). *Communication concepts 6: Agenda setting*. Thousand Oaks, CA: Sage.
- Downs, A. (1972). Up and down with ecology – The “issue-attention cycle.” *Public Interest, 28*(Summer), 38-50.

- Druckman, J. N. (2001a). Evaluating framing effects. *Journal of Economic Psychology*, 22(1), 91-101.
- Druckman, J. N. (2001b). The implications of framing effects for citizen competence. *Political Behavior*, 23(3), 225-256.
- Druckman, J. N. (2001c). On the limits of framing effects: Who can frame. *The Journal of Politics*, 63(4), 1041-1066.
- Edy, J. A., & Meirick, P. C. (2007). Wanted, dead or alive: Media frames, frame adoption, and support for the war in Afghanistan. *Journal of Communication*, 57(1), 119-141.
- Elliott, A., & Woodward, W. (2007). *Statistical analysis quick reference guidebook*. Thousand Oaks: Sage Publications, Inc.
- Entman, R. M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication*, 43(4), 51-58.
- Entman, R. M. (2004). *Projections of power: Framing news, public opinion, and U.S. foreign policy*. Chicago: The University of Chicago Press.
- Entman, R. M. (2007). Framing bias: Media in the distribution of power. *Journal of Communication*, 57(1), 163-173.
- Fan, D., Keltner, K., & Wyatt, R. (2002). A matter of guilt or innocence: How news reports affect support for the death penalty in the United States. *International Journal of Public Opinion Research*, 14(4), 439-452.
- Fine, T. (1992). The impact of issue framing on public opinion toward affirmative action programs. *Social Science Journal*, 29, 323-334.
- Framing*. (2008). Retrieved April 14, 2008, from Frameworks Institute Web site: <http://www.frameworksinstitute.org/>

- Funkhouser, G. R. (1973). The issues of the sixties: An exploratory study in the dynamics of public opinion. *Public Opinion Quarterly*, 37(1), 62-75.
- Gallup. (2009). *Gallup Brain Database*. October 18, 2009. University Park: PA: The Pennsylvania State University.
- Ghanem, S. (1997). Filling in the tapestry: The second level of agenda setting. In M. McCombs, D. L. Shaw, & D. Weaver (Eds.), *Communication in democracy: Exploring the intellectual frontiers of agenda-setting theory* (pp. 3-14). Mahwah, NJ: Lawrence Erlbaum.
- Gamson, W. & Lasch, K. (1983). The political culture of social welfare policy. In S. E. Sprio and E. Yuchtman-Yaar (Eds.), *Evaluating the welfare state: Social and political perspectives* (pp. 397-415). New York: Academic.
- Gamson, W., & Modigliani, A. (1989). Media discourse and public opinion on nuclear power: A constructionist approach. *American Journal of Sociology*, 95(1), 1-37.
- Gandy, O. (1982). *Beyond agenda-setting: Information subsidies and public policy*. Norwood, NJ: Ablex.
- Goffman, E. (1974). *Frame analysis: An essay on the organization of experience*. York, PA: The Maple Press.
- Gross, K. (2000). The limits of framing: how framing effects may be limited or enhanced by individual level predispositions. Presented at the annual meeting Midwest Political Science Association, Chicago, IL.
- Herbst, A. M., & Hopley, G. W. (2007). *Nuclear energy now*. Hoboken, NJ: John Wiley.
- Hill, D. B. (1985). Viewer characteristics and agenda-setting by television news. *Public Opinion Quarterly*, 49(3), 340-350.

- Hwang, H., Gotlieb, M. Nah, S., & McLeod, D. (2007). Applying a cognitive-processing model to presidential debate effects: Postdebate news analysis and primed reflection. *Journal of Communication, 57*(1), 40-59.
- Isaac, M. & Michael, W. (1997). Handbook in research and evaluation, 2nd edition, San Diego: Educational and Industrial Testing Services
- Iyengar, S. (1991). *Is anyone responsible? How television frames political issues*. Chicago: The University of Chicago Press.
- Iyengar, S., & Kinder, D. R. (1987). *News that matters: Agenda-setting and priming in a television age*. Chicago: Chicago Press.
- Jasperson, A. E., Shah, D. V., Watts, M., Faber, R. J., & Fan, D. P. (1998). Framing and the public agenda: Media effects on the importance of the federal budget deficit. *Political Communication, 15*(2), 205-224.
- Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgment under uncertainty: Heuristics and biases*. New York: Cambridge University Press.
- Kahneman, D., Slovic, P., & Tversky, A. (1984). *Choices, values, and frames*. *American Psychologist, 39*(April), 341-350.
- Kahneman, D. (2003). Maps of bounded rationality: A perspective on intuitive judgment and choice. In T. Frangmyr (Ed.), *Les Prix Nobel: The Nobel Prizes 2002* (pp.449-489). Stockholm: Nobel Foundation.
- Kaid, L., & Wadsworth, A. (1989). Content analysis. In P. Emmert & L.L. Barker (Eds.) *Measurement of communication behavior* (pp. 197-217). New York: Longman.
- Kellstedt, P. M. (2000). Media framing and the dynamics of racial policy preferences. *American Journal of Political Science, 44*(2), 245-260.

- Kensicki, L. J. (1998). No cure for what ails us: The media-constructed disconnect between social problems and possible solutions. *Journalism & Mass Communication Quarterly*, 81(1), 53-73.
- Kim, S., Scheufele, D. A., & Shanahan, J. (2002). Think about it this way: Attribute agenda-setting function of the press and the public's evaluation of local issues. *Journalism & Mass Communication Quarterly*, 79(1), 7-25.
- Kinder, D. & Sanders, L. (1990). Mimicking political debate with survey questions: The case of white opinion on affirmative action for blacks. *Social Cognition* 8(1), 73-103.
- Krippendorff, K. (2004). Reliability in content analysis: Some common misconceptions and recommendations. *Human Communication Research*, 30(3), 411-433.
- Lando, B. (2007). Analysis: American favor nuclear energy. United Press International. Retrieved April 22, 2008, from <http://www.upi.com>
- Lasorsa, D. L. (1997). Media agenda setting and press performance: A social system approach for building theory. In D. Shaw, M. McCombs, & D. Weaver (Eds.), *Communication and democracy: Exploring the intellectual frontiers in agenda-setting theory* (pp. 155-167). Mahwah, NJ: Lawrence Erlbaum.
- Lippman, W. (1922). *Public opinion*. New York: Macmillan.
- Lombard, M., Snyder-Duch, J., & Bracken, C. C. (2002). Content analysis in mass communication: Assessment and reporting of intercoder reliability. *Human Communication Research*, 28(4), 587-604.
- Long, M., Slater, M., Bolarsky, G., Stapel, L. & Keefe, T. (2005). Obtaining nationally representative samples of local news media outlets. *Mass Communication & Society*, 8(4), 299-322.

- Luther, C. A., & Miller, M. M. (2005). Framing of the 2003 U.S. Iraq war demonstrations: An analysis of news and partisan text. *Journalism & Mass Communication Quarterly*, 82(1), 78-96.
- MacKuen, M. & Coombs, S. (1981). More than news: Two studies of media power. Beverly Hills: Sage Publications.
- McCombs, M. (1997). Building consensus: The news media's agenda-setting roles. *Political Communication*, 14(4), 433-443.
- McCombs, M. (2004). *Setting the agenda*. Malden, MA: Blackwell.
- McCombs, M., & Ghanem, S. (2003). The convergence of agenda setting and framing. In S. D. Reese, O. H. J. Gandy & A. E. Grant (Eds.), *Framing public life: Perspectives on media and our understanding of the social world* (pp. 67-82). Mahwah: Lawrence Erlbaum Associates.
- McCombs, M., & Shaw, D. (1972). The agenda-setting function of mass media. *Public Opinion Quarterly*, 36(2), 176-185.
- McCombs, M., Shaw, D. L., & Weaver, D. (1997). Prologue: The game is afoot. In M. McCombs, D. L. Shaw, & D. Weaver (Eds.), *Communication and democracy: Exploring the intellectual frontiers in agenda-setting theory* (pp. ix-xiii). Mahwah, NJ: Lawrence Erlbaum.
- McLeod, D. M., Kosicki, G. M., & McLeod, J. M. (2002). Resurveying the boundaries of political communication effects. In J. Bryant & D. Zillman (Eds.), *Media effects: Advances in theory and research* (pp. 215-267). Mahwah, NJ: Lawrence Erlbaum.
- McLeod, S. (2001). Why worry about CSR? *Strategic Communication Management*, August/September, 8-9.

- Mumford, L. (1991). *The city in history: Its origins, its transformations, and its prospects*. Harmondsworth, UK.
- Nelson, B. (1984). *Making an issue of child abuse*. Chicago: University of Chicago Press.
- Nelson, T. E., Clawson, R. A., & Oxley, Z. M. (1997). Media framing of a civil liberties conflict and its effect on tolerance. *American Political Science Review*, 91(3), 567-583.
- Neuendorf, K. A. (2002). *The content analysis guidebook*. Thousand Oaks, CA: Sage.
- Nuclear Energy Institute (2007). *Environment: Emission prevented*. Washington, D.C.: Author.
- Nuclear energy: Powering America's future* [Brochure]. (2007). Washington, D. C.: Author.
- Nuclear power's new age. (2007, September 8-14). *The Economist*, 384(8545), 13.
- Nunnley, J. (1978). *Psychometric Theory*. New York: McGraw-Hill Publishing Company.
- Palmgreen, P., & Clarke, P. (1977). Agenda-setting with local and national issues. *Communication Research*, 4(4), 435-452.
- Pan, Z., & Kosicki, G. M. (1993). Framing analysis: An approach to news discourse. *Political Communication*, 10(1), 55-75.
- Perry, D., Taylor, M. & Doerfel, M. (2003). Internet-based communication in crisis management. *Management Communication Quarterly*, 17(2), 206 - 232
- Peter, J., & Lauf, E. (2002). Reliability in cross-national content analysis. *Journalism & Mass Communication Quarterly*, 79(4), 815-832.
- Petty, R. E., Priester, J. R., & Brinol, P. (2002). Mass media attitude change: Implications of the elaboration likelihood model of persuasion. In J. Bryant & D. Zillmann (Eds.), *Media effects: Advances in theory and research* (pp. 155-198). Mahwah, NJ: Lawrence Erlbaum.

- Pfau, M. R. (1995). Covering urban unrest: The headline says it all. *Journal of Urban Affairs*, 17(2): 131-41.
- Price, V. & Na, E. (2000). Citizen deliberation and resistance to framing effects. Paper presented at the annual meeting of the American Association for Public Opinion Research, Portland, Oregon, May.
- Price, V., & Tewskbury, D. (1997). News values and public opinion: A theoretical account of media priming and framing. In G. A. Barnett & F. J. Boster (Eds.), *Progress in communication sciences* (pp. 481-506). Norwood, NJ: Ablex.
- Reese, S. (2003) Prologue. In S. Reese, O. Gandy, & A. Grant (Eds.), *Framing public life* (7-31). Mahwah, NJ: Lawrence Erlbaum.
- Riffe, D., Lacy, S., & Fico, F. (2005) *Analyzing media messages*. Mahwah, NJ: Lawrence Erlbaum.
- Roberts, M. (1997). Political advertising's influence on news, the public and their behavior. In M. McCombs, D. L. Shaw, & D. Weaver (Eds.), *Communication and democracy: Exploring the intellectual frontiers in agenda-setting theory* (pp. 85-96). Mahwah, NJ: Lawrence Erlbaum.
- Rosa, E., & Dunlap, R. (1994). Nuclear power: Three decades of public opinion. *Public Opinion Quarterly*, 58(2), 295-324.
- Ross, S., & Bantimaroudis, P. (2006). Frame shifts and catastrophic events: The attacks of September 11, 2001, and *New York Times's* Portrayals of Arafat and Sharon.
- Salovey, P., Schneider, T. R., & Apanovitch, A. M. (2002). Message framing in the prevention and early detection of illness. In J. P. Dillard & M. Pfau (Eds.), *The persuasion handbook* (pp. 391-406). Thousand Oaks, CA: Sage.

- Sassen, S. (2001). *The global city: New York, London, Tokyo* (2nd ed.). Princeton, NJ: Princeton University Press.
- Scheufele, D. A. (1999). Framing as a theory of media effects. *Journal of Communication*, 49(1), 103-122.
- Scheufele, D. A. (2000). Agenda-setting, priming, and framing revisited: Another look at cognitive effects of political communication. *Mass Communication & Society*, 3(2/3), 297-316.
- Scheufele, D. A. (2004). Framing-effects approach: A theoretical and methodological critique. *Communications*, 29(4), 401-428.
- Scheufele, D., & Tewksbury, D. (2007). Framing, agenda setting, and priming: The evolution of three media effects models. *Journal of Communication*, 57(1), 9-20.
- Schoenbach, K. (1982). The issues of the seventies: Electronic content analysis and the orange observation of agenda-setting effects of the mass media. *Publizistik*, 27(1) 129-140.
- Scott, W. (1955). Reliability of content analysis: The case of nominal coding. *Public Opinion Quarterly*, 19(3), 321-325.
- Sethi, S. P. (1979). Institutional/image advertising and idea/issue advertising as marketing tools: Some public policy issues. *Journal of Marketing*, 43(1), 68-78.
- Shah, D. V., Watts, M. D., Domke, D., & Fan, D. P. (2002). News framing and cueing of issue regimes: Explaining Clinton's public approval in spite of scandal. *Public Opinion Quarterly*, 66(37), 339-370.
- Shah, H., & Thronton, M. C. (2004). *Newspaper coverage of interethnic conflict. Competing visions of America*. Thousand Oaks, CA: Sage.

- Shah, D. V., Dome, D., & Wackman, D. B. (1996). 'To thine own self be true': Values, framing and voter decision-making strategies. *Communication Research*, 23(5), 509-560.
- Shah, D. V., Kwak, N., Schmierback, M., & Zubric, J. (2004). The interplay of news frames on cognitive complexity. *Human Communication Research*, 30(1), 102-120.
- Shaw, D. L., & Hamm, B. J. (1997). Agendas for a public union or for private communities? How individuals are using media to reshape American society. In D. Shaw. M. McCombs, & D. Weaver (Eds.), *Communication and democracy: Exploring the intellectual frontiers in agenda-setting theory* (pp. 155-167). Mahwah, NJ: Lawrence Erlbaum.
- Shen, F. (2004). Effects of news frames and schemas on individuals' issue interpretations and attitudes. *Journalism & Mass Communication Quarterly*, 81(2), 400-416.
- Takeshita, T. (2006). Current critical problems in agenda-setting research. *International Journal of Public Opinion Research*, 18(3), 275-296.
- Tversky, A. & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science* 211(4481), 453-458.
- Tversky, A. & Kahneman, D. (1987). Rational choice and the framing of decisions. In Robin M. Hogarth and Melvin W. Reder (Eds.), *Rational choice: The contrast between economics and psychology* (pp. 67-94). Chicago: University of Chicago Press.
- Taylor, J. & Watkinson, D. (2007). Indexing reliability for condition survey data. *The Conservator*, 40, 49-62.
- Top media outlets 2009: Newspapers, blogs, consumer magazines & social networks.* (2009). Retrieved April 11, 2009, from *Burrelles Luce* Web site:
http://www.burrellesluce.com/top100/?cid=tpm_PR_A172XK3W

- Turk, J. V. (1986). Public relations' influence on the news. *Newspaper Research Journal*, 7(4), 15-27.
- Wahkstrom, B. (2005). Challenges in the nuclear industry: Perspectives from senior managers and safety experts. In B. Wilpert, N. Itoigawa & B. Fahlbruch (Eds.), *Emerging demands for the safety of nuclear power operations* (pp. 17-30). Boca Raton, FL: CRC Press.
- Walker, J. S. (2000). *Permissible dose*. Los Angeles: University of California Press.
- Weaver, D. (1977). Political issues and voter need for orientation. In D. Shaw & M. McCombs (Eds.), *The emergence of American political issues: The agenda-setting function of the press* (pp. 107-120). St. Paul, MN: West.
- Williams, W., Shaprio, M., & Cutbirth, C. (1983). The impact of campaign agendas on perceptions of issues. *Journalism Quarterly*, 60(2), 226-232.
- Wimmer, R. D., & Dominick, J.R. (2003). *Mass media research: An introduction* (7th ed.). Belmont, CA: Wadsworth.
- Yang, J. & Stone, G. (2003). The powerful role of interpersonal communication in agenda setting. *Mass Communication and Society*, 6(1), 57-74.

Appendix A: Tables

Table A1: Comparison of Intercoder Reliability Indices

Category	Percent Agreement*	PRL*	Scott's Pi**																								
Dateline	.87	.95																									
Newspaper	.95	.95																									
ALT Energy Head	.99	.95																									
Headline Tone	.73	.80	.59																								
Brief	.97	.95																									
Byline	.97	.95																									
Story Tone	.72	.80	.56																								
Story Elements	.99	.95																									
	<table border="1"> <tr><td>Chernobyl</td><td>.99</td></tr> <tr><td><i>The China Syndrome</i></td><td>100</td></tr> <tr><td>Global warming</td><td>.97</td></tr> <tr><td>Marshall Plan</td><td>.99</td></tr> <tr><td>Nuclear weapons</td><td>.91</td></tr> <tr><td>Price Anderson Act</td><td>.99</td></tr> <tr><td>Tennessee Valley Authority</td><td>100</td></tr> <tr><td>Three Mile Island</td><td>.99</td></tr> <tr><td>Yucca mountain</td><td>.99</td></tr> <tr><td>Energy Policy 2005</td><td>.99</td></tr> <tr><td>Nuclear Waste Policy Act</td><td>100</td></tr> </table>	Chernobyl	.99	<i>The China Syndrome</i>	100	Global warming	.97	Marshall Plan	.99	Nuclear weapons	.91	Price Anderson Act	.99	Tennessee Valley Authority	100	Three Mile Island	.99	Yucca mountain	.99	Energy Policy 2005	.99	Nuclear Waste Policy Act	100				
Chernobyl	.99																										
<i>The China Syndrome</i>	100																										
Global warming	.97																										
Marshall Plan	.99																										
Nuclear weapons	.91																										
Price Anderson Act	.99																										
Tennessee Valley Authority	100																										
Three Mile Island	.99																										
Yucca mountain	.99																										
Energy Policy 2005	.99																										
Nuclear Waste Policy Act	100																										
Story Elements Defined	.90	.95																									
	<table border="1"> <tr><td>Energy</td><td>.95</td></tr> <tr><td>Health</td><td>.91</td></tr> <tr><td>Catastrophic Incident</td><td>.88</td></tr> <tr><td>Plant financing</td><td>.86</td></tr> <tr><td>Licensing process</td><td>.87</td></tr> <tr><td>Safety/security</td><td>.87</td></tr> <tr><td>Negative economic consequence</td><td>.89</td></tr> <tr><td>Positive economic consequence</td><td>.94</td></tr> <tr><td>Global</td><td>.81</td></tr> <tr><td>Government</td><td>.59</td></tr> <tr><td>Nuclear waste</td><td>.91</td></tr> <tr><td>Parts</td><td>.94</td></tr> </table>	Energy	.95	Health	.91	Catastrophic Incident	.88	Plant financing	.86	Licensing process	.87	Safety/security	.87	Negative economic consequence	.89	Positive economic consequence	.94	Global	.81	Government	.59	Nuclear waste	.91	Parts	.94		
Energy	.95																										
Health	.91																										
Catastrophic Incident	.88																										
Plant financing	.86																										
Licensing process	.87																										
Safety/security	.87																										
Negative economic consequence	.89																										
Positive economic consequence	.94																										
Global	.81																										
Government	.59																										
Nuclear waste	.91																										
Parts	.94																										

	Delay	.97		
Dominant Frame Package	.58		.80	.54
Frame Type	.66		<.80	1
Stereotypes	.72		.90	.02
Public Opinion	.97		.95	
Alternative Energy Sources	100		.95	
Quote Affiliation 1	.89		.95	
Quote Affiliation 2	.88		.95	
Quote Affiliation 3	.84		.95	
Quote Affiliation 4	.89		.95	
Quote Affiliation 5	.94		.95	
Quote Affiliation 6	.96		.95	
Quote Affiliation 7	.99		.95	
Quote Tone 1	.74		.90	.74
Quote Tone 2	.83		.95	.79
Quote Tone 3	.85		.95	.77
Quote Tone 4	.89		.95	.78
Quote Tone 5	.96		.95	.86
Quote Tone 6	.96		.95	.70
Quote Tone 7	.99		.95	1
Hiding	.89		.95	.64
Countries	.98		.95	

**Represents three coders **Represents two coders*

Table A2: Total Number of Stories with Dominant Frame Packages by Newspaper

DPF	Total	%	<i>New York Times</i>	%	<i>USA Today</i>	%	<i>Wall Street Journal</i>	%	<i>Washington Post</i>	%
Proliferation	140	25.3	68	29.1	8	30.8	16	10.1	56	39.2
Human/health	134	24.2	69	29.5	9	34.6	23	14.6	33	23.1
Procedural	116	21.0	46	19.7	4	15.4	44	27.8	22	15.4
Marketplace	100	18.1	25	10.7	2	7.7	61	38.6	12	8.4
Sustainable	21	3.8	6	2.6	2	7.7	3	1.9	10	7.0
Technology	19	3.4	8	3.4	0	0	6	3.8	5	3.5
Choice	17	3.1	7	3.0	1	3.8	5	3.2	4	2.8
Necessity	6	1.1	5	2.1	0	0	0	0	1	0.7

Note. n = 553, n = 234, n = 26, n = 158, n = 143

Table A3: Chi Square Results for Significant Dominant Frame Packages by Newspaper

Dominant Frame Package		Newspaper			
		<i>NYT</i>	<i>USA</i>	<i>WSJ</i>	<i>WP</i>
Human/Health	Count	69.0	9.0	23.0	33.0
	Expected Count	55.9	6.2	37.7	34.2
Procedural	Count	46.0	4.0	44.0	2.0
	Expected Count	48.4	5.4	32.7	29.6
Marketplace	Count	25.0	2.0	61.0	12.0
	Expected Count	41.7	4.6	28.2	25.5
Proliferation	Count	68.0	8.0	16.0	56.0
	Expected Count	61.7	6.9	41.7	37.7
TOTAL	Count	234.0	26.0	158.0	143.0

Table A4: Total Number of Stories by Dominant Frame Package and Story Tone

DPF	n	Positive	%	Negative	%	Neutral	%	Chi-square
Proliferation	148	1	0.7	61	41.2	86	58.1	15.219***
Human/ health	134	2	1.5	60	44.8	72	53.7	18.988***
Procedural	113	3	2.7	22	19.5	88	77.9	8.833*
Marketplace	99	8	8.1	12	12.1	79	79.8	22.361***
Sustainable	36	4	11.1	3	8.3	14	38.9	15.334***
Technology	19	1	5.3	4	21.1	14	73.7	.83
Choice	17	1	5.9	4	23.5	12	70.6	.517
Necessity	6	1	16.7	2	33.3	3	50.0	2.933

2X2 Chi-square analysis run with presence of device (yes/no) by story tone (positive/negative).

*p<.05. **p <.01. ***p<.001.

Table A5: Chi Square Results for Headline Tone and Story Tone

Headline Tone		Story Tone		
		Negative	Neutral	Positive
Negative	Count	91.0	77.0	0
	Expected Count	48.6	113.5	5.9
Neutral	Count	81.0	314.0	14.0
	Expected Count	118.2	276.3	14.4
Positive	Count	0	11.0	7.0
	Expected Count	5.2	12.2	.6
TOTAL	Count	172.0	402.0	21.0

Appendix B: Figures

Figure B1: The Population of Nuclear Energy Articles by Newspaper Per Year

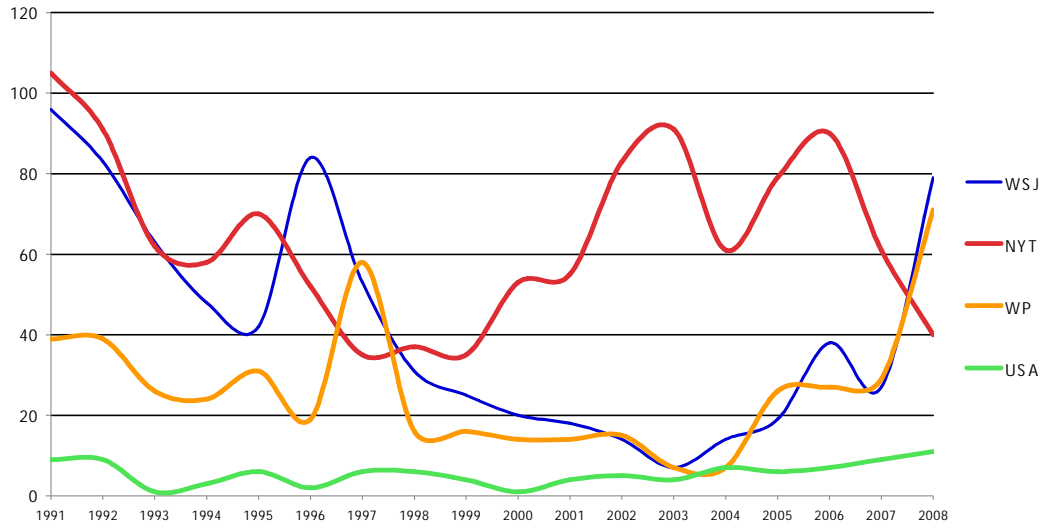


Figure B2: Randomly Generated Article Numbers for Sampling from the Wall Street Journal
for 1991.

057	108	044	058	049	076	084	118	047	050	072	095	083	030	067
111	036	081												

Figure B3: Comparison of Dominant Frames Packages

Between the *New York Times* and *USA Today*

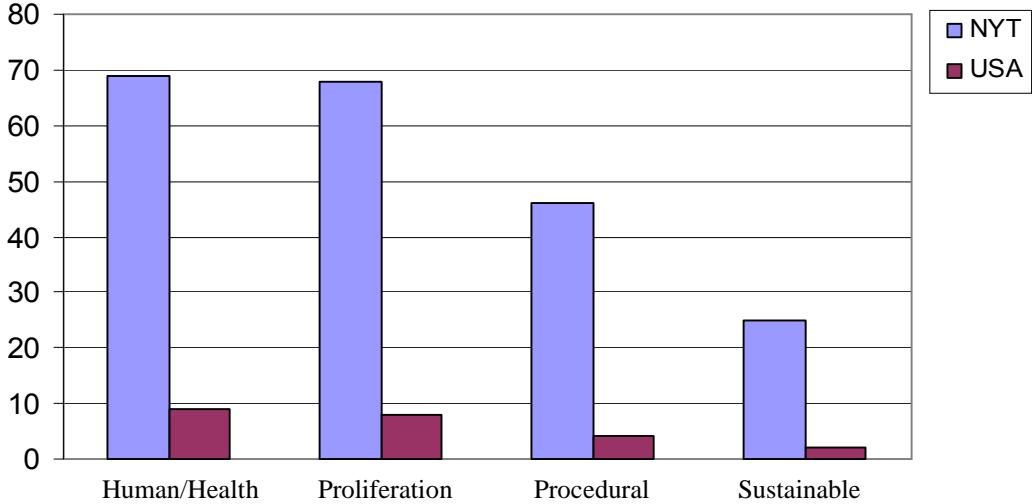


Figure B4: Dominant Frame Packages for the *Washington Post*

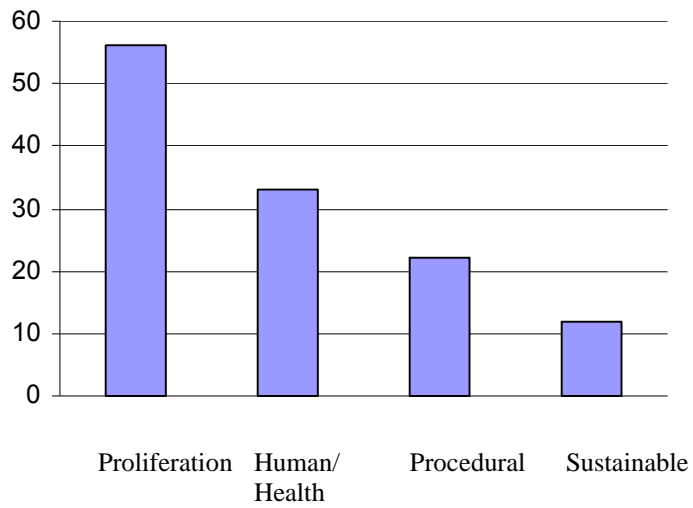


Figure B5: Dominant Frame Packages for the *Wall Street Journal*

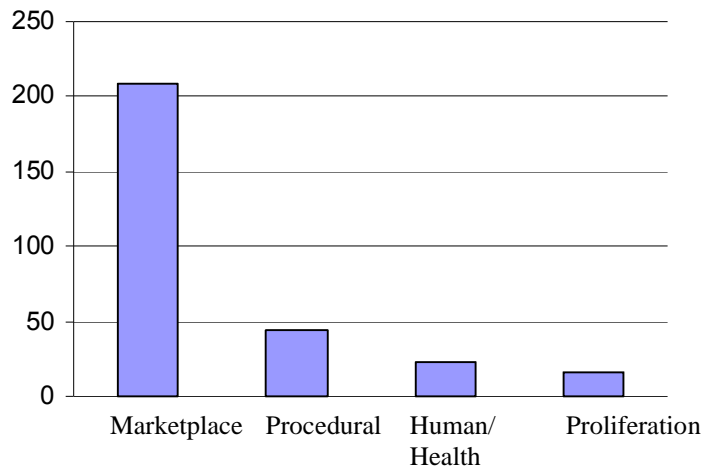


Figure B6: Changes Among Significant Defined Story Elements from 1991-2008

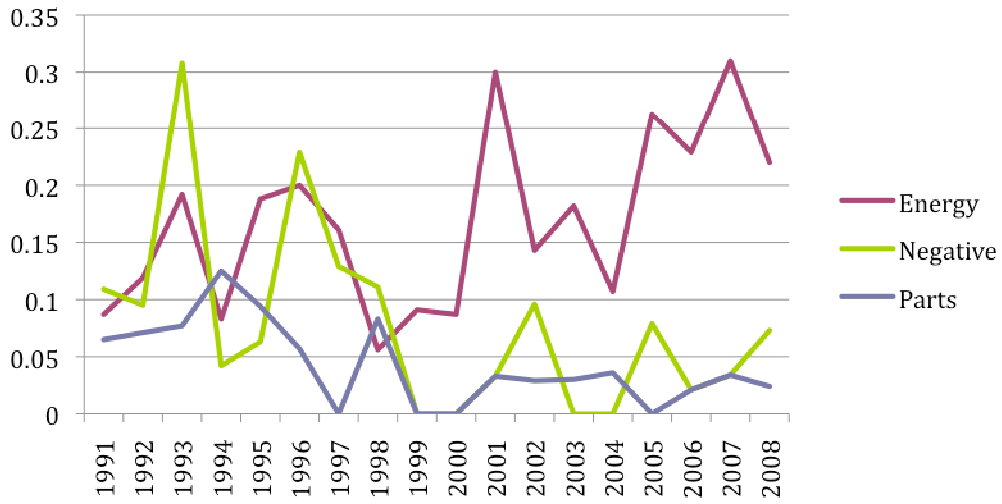
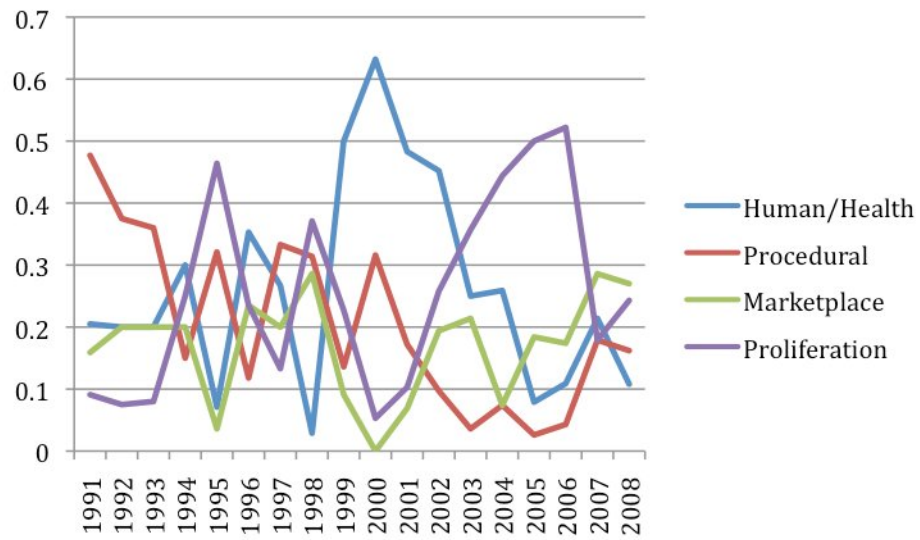


Figure B7: Comparison of Significant Dominant Frame Packages from 1991-2008



Appendix C

Original Framing Study Codebook

Directions: Please analyze each article using the questions below. You will notice that a double-digit number appears before each response. Please enter the double-digit number onto the coding sheet within the category.

1. NO (STORY NUMBER)

Record the article number located in the upper right corner.

2. DT (DATE)

Record the date of the article, year first. (1991/01/01)

3. DL (DATELINE)

According to the dateline, does the story originate in the United States?

01 Yes

00 No

4. NP (NEWSPAPER)

Code for the newspaper that ran the article

01 The New York Times

02 USA Today

03 The Wall Street Journal

04 The Washington Post

5. Write the headline as it appears above the story on the headline sheet.

6. ALTH (ALTERNATIVE ENERGY HEADLINE)

Does the headline refer to nuclear energy as an alternative energy source?

01 Yes

00 No

7. HT (HEADLINE TONE)

Is the tone of the headline anti-nuclear, neutral or pro-nuclear?

01 Anti-nuclear

02 Neutral

03 Pro-nuclear

8. BF (BRIEF)

Is the article three paragraphs or less?

01 Yes

00 No

9. BY (BYLINE)

Does article have a byline (author), or is it an Associated Press article?

01 Byline

02 Associated Press

Code for Associated Press even if a byline appears with AP following it.

10. ST (STORY TONE)

Is the tone of the article anti-nuclear, neutral, or pro-nuclear?

01 Anti-nuclear

02 Neutral

03 Pro-nuclear

11. SE (STORY ELEMENTS)

Identify all story elements that are directly referenced, meaning that the term or name appears in the article:

01 Chernobyl

02 *The China Syndrome*, the movie

03 Global warming

04 Marshall Plan

05 Nuclear weapons

06 Price Anderson Act

07 Tennessee Valley Authority (TVA)

08 Three Mile Island (TMI)

09 Yucca mountain

10 The Energy Policy Act of 2005

12. SED (STORY ELEMENTS DEFINED)

Identify all story elements that may be referenced directly, through the usage of the term, or indirectly, by the definition of the term.

01 Energy: Reference to the United States becoming less dependent upon oil and/or natural gas; future energy needs.

02 Health concerns: Mental or physical risk associated with exposure to radiation, or the possibility or fear of mental or physical risk from nuclear energy such as NIMBY (not in my back yard).

03 Catastrophic incident: Potential for a nuclear plant meltdown; nuclear plants as terrorists' targets.

04 Plant Financing: Funding, loan guarantees, cost over-runs, and/or budget cuts in the construction of new nuclear reactors or plants.

05 Licensing process: Combined Operating Licensing Application (COLA), design certification for new reactors, end/or early site permit.

06 Safety/security: Prevention of nuclear accidents due to human error, or technical/mechanical malfunction.

07 Negative Economic Consequence: Negative outcomes for the economy through increased nuclear energy production. These outcomes include nuclear plant construction costs and increased electricity prices to cover the construction costs.

08 Positive Economic Consequence: Positive outcomes for the economy through increased nuclear energy production. These outcomes include increased revenue or taxes from nuclear energy plants for the communities it serves, and increased employment.

09 Global: Comparing the United States use of nuclear energy with other countries such as France or China.

10 Government: Inspection or investigation of a nuclear plant by the Nuclear Regulatory Commission (NRC) or the Department of Energy (DOE).

11 Nuclear waste: The storage, transportation, long-term effects of spent fuel rods from a nuclear reactor or plant.

12 Parts: The supply of reactors, turbines, concrete, or other materials needed for construction.

13. DFP (DOMINANT FRAME PACKAGE)

The following framing packages may appear within the news article. Select the dominant framing package.

01 Technology – The news article focuses on technology aspects such as improved safety, efficiency, improved design, and/or international comparison between U.S. nuclear plants and another country.

02 Human/Health – The news article focuses on negative consequences to life or health from a meltdown due to human error, terrorist attack, technical malfunction, leaks, waste disposal or reluctance to have a nuclear plant in the area.

03 Global Warming – The news article focuses on lower emissions, environment, carbon footprint, cleaner air, and pollution control or pollution reduction.

04 Procedural – The news article focuses on the licensing and application process for nuclear energy plants, construction time, or anticipate start date for plant.

05 Necessity – The article focuses on nuclear energy as a necessity for energy independence, energy sustainability or meeting energy demands.

06 Sustainable – The articles focuses on alternative energy sources that have minimal impact on the environment.

07 Marketplace – The article focuses on nuclear energy as a cost effective, viable investment.

08 Choice – The articles focuses on nuclear energy as a negotiation between the positive and negative attributes of this energy source.

09 Other (Please specify) _____

14. FT (FRAME TYPE)

Identify the type of frame used, episodic or thematic. Definitions and examples provided by the Framing Works Institute, 2009.

01 Episodic

“Episodic news frames are those that apply a telephoto lens to the coverage of the issue – focusing on individual case studies and discrete events.”

Episodic framing example

Health-care coverage continued to be a problem when Robinson, who is black, went to work. Until February, Robinson, who is married and the father of a 1-year-old son, Gabriel, was a sales floor supervisor for an office supply store in Cherry Hill. Robinson put in about 35 hours a week, but he and his family weren't eligible for company health benefits...

02 Thematic

”Thematic news frames are those that apply a wide-angle lens to the coverage of the issue – focusing on trends over time, and highlighting contexts and environments.”

Thematic framing example:

Spurred by the growing crisis in child obesity, the nation's schools have made “considerable improvements” in nutrition, fitness and health over the last six years, according to a new government survey that found that more schools require physical education and fewer sell French fries. The survey, which is conducted every six years, shows that more schools than six years ago offer salads and vegetables and that fewer permit bake sales.

15. STER (STEREOTYPES)

Does the article reinforce nuclear stereotypes or dispel nuclear stereotypes?

01 Reinforce nuclear stereotypes (Unsafe for humans, health, environment)

02 Dispel nuclear stereotypes (Safer, better technology, reliable energy)

16. PO (PUBLIC OPINION)

Does the article reference the state of public opinion on nuclear energy? If so, does the article refer to public opinion towards nuclear energy as:

01 Increased/increasing

02 Decreased/decreasing

03 Uncertain/undecided

17. AES (ALTERNATIVE ENERGY SOURCES)

Code for all references to alternative energy sources. Check all that apply.

- 01 Wind
- 02 Solar
- 03 Hydro (water)
- 04 Fuel Cell
- 05 Geothermal
- 09 Other (Please specify)

18. ALTS (ALTERNATIVE ENERGY STORY)

Does the news article refer to nuclear energy as an alternative energy source?

- 01 Yes
- 00 No

19. AFF (AFFILIATION)

Identify all political, business or organization affiliations quoted in the story directly or indirectly. If a quote begins in one part of the story and continues in another part, count this as one quote.

Direct quote: “We expect to see conditions improve rather quickly,” said Senator Robert c. Byrd (D).

Indirect quote: Once the new policy is in play, Sen. Byrd (D) said conditions should improve quickly.

- 01 Republican
- 02 Democrat
- 03 Independent
- 04 Corporation/Business
- 05 Environmental Organization
- 09 Other

20. QT (QUOTE TONE)

Is the tone of the quote anti-nuclear, neutral, or pro-nuclear? Code for each quote.

- 01 Anti-Nuclear
- 02 Neutral
- 03 Pro-Nuclear

21. Count the number of words within any direct quotes and record the count under WD on the coding sheet. Align the quote tone with the word count so that QT1 goes with WD1 and so forth.

22. AOR (AGENCIES, ORGANIZATIONS REFERENCED)

Identify all agencies and organizations referenced within the article.

01 U. S. Department of Energy

02 Nuclear Regulatory Commission

03 Nuclear Energy Institute

04 Advocacy Group (Please specify) _____

09 Other (Please specify) _____

23. OC (OTHER COUNTRIES)

Identify all countries other than the United States referenced in the article?

01 China

02 France

03 Germany

04 Switzerland

05 Great Britain

06 India

09 Other (Please specify)

Appendix D

Final Framing Study Final Codebook

Directions: Please analyze the full-text of each article using the coding system below. You will notice that a double-digit number appears before the listed responses. Please enter the appropriate double-digit number onto the Excel coding sheet for each question.

1. NO (STORY NUMBER)

Record the article number located in the upper right corner.

2. DT (DATE)

Record the date of the article by year, month and date, i.e. January 1, 1991 would appear as 01/01/1991.

3. DL (DATELINE)

According to the dateline, does the story originate in the United States?

01 Yes

00 No

4. NP (NEWSPAPER)

Code for the newspaper that ran the article

01 The New York Times

02 USA Today

03 The Wall Street Journal

04 The Washington Post

5. ALTH (ALTERNATIVE ENERGY HEADLINE)

Does the headline refer to nuclear energy as an alternative energy source?

01 Yes

00 No

6. HT (HEADLINE TONE)

Is the tone of the headline negative, neutral or positive? Story tone may differ from the tone of the headline.

01 Negative

02 Neutral

03 Positive

7. BF (BRIEF)

Is the article three paragraphs or less? A new paragraph begins with each new break or line space between sentences within the article.

01 Yes

00 No

8. BY (BYLINE)

Does the article have a byline (author), or is it an Associated Press article?

Code for Associated Press even if a byline appears with AP following it.

00 No Byline

01 Byline

02 Associated Press

99 Other (Please specify, i.e. UPI)

9. ST (STORY TONE)

Is the tone of the article negative, neutral, or positive? Story tone may differ from the tone of the headline.

01 Negative

02 Neutral

03 Positive

10. SE (STORY ELEMENTS)

Identify all story elements that are directly referenced, meaning that the term or name appears anywhere in the article. Code for each.

01 Yes

00 No

01 Chernobyl

02 *The China Syndrome*, the movie

03 Global warming

04 Marshall Plan

05 Nuclear weapons

06 Price Anderson Act

07 Tennessee Valley Authority (TVA)

08 Three Mile Island (TMI)

09 Yucca mountain

10 The Energy Policy Act of 2005

11 Nuclear Waste Policy Act

99 Other (Please specify on code sheet)

11. SD (STORY ELEMENTS DEFINED)

Identify all story elements that may be referenced directly, through the usage of the term, or indirectly, by the definition or meaning of the term. Code yes or no for each SD.

01 Yes

00 No

01 Energy: Reference to the United States becoming less dependent upon oil and/or natural gas; future energy needs.

02 Health: Perceived risk to health.

03 Catastrophic Incident: Potential for a nuclear plant meltdown; nuclear plants as terrorists' targets, human error, or equipment malfunction.

04 Plant Financing: Funding, loan guarantees, cost over-runs, and/or budget cuts in the construction of new nuclear reactors or plants.

05 Licensing process: Combined Operating Licensing Application (COLA), design certification for new reactors, and/or early site permit.

06 Safety/security: Preventing/protecting nuclear plants from potential accidents resulting from human error, equipment malfunction, terrorist attacks; training of workers, evacuation plans, maintaining regulatory or industry standards.

07 Negative Economic Consequence: Negative outcomes for the economy through increased nuclear energy production. These outcomes include nuclear plant construction costs and increased electricity prices to cover the construction costs.

08 Positive Economic Consequence: Positive outcomes for the economy through increased nuclear energy production. These outcomes include increased revenue or taxes from nuclear energy plants for the communities it serves, and increased employment.

09 Global: Comparing the United States use of nuclear energy with other countries such as France or China, contracts for parts, supplies etc with other countries.

10 Government: Inspection or investigation of a nuclear plant by the Nuclear Regulatory Commission (NRC), the Department of Energy (DOE), U.S. Courts, federal courts, etc.

11 Nuclear waste: The storage, transportation, and long-term effects of spent fuel rods from a nuclear reactor or plant.

12 Parts: The supply of reactors, turbines, concrete, or other materials needed for construction.

13 Delay: Suspending nuclear plant expansion; a moratorium on increasing nuclear energy within the United States.

12. DFP (DOMINANT FRAME PACKAGE)

The following framing packages may appear within the news article. Select the dominant theme of the news article.

01 Technology – The news article focuses on research or technology aspects of nuclear energy such as improved safety, efficiency, improved design, and/or international comparison between U.S. technology/research in nuclear energy and another country.

02 Human/Health – The news article focuses on negative consequences to life or health from a meltdown due to human error, terrorist attack, technical malfunction, leaks, exposure to radiation, waste disposal or reluctance to have a nuclear plant in the area.

03 Sustainable – The news article focuses on lowering carbon emissions, alternative energy sources, carbon footprint, cleaner air, the environment, pollution control, or pollution reduction.

04 Procedural – The news article focuses on the licensing and application process for nuclear energy plants, construction time, anticipated start date for a plant, or delay (moratorium) in operating a plant.

05 Necessity – The article focuses on nuclear energy as a necessity for energy independence, energy sustainability or meeting energy demands.

06 Marketplace – The article focuses on nuclear energy as a cost effective, viable investment, and/or financial struggles of the industry or a nuclear plant.

07 Choice – The articles focuses on nuclear energy as a negotiation between the positive and negative attributes of this energy source.

08 Proliferation – The expansion of nuclear energy technology leading to an increase/enhancement in nuclear weapons, and/or enrichment of plutonium for nuclear weapons.

99 Other (Please specify) _____

13. FT (FRAME TYPE)

Identify the type of frame used, episodic or thematic. 01 Episodic 02 Thematic

What is a frame?

Frames are defined as interpretive packages for content that supplies a context and suggests the importance of an issue through selection, emphasis, exclusion, and elaboration (Gamson & Modigliani, 1989). Frames organize information in order to perpetuate understanding through the use of narratives and may be identified through the headline, lead, quotes, and paragraph within the body of a news story (Entman, 2007; Gamson, & Modigliani, 1989).

What is an episodic frame?

“The episodic news frame takes the form of a case study or event-oriented report and depicts public issues in terms of concrete instances (for example, the plight of a homeless person or a teenage drug user, the bombing of an airline, or an attempted murder” (Iyengar, 1991, p. 14).

What is an example of an episodic frame?

“Two years ago, when many college graduates were scrambling for a single job offer, seven landed in the hands of Ryan Hagler. The mechanical engineering graduate picked Westinghouse Electric Co., which is providing full tuition payment for his master’s degree in nuclear engineering from Penn State University.”

“Despite signs of improvement at Commonwealth Edison’s Dresden nuclear plant, much work remains to be done before federal regulators will consider removing it from a list of the nation’s most troubled nuclear power facilities, the head of the Nuclear Regulatory Commission said Monday.”

What is a thematic frame?

”The thematic frame, by contrast, places public issues in some more general or abstract context and takes the form of a ‘takeout,’ or ‘backgrounder;’ the report is directed at general outcomes or conditions” (Iyengar, 1991, p. 14).

What is an example of a thematic frame?

“The governments of Western Europe are subsidizing the operations of potentially dangerous nuclear reactors in Eastern Europe in order to import cheap electricity. Although the poor design and disrepair of Soviet-era nuclear reactors have been well documented, records at the International Atomic Energy Agency (IAEA)...”

How are episodic and thematic frames different?

“Episodic frames can be contrasted with thematic frames in many ways. Where an episodic frame would focus on an *individual*, a thematic frame would focus on the *issue*. An episodic frame focuses on a single *event*; a thematic frame focuses on *trends over time*. An episodic frame is more likely to keep its focus on the *private* realm (an individuals’ psychology, or behaviors within in a family) while a thematic frame would include the *public* (the surrounding environment, public institutions” (Benjamin, 2007).

14. STER (STEREOTYPES)

Does the article reinforce nuclear stereotypes or dispel nuclear stereotypes?

00 Neither reinforces nor dispels any stereotypes

01 Reinforce nuclear stereotypes (Unsafe for humans, health, environment)

02 Dispel nuclear stereotypes (Safer, better technology, reliable energy)

15. PO (PUBLIC OPINION)

Does the article reference the state of public opinion on nuclear energy? If so, does the article refer to public opinion towards nuclear energy as:

00 No reference to public opinion

01 Increased/increasing or favorable public opinion

02 Decreased/decreasing or opposing public opinion

03 Public is uncertain/undecided

16. AES (ALTERNATIVE ENERGY SOURCES)

Code for all references to alternative energy sources.

Code for each.

01 Yes

00 No

01 Wind

02 Solar

03 Hydro (water)

04 Fuel Cell (including Hydrogen technology)

05 Geothermal

99 Other (Please specify)

17. AEST (ALTERNATIVE ENERGY STORY)

Does the news article refer to nuclear energy as an alternative energy source?

01 Yes

00 No

Direct Quotes

Items 18, 19 and 20 are grouped on the code sheet as AFF1 QT1 WD1, AFF2, QT2, WD2, etc.

Direct quotes have been numbered within each story for you as “DQ1,” “DQ2,” etc.

If a direct quote begins in one part of the story and continues in another part, this is counted as one quote. Therefore, all quotes identified as “DQ1” should be coded as one quote for affiliation, tone and word count.

Example of a direct quote, coding for affiliation, tone, and word count

Direct quote: “We should see more nuclear plant construction over the next five years,” said Senator John Doe (D). You would code Sen. Doe’s affiliation as 02 – Democrat, tone – neutral, word count – 12.

If the story does not contain any quotes, it will be labeled as “No Quotes” at the top of the page. In then case, code 00 for affiliation, tone and word count.

18. AFF (AFFILIATION)

Code for the political, business, government or organization affiliation of the person quoted. Please note that direct quotes may be attributed to organizations and government agencies.

- 01 Republican political
- 02 Democrat political
- 03 Independent political
- 04 Corporation/Business
- 05 Advocacy Group
- 06 Government – Federal courts, U.S. court, Department of Energy, Nuclear Regulatory Commission, public service commissions, FBI CIA, etc.
- 07 Research Institute
- 08 University or College
- 09 International Organization or Agency (i.e. IAEA)
- 10 Lobbyist Groups
- 11 Union
- 12 Individual does not represent any corporation, organization or government agency
- 99 Other affiliation (Please specify on code sheet) _____

19. QT (QUOTE TONE)

Is the tone of the direct quote negative, neutral, or positive? Code for each individual or entity directly quoted.

For example, Senator Doe’s direct quote would be coded as 02, neutral.

- 01 Negative
 - 02 Neutral
 - 03 Positive

20. WD (WORD COUNT)

Record the number of words within quotes marks. Contractions (doesn't), numbers (1,000), percentages (9.6%) count as one word. For hyphenated words, count each word (i.e. long-standing = 2 words, 12-years-old = 3 words). Do count words appearing in parentheses or brackets within the quote.

21. AOR (AGENCIES, ORGANIZATIONS REFERENCED)

Identify all agencies and organizations referenced within the article.
Code for each.

01 Yes

00 No

- 01 U. S. Department of Energy (DOE)
- 02 Federal courts, U.S. court
- 03 Nuclear Regulatory Commission (NRC)
- 04 Public Service Commissions (PSC) or Public Utilities Commission (PUC)
- 05 FBI, CIA, Pentagon
- 06 Media (CNN, MSNBC, *New York Times*, etc.)
- 07 Nuclear Energy Institute (NEI)
- 08 Corporation/Business *other than an energy company*
- 09 Advocacy Group
- 10 Energy Company
- 11 Nuclear Reservation
- 12 Nuclear Energy Laboratory
- 13 University, College, or higher education affiliation
- 14 Research Institute
- 15 Environmental Law & Policy Center
- 16 IAEA (International Atomic Energy Association)
- 17 NATO
- 18 Lobbyist Groups
- 19 Union
- 20 Construction/Building Trades Council
- 21 International Commission on Radiological Protection
- 22 Department of Health
- 23 United States Council for Energy Awareness
- 24 Institute for Nuclear Power Operations
- 25 Nuclear Energy Agency (NEA)
- 26 Foreign nuclear energy ministry or department
- 99 Other (Please specify) _____

22. OC (OTHER COUNTRIES)

Identify all countries other than the United States referenced in the article
Code for each.

01 Yes

00 No

01 China

02 France

03 Germany

04 Switzerland

05 Great Britain

06 India

07 Russia

08 North Korea

09 South Korea

10 Iran

11 Spain

12 Portugal

13 Austria

14 Ukraine

15 Romania

16 Afghanistan

17 Indonesia

18 Iraq

19 Saudi Arabia

20 Czechoslovakia

21 Canada

22 Bulgaria

23 Hungary

24 Poland

25 Japan

26 Belarus

27 Israel

99 Other (Please specify)

23. H (Hiding)

Is the country or countries referenced in the article accused of hiding or disguising expansion of
its nuclear weapons within its nuclear energy program?

01 Yes

00 No

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- Spring 2009 Adjunct Instructor, English Department,
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