The U.S. Print Media's Framing of the Genetic Modification of Food

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(ABSTRACT)

In the last decade, the prevalence of genetically modified organisms (GMOs) within the American food supply has rapidly increased, with some experts estimating their presence in 80% of all U.S. food products. Unlike many other parts of the world, consumer opposition to this biotechnology has been modest in the U.S., and numerous studies have found that most Americans are unconcerned about this paradigm shift in agriculture. Although the genetic modification (GM) literature is substantial, little research has examined the role the media plays in this acquiescence, while even less has focused on the way critics and advocates of genetic modification have framed this issue. Addressing this lacuna is important because many scholars have concluded that the way an issue is framed significantly influences how an audience interprets a given message, and ultimately affects opinion formation. This study examined the websites of numerous anti-GM organizations and transnational biotech companies to determine the dominant frames they employ in their attempt to resonate with the American consumer. Once these frames were identified, frame analysis of the three most widely read newspapers in the country was conducted to measure the extent these frames have been employed by the U.S. print media. I hypothesized that the frames used by advocates of this technology have been employed at significantly greater rates than those of critics. This analysis suggested, however, that the way this issue has been framed in the print media is a less significant factor in this acquiescence than the dearth of coverage generally.

TABLE OF CONTENTS

LIST OF TABLES:

Chapter 1: Problem Statement

Agricultural biotechnology—the manipulation of plants and animals to elicit specific responses—dates back to the ancient practices of fermentation, grafting, and cloth manufacturing. Gregor Mendel significantly increased humanity's ability to control agricultural production with his discovery of the laws of inheritance in the 1850's. It was not until 1953, however, when Watson and Crick unraveled the DNA mystery with the identification of the 'double helix' structure that the current agricultural biotechnology revolution became possible. Today, the practice of genetic modification transfers DNA from one organism to another, expressing some trait of a donor organism in a recipient organism, and effectively takes biotechnology to a level inconceivable just a few decades ago. This recombinant DNA technology is used to increase agricultural productivity, improve plant resistance to external pressures, and to develop new pharmaceutical proteins and industrial compounds (Nevitt et al. 2003).

The introduction of food containing genetically modified organisms (GMOs) into the global food chain in the mid 1990's signaled the beginning of this new era and sparked a vitriolic global debate. Advocates of genetic modification (GM) claim this technology benefits farmers and the environment, and has the potential to alleviate global hunger and poverty. Critics counter that genetic modification may prove devastating to human and environmental health, decimates small-scale farmers and indigenous cultures, and only benefits transnational biotech companies. Many nations, particularly those of Europe and Africa, have adopted the precautionary principle and placed moratoriums on the cultivation and importation of GMOs (Bonfadelli et al. 2007). The U.S. has adopted the opposite position, stating that evidence must prove that GM crops are harmful before their implementation is limited or banned. Today, the U.S. produces over 70% of the world's GM crops, with roughly half of its corn, two thirds of its cotton, and nearly all of its soybeans genetically modified (Wolf et al. 2004)

Despite the profound implications of this manipulation of the food supply, genetic modification has yet to become an issue of much consequence for the majority of the American public (Chern et al. 2002; Hoban 1998; Wolf et al. 2004; Bonny 2004; Falkner 2007). For instance, a 2004 Food and Agriculture Organization (FAO) survey of 34

countries found that Americans were among the most supportive of genetic modification with over 60% of Americans believing that the benefits of biotechnology outweigh the risks and will benefit them in the next five years (FAO 2004). After conducting nationwide surveys from 2001 to 2006, the Pew Initiative on Food and Biotechnology concluded that with respect to the genetic modification of food, "it is clear that public opinion remains largely up for grabs" (Pew Initiative on Food and Biotechnology, 2006).

These findings prompted me to ask: "Is the apathy (or at least the undecided nature) of the American public towards the genetic modification of food due in part to the way it has been framed by the U.S. print media?" Numerous studies have concluded that the way an issue is framed significantly influences how that message is received and encoded by its audience, and ultimately affects opinions. Media frames hold a particularly important role in constructing reality, influencing the way its audience 'knows' the world by deeming certain issues worthy of discussion, highlighting certain bits of information while ignoring others, and encouraging a particular understanding of an issue (Tuchman 1978; Gans 1979; McQuail 1994; Entman 2002; Scheufele 1999). Gamson (1992: 6) points outs the important role media frames play in social change, noting, "Frames that are present in social movement discourse but are invisible in mass media commentary rarely find their way into (the public's) conversations."

This study has two primary purposes: 1) to shed light on how the critics of genetic modification (namely anti-GM environmental and consumer organizations) and its advocates (namely transnational biotech companies) have framed this issue, and 2) to locate and measure the use of these frames within the U.S. print media's coverage of agricultural biotechnology. In other words, this study examines the extent to which the frames employed by both sides of the GM debate have been incorporated into the U.S. print media's coverage of the issue, and to shed light on the possibility that this framing may factor into the acquiescence of the American public.

To address these issues, this study examines the websites of environmental and consumer organizations opposed to this biotechnology, and those of advocates, represented by the transnational biotech companies Monsanto, DuPont, and Dow, to determine the dominant frames they employ. Once identified, contextual content analysis of the New York Times, USA Today, and Wall Street Journal is conducted to locate and

measure the extent these frames are found in the three most widely read newspapers in the country. The selection of these three newspapers also allows for comparisons to be made between these outlets that are generally perceived as holding very different political viewpoints. I hypothesize that the frames employed by the critics of genetic modification have not made significant inroads within the U.S. print media's coverage of the issue, and likely factor into the lack of resonance this issue has for the American public.

This is important because the outcome of the genetic modification debate will ultimately affect the diet and health of all global citizens. Through the electorate and the purse the American public has a voice in determining whether this controversial practice is continued, limited, or rejected. The current food insecurity witnessed around the world, rising petroleum prices linked to agro-fuels, and conflicting claims about the merits of genetically modified food underscore the need to reassess the links between food, technology, and the media. If the critics of genetic modification are unable to reach the American public and resonate with them, the acquiescence evidenced by the "up for grabs" finding of the Pew institute will continue until the entire food supply is infiltrated with organisms whose long-term effects on society and the environment are unknowable.

The paper begins with a review of the literature that deals with frame theory, including its origin and principles, its applications within media and social movement studies, and its critics. Next, a brief overview of the genetic modification debate is covered and focuses on the major frames employed by interested actors. These frames are then searched for within the U.S. print media between 2001 and 2006 and analyzed to shed light on the potential influence of the U.S. print media on consumer acceptance of the genetic modification of food. Finally, avenues for further research are suggested.

Chapter 2: Review of the Literature

The purpose of this chapter is to introduce some of the literature on framing relevant for this study. The first section provides an overview of frame theory, discusses numerous topics within media and social movement studies that have utilized frame theory, and includes some of the most salient criticisms of this theory. The second section addresses the limited amount of research that applies frame theory to the genetic modification of food, and highlights the relative acceptance of genetic modification by American consumers. Finally, I use this review of the literature to point to the research questions this study addresses.

Frame Theory

Built on the ideas found within Erving Goffman's *Frame Analysis: An Essay on the Organization of Experience* (1974), frame theory has proven to be a useful tool for analyzing discourse within the social sciences. For Goffman (1974:21), frames are cognitive structures, or 'schemata' that allow us "to locate, perceive, identify, and label" experiences in our lives and hence make sense of our worlds. In other words, we actively interpret messages from the outside world through our own sense of reality, deciphering the extraneous presentation of ideas and their meanings through reference frames of our own, generally unconscious creation. Information is only meaningful when nested within a frame, allowing messages to be organized in a comprehensible manner. As Todd Gitlin (2003: 6) explains, "frames are principles of selection, emphasis and presentation composed of little tacit theories about what exists, what happens, and what matters."

In this manner, frames save us from sensory overload by siphoning out the most salient information needed to function effectively within our milieu. They allow for the interpretation, comprehension, storage and retrieval of information, while assisting with the formation of opinions and decisions. In essence, frames help people understand "what is it that is going on here" (Goffman 1974: 8) and "permit social actors to move in and out of different experiences as if they were not completely new" (Oliver and Johnston 2000:40). Klintman and Bostrom (2004: 615) note that our "pool of frames" is limited, allowing members of society to efficiently "relate new experiences to old ones."

Snow and Benford elaborate this notion in noting the role of a frame is to "selectively punctuate and encode objects, situations, events, experiences and sequences of actions within one's present and past environment" (1992: 137). In sum, frames prevent a constant, all consuming assessment of external stimuli by locating messages within digestible and familiar stories.

Goffman (1974: 22) posited that frames or 'primary frameworks' can be divided into two broad categories: natural and social. According to Goffman, natural frameworks "identify occurrences seen as undirected, unoriented, unanimated, unguided, 'purely physical'…It is seen that no willful agency causally and intentionally interferes, that no actor continuously guides the outcome." These frames are essentially hardwired cognitive structures that are innate and universal. Oliver and Johnston (2000) note that this notion has been supported by anthropological linguists who have found similarities in speech acts and rituals occurring across cultures, and by artificial intelligence researchers studying everyday language performances. The important point is that for Goffman, individuals do not create or manipulate natural frameworks consciously; they are built-in (Goffman 1974; Kendall 2005).

Most of today's frame theorists, particularly those in media and social movement studies, minimalize the unconscious, cognitive nature of Goffman's conception of frames, and emphasize the conscious, manufactured nature of frames. These scholars tend to view frames as "inherently malleable and emergent mental constructs" (Oliver and Johnston 2000: 40) that are constantly remolded by ongoing life experiences and interactions (Gamson et al. 1982). This view correlates more closely to Goffman's notion of 'social frameworks' and their incorporation of "an intelligence, a live agency…Such an agency is anything but implacable; it can be coaxed, flattered, affronted, and threatened. What it does can be described as 'guided doings'" (1974: 22). Koenig (2004:4) claims that a large portion of frame analysis, in a "Goffmanian framework" is "non-sensical, since framing is an innate property of all social processes, not only those most consciously manufactured." For Koenig, the media and social movement scholars, have gradually shifted frame theory away from its original focus on frames as cognitive structures, to highlighting the manufactured and deliberate nature of *framing* by invested actors.

In this regard, it is accepted that frames make up just one half of frame theory, with the other half being *framing*. Whereas frames are cognitive structures or 'schemata' for reception and comprehension, framing is defined as an action. Entman (2002: 391) explains this action thusly, to "select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation." Oliver and Johnston (2000: 42) unite the two in their definition of frame theory: "Frame theory, therefore, embraces both cognitive structures whose contents can be elicited, inferred, and plotted in a rough approximation of the algorithms by which people come to decisions about how to act and what to say; and the interactive processes of talk, persuasion, arguing, contestation, interpersonal influence, subtle rhetorical posturing, outright marketing that modify-indeed, continually modify-the contents of interpretive frames."

These "interactive processes of talk" are of primary importance for this study, and it is critical to emphasize that for most media and social movement scholars framing is an act of constructing reality. This involves providing the lens through which a specific audience receives a message. Framing conveys a necessarily limited amount of information in a communicative process, making these selected bits more prominent and more likely to be encoded and stored by the message receiver (Entman 2002). Conversely, what is left out of the frame is often of greater importance than what is included, and sheds light on the values, priorities, and motives of the framer (Klintman and Bostrom 2004; Scheufele 1999; Entman 2002; Gitlin 2003). Because of the vast array of potential realities to include within a message presentation, what one includes within a frame is significant by mere inclusion and imputed with worth and importance, while the omitted elements are minimalized and obscured. Entman (2007: 163) defines framing as the "process of culling a few elements of perceived reality and assembling a narrative that highlights connections among them to promote a particular interpretation." In sum, the successful framer selects certain bits of information, makes them more salient than others, and weaves these bits into a narrative that resonates with his audience, guiding them to certain conclusions and/or actions (Snow and Benford 1992).

Dependent on one's level of cynicism, framing can be viewed as manipulation to influence and further selfish interests, or as the provision of the appropriate and necessary context to further an audience's understanding. The sustainable agriculture organization, the Minnesota Project, frames 'framing' in the latter fashion, declaring that framing is not "a tool for persuasion, but a tool for affirming and expanding people's viewpoint" (www.mnproject.org). Regardless, the power of framing has been well documented in subjects as diverse as the first Gulf War (Entman and Page 1994), affirmative action (Gamson 1992), Students for a Democratic Society (Gitlin 2003), nuclear energy (Gamson and Modigliani 1989), Islamic movements (Snow 2000), drunk driving (McCarthy 1994), the evening news (Tuchman 1978; Gans 1979), and agrarian mobilization (Mooney and Hunt 1996).

Kahneman and Tversky (1984) displayed the power of framing in their famous study dealing with a hypothetical disease. In this study, the authors received a near perfect reversal of opinion by simply re-framing the consequences of an experimental drug from 'likely deaths' to 'likely lives saved'. Entman and Page (1994) further highlight the power of frames and their tendency to be 'self-reinforcing' in their examination of news coverage prior to the first Gulf War. They show that the "news frame included only two remedies, war now or sanctions with war (likely) later" silencing views in favor of negotiation (Entman 2002: 394). Entman and Page argue that the lack of publicity given to alternative options "meant elites felt no pressure to expand the frame so it included other treatments" and lead to greater public support for the war (Entman 2002:394). Gitlin (2003: 6) notes that the assumed 'objectivity' of the media accounts for their power to "divide (social) movements into legitimate main acts and illegitimate sideshows, so that these distinctions appear 'natural,' matters of 'common sense." Countless other examples abound documenting the power of frames to influence public perception.

In essence, frame theory holds that the manner in which information is presented, particularly what is salient and what is silent, has a great impact on how an audience receives, digests, and acts upon information. In addition, when framing is analyzed it can reveal the values, priorities, and motives of the framer. Frame theory has proven

particularly useful in studies of the media and social movements, which are discussed below.

Media Framing

Out of myriad possibilities the media siphons out a limited number of stories and presents them for consumption in familiar packages, or media frames. For Gitlin (2003: 7), " media frames are persistent patterns of cognition, interpretation, and presentation, of selection, emphasis, and exclusion, by which symbol handlers routinely organize discourse, whether verbal or visual." Gamson and Modigliani (1989) depict a media frame as "a central organizing idea or story line that provides meaning to an unfolding strip of events." In essence, media frames construct reality (McQuail 1994), influencing the way their audience "knows" the world by highlighting certain bits of information, deeming issues worthy of discussion, and encouraging a particular understanding of an issue (Gans 1979; Entman 2002; Scheufele 1999). These frames are exceedingly important because of the shear amount of people they reach and their power to influence and "orchestrat(e) everyday consciousness" (Gitlin 2003).

By deciding whose voice gets heard, what images are shown, and the context in which an issue is presented the media legitimate certain points of view while marginalizing others (Gans 1979). If information dealing with a specific issue is available to the public exclusively through the news media, the public's knowledge of that issue will necessarily be viewed through the provided frame (Gamson and Modigliani 1989). Coupled with the fact that most "mainstream" news organizations are owned by a very few transnational corporations, the media and "news' have great potential for agenda setting and manipulation by interested parties (Entman 2002). In his discussion of social movements, Gitlin (2003) notes that the media has the power to turn the extraordinary into "common sense".

Media frames are also unavoidable, if for no other reason than logistics; "news" must necessarily be new, or risk irrelevance. Gitlin (2003: 7) notes that media frames are useful because they allow "journalists to process large amounts of information quickly and routinely: to recognize information, to assign it to cognitive categories, and to package it for efficient relay to their audiences." In a timely manner, media frames tell

the audience a story *and* tell them how they should feel about it. This ability to reach and influence a large audience leads to contention, and makes the media "a site on which various social groups, institutions, and ideologies struggle over the definition and construction of social reality" (Gurevitch and Levy 1985: 19).

The notion of control is crucial to understanding the importance of media framing, and as Entman (2002: 394) notes "the frame in a news text is really the imprint of power—it registers the identity of actors or interests that competed to dominate the text." This idea is evidenced by the recent protests against Chinese rule by Tibetan monks. Though overwhelmingly non-violent, the state run Chinese media has repeatedly aired clips of a few monks burning Chinese-owned stores, while shelving video of the non-violent tactics of most monks (www.npr.org March 20, 2008). This "violent uprising" frame has reportedly resonated with the Chinese citizenry, fostering support of the government's actions. According to Tuchman (1978: x) these findings should be expected: "I continue to suspect that news is an interchange among politicians and policy makers, newsworkers, and their organizational superiors, and that the rest of us are eavesdroppers on that ongoing conversation."

Importantly, once a media frame is embedded, it is difficult to remove or supplant (Gamson and Modigliani 1989; Schon and Rein 1994). Gamson and Modigliani (1989) highlight the stubborn nature of frames in their research on nuclear energy. According to the authors, before the Three Mile Island accident, the media used a "progress" frame in discussions of nuclear energy. After the accident the media typically adopted "devil's bargain" or "runaway technology" frames that highlighted a loss of control over technology, yet the progress frame remained implicitly contained within these new frames.

Various topics have been used to highlight the power of media frames (Entman 1993,1994,2002; Gitlin 2003; Gans 1979; Tuchman 1979; Iyengar 1991; Jamieson and Waldman 2002). The portrayal of the opening salvos of the first Gulf War provides a vivid example of the power of media frames. The news media presented the initial bombing stages of the invasion through a "technology" frame as the wizardry of "Smart" bombs was highlighted. Just as easily a "conflict" frame focusing on casualties of war

and including images of the innocent losing life, limb, or property could have been used, and likely elicited very different responses in the audience.

Finally, it is important to note that the members of the media's audience are active agents, not merely passive receptors who unquestioningly accept every premise shown to them. Scheufele (1999: 105) notes "people's information processing and interpretation are influenced by preexisting meaning structures or schemas." This notion echoes Goffman's (1974) conception of 'societal frameworks', and is supported by Gamson (1992:4) who explains "people negotiate with media messages in complicated ways that vary from issue to issue." In addition, these negotiations vary from person to person, with three types of news processors identified by Kosicki and McLeod (1990). According to these authors, the *active* processor is an individual that seeks multiple sources of information due to her "assumption that mass-mediated information in general is incomplete, slanted, or in other ways colored by the intentions of the communicator" (Scheufele 1999: 105). The *reflective integrators* ponder and discuss with others what they have garnered from the news media, while *selective scanners* skim the mass media in their search for a very limited amount of personally relevant information. In sum, for numerous scholars, media frames are an important factor in influencing public opinion, but vary from person to person and from issue to issue. Other researchers have concluded that the frames employed by social movements are also important and influence public opinion, and are discussed below.

Social Movement Framing

Although the existence of an anti-GM movement is a matter of debate, it is clear that both critics and advocates of this technology share many of the same goals of social movements, particularly their attempts to influence their audience. Therefore, a brief discussion of the framing processes of social movements proves helpful by highlighting how these organizations attempt to resonate with the American consumer.

Within the study of social movements, frame theory has been utilized to address the failings of resource mobilization theory. Resource mobilization theory "emphasize [d] the variety and sources of resources; the relationship of social movements to the media, authorities, and other parties; and the interaction among movement organizations"

(McCarthy and Zald 1977: 1212). Highlighting the need to incorporate the political and organizational into social movement theory while locating social movements within larger, institutionalized power conflicts, resource mobilization theory effectively addressed the failure of collective behavior theory to explain the abundance of social movements in the 1960's. However, resource mobilization theory was in turn, criticized by social psychologists for "neglecting the problems of social construction" (Oliver and Johnston 2000: 37), its reliance on a structural determinist scaffolding, and its general failure to consider "ideational factors" (Snow and Oliver 1995: 586).

Frame theory has ameliorated these failings of resource mobilization theory by integrating agency into social movements, linking the social construction of information with political and organizational elements, and "bringing ideas back in" (Oliver and Johnston 2000: 37; Benford 1997). In addition, frame theory allows space for the ideology that resource mobilization neglected (Oliver and Johnston 2000). Gamson (1992: 67) notes that framing acts as a valuable 'bridge' between the realms of "cognition and culture". In other words, values and beliefs are integral aspects of humanity and essential for valid investigation into the motivations of societal actors.

In their discussion of social movements, Snow and Benford (2000) state "movement actors are viewed as signifying agents actively engaged in the production and maintenance of meaning for constituents, antagonists, and bystanders or observers" (2000: 613). For these theorists, social movement actors are continuously attempting to influence their intended audiences. This work may "involve the amplification and extension of extant meanings, the transformation of old meanings, and the generation of new meanings" (Snow and Benford 1992: 136). The effective dispersal of these messages are of primary importance, as Gamson (1992: 6) points outs, "Frames that are present in social movement discourse but are invisible in mass media commentary rarely find their way into their (the public's) conversations." This idea is key to this study. The extent to which the frames of critics and advocates of GM have made inroads in the media matters, particularly on a topic that involves a technology generally unfamiliar to most Americans. Because most consumers receive their information about this technology through the media's coverage, the way this issue is framed will necessarily affect consumer acceptance to some extent.

In the sections below, I outline how social movements attempt to get their messages into these conversations by accomplishing the "core framing tasks", and once there, to "resonate" with their audience. Later in the paper I highlight the crucial role these elements play in the framing of genetic modification by the critics and advocates of genetic modification.

Core Framing Tasks

According to Snow and Benford (1988), three core framing tasks are critical for the success of social movements: diagnostic framing, prognostic framing, and motivational framing. Diagnostic framing serves two purposes. First, diagnostic framing identifies some development, "event or condition as problematic and in need of amelioration" (Hunt et al. 1994: 191). This aspect is usually not contentious and typically agreed upon by movement actors. However, the second purpose of diagnostic framing, attribution of blame, is "less frequently realized or is more problematic" (Snow and Benford 1988: 200). Attribution of blame involves casting blame, imputing motivation, and essentially casting the villain(s) (Hunt et al. 1994). Snow and Benford (1992: 137) call this the 'punctuating function' that "either underscore and embellish the seriousness and injustice of a social condition or redefine as unjust and immoral what was previously seen as unfortunate but perhaps tolerable."

The key function of attributing guilt often fails to be agreed upon by movement members, and can lead to controversies and splintering within social movements (Benford and Snow 2000). This common lack of consensus within the attribution task is effectively pointed out in Benford's (1987) study of the nuclear disarmament movement, where he found blame being cast widely, from capitalism to communism to technology. For most anti-GM groups, this task is not contentious, as there is nearly universal agreement that transnational biotech companies, especially Monsanto Co., are responsible for corrupting the world's food supply, indenturing farmers, and endangering the environment. Unencumbered by moral constraints (critics frequently note Monsanto had no qualms about producing the notorious defoliant "Agent Orange" used by the U.S. Army during the Vietnam War) these companies are attempting to "own food" (*The World According to Monsanto*, www.organicconsumers.org/monlink.cfm) and currently

thrive because of neo-liberal policies that encourage the concentration of capital and power on a global scale.

The second task of framing according to Snow and Benford (1988), prognosis, suggests strategies and tactics for redressing the designated problem. This includes delineating "what should be done by whom" (Hunt et al. 1994: 191) and the formulation of a "plan of attack" (Benford and Snow 2000). In addition, prognostic framing typically refutes or rebuts the "logic or efficacy of solutions advocated by opponents as well as a rationale for its own remedies" (Benford 1987: 75; Benford and Snow 2000: 617). In general most anti-GM groups examined for this study call for consumers to resist genetically modified foods by eating organic food, supporting farmers who refuse to grow GM crops and by lobbying Congress to curtail the hegemony of these transnational corporations (www.foodfirst.org/en/actionalerts). Hunt et al. (1994) note that these first two core framing tasks do not necessarily result in collective action.

The third task, motivational framing is crucial for mobilization and action. Functioning as "prods to action" (Snow and Benford 1988: 202), motivational framing is needed to move constituents from the balcony to the street. Rationales for action must be appropriately articulated. This task is referred to as the "agency component" of framing, and entails the social construction, or manipulation, of "vocabularies of motive" needed to resonant with intended audiences (Benford and Snow 2000: 617). With his allusion to the crash-proof recorder of an airplane, Hank Johnston (1995: 234) succinctly notes the critical role of frame resonance for the success of social movements: "Whether framing activities are done by the media or by a social movement organization, they count only insofar as they penetrate the "black box" of mental life to serve as determinants of how a situation is defined, and therefore acted upon" (Johnston 1995: 234). Stated another way, if the audience does not connect with the provided frame or see themselves in its story, the frame is unlikely to influence and motivate. Despite the critical importance of frame resonance for social movement success, it has continuously been glossed over in the social movement literature according to Snow and Benford (1988: 198) "it strikes us as foolhardy to take meaning and other ideational elements for granted or to treat them purely descriptively in any equation attempting to account for movement participation."

To ameliorate this lacuna, Benford and Snow (2000: 619; Snow and Benford: 1988) have organized two sets of interacting factors that account for variances in frame resonance: *frame credibility* and *relative salience*. Frame credibility, according to these authors, consists of three sub-factors: *frame consistency*, *empirical credibility*, and the *credibility* of the frame articulators or claimsmakers. For Benford and Snow, frame consistency is the amount of congruence between the stated beliefs and claims of a social movement (or more correctly the *people* within the movement), and the actions of the movement. This could be considered the "practice what you preach" doctrine. Logically, it follows that the greater the perceived consistency between a movement's words and actions, the greater potential for resonance. The second element outlined by Benford and Snow that affects frame credibility, empirical credibility, is defined as the fit between the framings and real world events. Does the frame presented seem plausible and "culturally believable"? The final factor affecting frame credibility is the perceived credibility of the claimsmakers. The authors note the important link between credibility and persuasion, evidenced by the increased prevalence of "experts" and "credentialization" (Benford and Snow 2000: 621).

The second set of factors affecting a frame's resonance according to Snow and Benford deal with the level of salience the frame has for its target audience. The first of the three dimensions of salience they outline is *centrality*, which is "how essential the beliefs, values and ideas associated with the movement frames are to the lives of the targets of mobilizations" (Benford and Snow 2000: 621). The second factor *experiential commensurability*, touches on the extent to which the presented frame is congruent with the everyday lives of the targeted audience. Constituting their final saliency factor, *narrative fidelity*, is the amount of cultural resonance of a frame, essentially the ability of a frame to tell a culturally relevant story. In sum, for Benford and Snow, social movements must effectively perform the core framing tasks of diagnosis, prognosis, and motivation for success. In addition, and of equal importance, these frames must be credible and salient in order to resonate with their target audience, and move them from the balcony to the street. This next section addresses some of the most salient criticisms of frame theory, and justifies the use of this theoretical approach for an analysis of the media's coverage of the genetic modification of food.

Criticisms of Frame Theory

In spite of, or perhaps due to, its widespread use across the social sciences, frame theory has countenanced numerous criticisms. One of the most common is that frame theory lacks consistency across these disciplines, with definitions and methodologies dependent upon the field of inquiry, leading Entman (2002) to characterize frame theory as a "fractured paradigm". Scheufele (1999, 2000) notes that framing is used to describe similar but different approaches, and that framing is often mistakenly used as a synonym for the related terms of agenda setting and priming. In his "insider's critique", Benford (1997:409) claims that framing has become a cliché, and points out numerous shortcomings of the framing perspective, including reductionism and descriptive bias. Others have claimed that framing fails to address the intimate relationship between frames and ideology, often confusing the two (Oliver and Johnston 2000).

The most pervasive criticism of frame theory has been the general vagueness of its methodology (Goffman 1974; Gamson 1975; Johnston 1995; Entman 2002). Because Goffman never explicitly outlined a research methodology for frame analysis, scholars have adopted numerous, and sometimes conflicting methods for their studies. In *Frame Analysis*, Goffman raises this issue, wryly noting, "There are lots of good grounds for doubting the kind of analysis about to be presented. I would do so myself if it weren't my own. It is too bookish, too general, too removed from fieldwork to have a good chance of being anything more than another mentalistic adumbration " (1974:13). Soon after the publication of *Frame Analysis*, William Gamson (1975: 605) reiterated this concern, asking "Can one use this framework to do systematic social research?...If it remains a sociological art form, then only certain talented individuals with inclinations in this direction will grasp the underlying principles intuitively and be able to perform."

Decades later this question is still relevant, as Entman (2002: 391) notes, "nowhere is there a general statement of framing theory that shows exactly how frames become embedded within and make themselves manifest in a text, or how framing influences thinking." Koenig (2004: 3-4) neatly summarizes the dilemma inherent in frame analysis, noting "Precisely because frames consist of tacit rather than overt conjectures, notorious difficulties to empirically identify frames arise." In other words, "What does one look for in a frame analysis?" This question is complicated further by

the fact that there is not even a consensus on the definition of a frame (for instance compare Goffman 1974 and Entman 1993).

Despite these criticisms, frame theory remains a valuable scaffolding for addressing discourse. Although frame analysis is flawed in certain aspects, it is an efficacious approach to address the latent aspects of discourse. The latent nature of frames will inevitably lead to questions of empirical credibility[1], but frame analysis succeeds in revealing the invisible packaging all around us. As I have shown, media and social movement scholars have repeatedly shown that frame analysis is an effective way of shedding light on the impact message framing has on audiences. The next section reviews some of the relevant literature on the framing of genetic modification, the consumer acceptance of GMOs, and attempts to show how this theoretical approach is appropriate for the genetic modification of food.

Framing Genetic Modification

To date, the majority of research on how the genetic modification of food has been framed by the media has focused on Europe. In their study of the Swiss media's coverage of biotechnology, Bonfadelli et al. (2007: 106) identified five dominant frames within a leading Swiss newspaper, *Neue Zurcher Zeitung*, from 1973-2002: "public accountability", "progress", "ethical", "economic", and "Pandora's Box."[2] Despite much controversy and negative attention over this timeframe, the authors note a trend towards a "less emotionalized" framing of this issue within the media. According to Bonfadelli et al. (2007), the media typically employed the forward-looking and positive progress frame in the 1970's and early 1980's, while today most coverage employs a public accountability frame. This frame emphasizes regulation, public involvement, and participation, although the authors note that the progress frame remains significant (2007: 105). Reiterating the argument of many critics, Bonfadelli et al. do emphasize that the identification of frames within biotechnology studies differ according to the

[1] Numerous scholars have attempted to "routinize" frame analysis, see Koenig 2004.
[2] In Greek mythology, all the gods jointly created the first woman on Earth, Pandora. She opened a jar or box that contained all of mankind's evils, including greed, vanity, and envy, and unleashed them on the world.

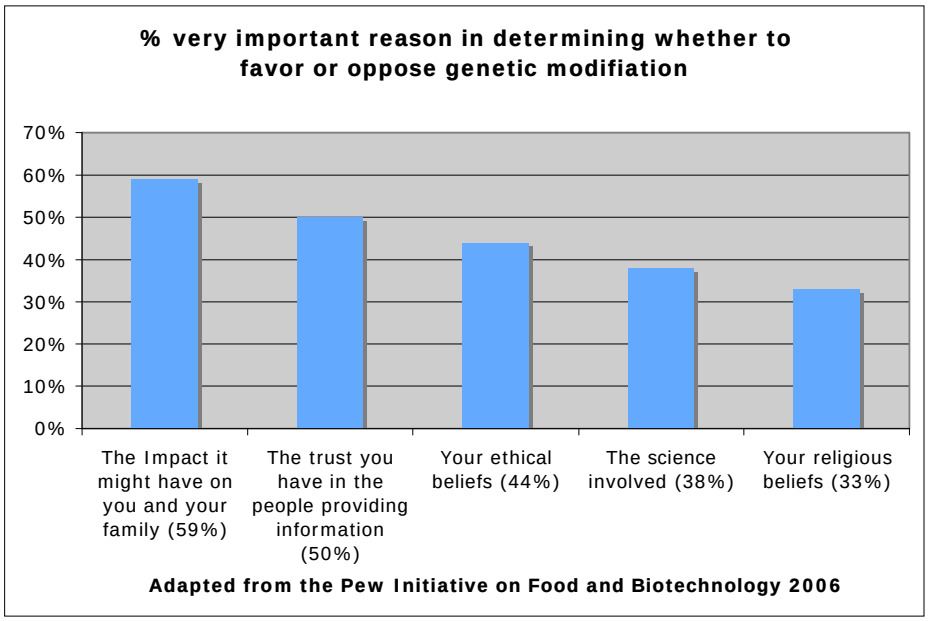
methodological approach used, particularly whether frames are extracted deductively or inductively.

Bonfadelli et al. (2007: 122) also cite the findings of the "Eurobarometer" survey of 2000, which found that 43% of Swiss respondents felt their attitude toward biotechnology had been influenced by the media's coverage of the issue. Of those who felt they had been influenced, 26% reported they had become more critical, while 17% reported they had become more positive towards the technology. The point that is particularly important for this study, however, is that the respondents felt that the media's coverage typically *reinforced* their existing beliefs rather than changed them. Peters and Sawicka's (2007:76) findings support the reinforcing nature of the media, and they explain, "People selectively trust organizations and groups which publicly represent stances that are congruent with the respondents' attitudes." In other words, for these scholars, the media is less a tool of persuasion and more a tool for bolstering pre-existing opinion. This finding is in opposition to the findings of numerous American media studies that emphasize the ability of the media to sway public opinion (Gitlin 2003; Gamson and Modigliani 1989).

In addition, consumers do not respond to biotechnology in a uniform way, but vary their views according to specific applications (Bonfadelli et al. 2007; Evenson and Santaniello 2004; Peters and Sawicka 2007). For example, Bonfadelli et al. (2007: 117) found that so-called "red" biotechnologies intended to benefit human health through advances in medicine are viewed more positively, while so-called "green" biotechnologies, such as the genetic modification of food, are viewed more critically. According to the authors, red technologies were generally viewed as "useful", while the green biotechnologies were more commonly regarded as unnecessary, risky, and immoral (2007:117). Supporting the finding that acceptance of biotechnology is not monolithic, the Pew Initiative on Food and Biotechnology (PIFB 2006) found that almost two thirds of Americans are "uncomfortable with animal cloning, and are far "less certain" that food from cloned animals is safe as compared to genetically modified plants. Citing the 2003 Gallup poll findings, Fink and Rodemeyer (2007: 147) note that cloning animals was less morally acceptable for survey respondents than all choices presented to them except suicide, cloning humans, polygamy, and extramarital affairs (Gallup, 2003).

In sum, the literature shows that consumers are typically more accepting of medical biotechnology than agricultural biotechnology, and more accepting of the genetic modification of plants than animals. However, much research is needed to better determine what factors influence consumer opinion, or put another way, what arguments resonate with the American public. One of the few exceptions is the Pew Initiative on Food and Biotechnology (PIFB 2006), which found that the most important reason determining whether consumers favored or opposed genetic modification was "The impact it might have on you and your family" (59%), followed by "The trust you have in the people providing information" (50%), "Your ethical beliefs" (44%), "The science involved" (38%), and finally, "Your religious beliefs" 33% (Table 1.)

Table 1. Factors Determining Support for Biotechnology



Brossard and Shanahan (2003) also found that trust in the messenger largely determines the consumer acceptance of biotechnology, what Snow and Benford (1988) called "frame credibility." Although these findings appear obvious, Peters and Sawicka (2007) conclude that in Germany these factors are less important, arguing instead that culture is the dominant factor in consumer acceptance. The authors state "attitudes cannot be understood as the result of a cost-benefit analysis from a consumer perspective, nor as a

credibility crisis, but rather as the outcome of ascribing symbolic meanings which are part of German culture." Contradicting other studies that stress the importance of credibility in attitude formation (Priest et al. 2003), the authors conclude that biotechnology exists within "cultural schemes" that draw on cultural elements specifically familiar to Germans, such as "Dutch Tomatoes" (very appealing but tasteless) and the Frankenstein myth (Peters and Sawicka 2007: 79).

The authors point out that with regards to genetic modification, German respondents trusted consumer organizations and environmental organizations more than any other source, including universities, religious organizations, the medical profession, and the press. Although these findings are not directly transferable to an American setting, they show that consumer and environmental groups have an opportunity to influence consumers if they can get their message "out there". This does, however, create a paradox: getting the message out usually entails getting arguments presented in the media, which, according to this study and the Pew findings (PIFB 2006), are much less trusted sources of information.

Of great import for this study is the work of Nisbet and Huge (2007), which makes connections between the print media's coverage of plant biotechnology and U.S. policy. After content analyzing the New York Times and the Washington Post from 1978 to 2004, the authors state that proponents of plant biotechnology have "been very successful at limiting the scope of participation surrounding the issue" and have established a "virtual 'policy monopoly' within the administrative policy arenas of the FDA, the EPA, and the USDA" (Nisbet and Huge 2007: 225). For Nisbet and Huge, this monopoly has been made possible in part to the lack of media coverage in the beginning years of the technology, and an adoption of "more technical", as opposed to "more dramatic" frames since that time (210-211). The more technical frames include: "new research", "scientific background", "policy and/or regulatory background", "market/ economic prospects or international competitiveness", and "patenting, property rights, ownership and access", while the more dramatic frames identified are: "ethics and/or morality", "scientific uncertainty", "political strategy and/or conflict", and "public engagement/ education."

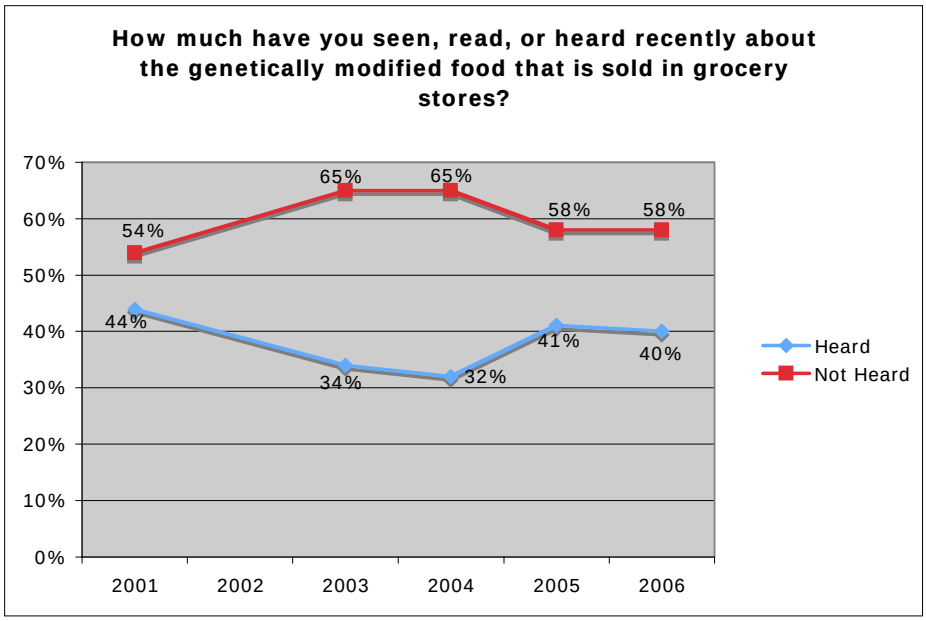
Like Bonfadelli et al. (2007), these authors claim that the greater use of technical frames as opposed to the more emotive dramatic frames "dampen(s) wider social excitement and American concern over plant biotechnology" (Nisbet and Huge 2007:217). In the U.K., Frewer et al. (2002: 701), found different results in their study of the intersection of the media and genetic modification. These authors claimed that the media had actually amplified the risk of genetic modification, concluding, "perceptions of benefit, however, appeared to be permanently depressed by negative reporting about genetically modified food." In other words this study found that the media was responsible for dampening *support* of genetic modification, not *opposition*.

It is clear that significant cultural differences are to be found in the media's coverage of this issue. In addition, it is worth noting that the expandability of the findings of Nisbet and Huge (2007) are somewhat limited because of two methodological decisions. The first is their decision to rely on the frames identified in previous studies that focused on politics and technical controversies (2007: 210). This *a priori* strategy limits the validity of their findings and restricts their examination to pre-determined frames that may not be appropriate for biotechnology. For instance, the authors include "patenting, property rights, ownership, and access frame" in their list of "more technical frames". However, within plant biotechnology (the focus of their study) the issues of patent rights, property rights, ownership, and access *must* be considered emotional and dramatic because these issues are at the very heart of the passionate and vitriolic battle to decide who controls seeds, food, and even DNA. Numerous global protests and boycotts have resulted from these issues, touching on such charged issues as copyrighting life and the suicides of scores of Indian farmers (Shiva 2007; 2001; 1993). The second decision that reduces the expandability of these findings is the authors' inclusion of only two newspapers of similar political "slants" within their content analysis. Although this study contributes greatly to the limited literature on the framing of biotechnology, it does not effectively repel the common critique that frame analyses lacks empirical credibility.

Although attempting to correlate framing processes with consumer acceptance is tenuous, it is important to mention how the technology has been received in the U.S. It is widely acknowledged that consumer acceptance of GMOs is significantly greater in the U.S. than in most "developed" nations, while opposition is noticeably muted (Wolf et al

2004; Bonny 2004; Falkner 2007; Lusk et al. 2004). In fact the Pew Initiative on Food and Biotechnology 2006 (PIFB), concluded, "public opinion remains largely up for grabs" (www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Public_Opinion/Food_and_Biotechnology/2006summary.pdf). This study also found that American consumers are generally uninformed and unfamiliar with the major issues of the GM controversy, with 44% of respondents reporting they have heard 'some' or a 'great deal' about genetic modification in 2001. Despite the increasing ubiquity of GMOs in the nation's food supply, this number dropped to 40% in 2006 (Table 2).

Table 2. U.S. Consumer Familiarity with Genetic Modification, 2001-06



In 2006 only 26% of respondents believed they had eaten GM foods, while 60% of consumers believed they had never eaten GM foods. As the PIFB summary notes, this "is a considerable underestimation, as most (if not nearly all) Americans have eaten GM foods in one form or another." The PIFB (2006) also found that consumer opposition to genetically modified food has decreased significantly over their study timeframe of 2001-06. When asked the question, "Do you favor or oppose the introduction of genetically

modified foods into the U.S. food supply?" opposition peaked in 2001 with 58% opposing GM, and has since declined to 46% in 2006.

Addressing the relatively high rates of consumer acceptance in the U.S., Nisbet and Huge (2007:227) conclude that if plant biotechnology is to become an issue of greater concern for the American public "it will probably be because it resonates and is framed in combination with these other food system issues" (such as childhood obesity, organics, animal welfare, and the survival of small farmers). However, the question of how to frame genetic modification in a way that resonates with the American public still lingers. The main reason for this is the dearth of survey research focusing on the factors affecting American consumer acceptance. An examination of how critics and advocates of GM have framed the issue and *attempted* to resonate with the American public is a good starting point for addressing these issues. Further research to determine the extent these frames are found within the U.S. print media's coverage of the issue is also needed, because of the power and influencing capabilities of the media. As Todd Gitlin (2003: 3) explains, agents of change must "rely on large-scale communications in order to matter."

Research Questions

Despite the increased prevalence of GMOs within the American food supply, consumer awareness remains low, levels of consumer support remain stable, while opposition to genetic modification has actually declined (PIFB 2001-06). It is clear that numerous researchers, particularly in media and social movement studies, have concluded that framing is an important factor in the formation of opinion. However, little research has been conducted on the framing of the genetic modification of food and how the invested critics and advocates of genetic modification have framed this issue in their attempts to resonate with the American public. Before an effective evaluation of the resonance (or lack thereof) of these frames can be conducted, the frames must first be identified. In addition, before attempting to connect media framing with consumer opinion, the prevalence of these frames need to be measured. Therefore, several research questions can be posed:

Research Question (1) What are the dominant frames found in the websites of environmental and consumer organizations opposed to the genetic modification of food?

Research Question (2) What are the dominant frames found in the websites of the transnational biotech companies promoting this technology?

Research Question (3) To what extent have these frames been incorporated into the U.S. print media's coverage of the genetic modification of food?

Hypothesis

I hypothesize that the frames employed by advocates of GM will be found at significantly higher rates than those of the critics of GM within the U.S. print media's coverage of the issue.

Answering these research questions will contribute to our understanding of how critics and advocates of GM have framed this issue in their attempts to resonate with the American public, point to possible connections between the coverage of the issue in the U.S. print media and consumer acceptance, highlight variances in coverage between these newspapers, and shed light on extent to which the U.S. print media has employed frames that "dampen" consumer resistance to GMOs.

Chapter 3: Methods and Analysis

Goffman (1974: 8) notes that frame analysis is "not necessarily restricted to the mutually monitored arena of a face-to-face gathering", and most studies focusing on framing employ content analysis as an unobtrusive and thorough method for shedding light on framing processes (McCarthy 1994; Gans 1979; Semetko and Valkenburg 2000). I employed a two-step approach to content analysis in order to address the two main research questions of this paper: (1) What are the dominant frames employed by critics and advocates of the genetic modification of food as presented on their websites? And, (2) To what extent are these frames incorporated into the U.S. print media's coverage of the issue? The first step involved an examination of the frames employed by critics and advocates.

Data and Sample (Websites)

I was pointed to several anti-GM organizations by the work of Nisbet and Huge (2007), which began a sort of "snowball" sampling. These authors noted that Friends of the Earth and the Union of Concerned Scientists were both actively involved in the issue. The website of Union of Concerned Scientists (www.ucsusa.org) provided a helpful listing of other anti-GM organizational web sites, including: Campaign to Label Genetically Engineered Food, Center for Food Safety, Organic Consumers Association, Food First, The True Food Network, and Greenpeace International- Genetic Engineering. Further on-line research yielded the organization Eco-Nexus. A list of these organizations along with a brief description of each is given below (see Table 1).

Table 3.

Organization	Website
Campaign to Label Genetically Engineered Food	www.thecampaign.org/
Center for Food Safety	www.centerforfoodsafety.org/geneticall7.cfm
EcoNexus	www.econexus.info/

Food First	www.foodfirst.org/
Friends of the Earth	www.foe.org/
Friends of the Earth International	www.foei.org/
Greenpeace USA	www.greenpeace.org/usa/
Organic Consumers Association	www.organicconsumers.org/gelink.cfm
The True Food Network	www.truefoodnow.org/
Union of Concerned Scientists	www.ucsusa.org

Campaign to Label Genetically Engineered Food

"A national grassroots consumer campaign to lobby Congress to pass legislation requiring the labeling of genetically engineered foods in the United States."*

Center for Food Safety

"Challenges harmful food production technologies and promotes sustainable alternatives through litigation, legal petitions for rulemaking, and public education."*

EcoNexus

"EcoNexus is a not-for-profit public interest research organization. It investigates and analyses developments in science and technology. It offers a rigorous scientific critique of genetic engineering (GE) and genetically modified organisms, and more recently of agrofuels (biofuels), synthetic biology and other new technological applications."**

Food First

"The Institute for Food and Development Policy/Food First shapes how people think by analyzing the root causes of global hunger, poverty, and ecological degradation and developing solutions in partnership with movements working for social change."*

Friends of the Earth

"A group of committed people who fight daily for a healthy and just world."**

Friends of the Earth International

"Friends of the Earth International is the world's largest grassroots environmental network, uniting 69 diverse national member groups and some 5,000 local activist groups on every continent."**

Greenpeace USA

A large, well known organization known for attempts to ban whaling and nuclear power, has also added genetically modified foods to its list of issues in its "fight to save the planet." **

Organic Consumers Association

"Building a national and international consumer/farmer/labor/progressive retailer boycott of genetically engineered and chemically contaminated foods and crops."*

The True Food Network

"Unites consumers who want to end the use of genetically engineered organisms in food products. Offers opportunities for online action, a True Food activist kit, and more." *

Union of Concerned Scientists

"The Union of Concerned Scientists is the leading science-based nonprofit working for a healthy environment and a safer world."**[3]

In this study, I also sought to identify the frames employed by those directly benefiting from the continued implementation of GMOs, namely transnational biotech companies. I was directed to my sample of advocates of genetic modification by McGiffin (2005: 191) who noted that the five largest biotech companies, Monsanto, DuPont, Syngenta, Dow, and Bayer, control 71% of the all biotechnology patents, and thus, stand to gain the most from increased biotechnology implementation. I chose to analyze the websites of the companies tied most closely to the U.S. (i.e. based in the U.S.) because of the decidedly American approach of this project. This resulted in the inclusion of Monsanto co., Dupont Co., and Dow Co. (see Table 4).

[3] * Quote taken from the description of the organization on the Union of Concerned Scientists website.

www.ucsusa.org

** Quote taken from organization website.

Table 4.

Company	Website
Monsanto Co.	www.monsanto.com/
DuPont	www2.dupont.com/DuPont_Home/en_US/index.html
Dow	www.dow.com

After identifying the websites appropriate for inclusion within this study, I read all information directly pertaining to genetic modification within each website. In this manner the dominant frames employed within these websites emerged. This method reduced the level of "researcher fiat" within this frame analysis. As Koenig (2004: 9) notes, "Reading or listening over a reasonable amount of data, framing researchers should hermeneutically uncover frames." To merit inclusion in this study as a dominant frame, the theme had to be recurrent and salient within all or most of the websites studied. In this manner I located several dominant frames employed by critics, namely "risks", "morality", and "rights", and by advocates, namely "benefits", "morality", and "science." The defining characteristics of these frames are more clearly outlined in the analysis section below.

At this point it is necessary to address a criticism of frame analysis noted earlier: it lacks empirical credibility. The latent essence of frames necessarily requires the researcher to make interpretations and judgments, and a level of researcher subjectivity is unavoidable. I hold that the best strategy for this project is a contextual content analysis that is transparent, albeit necessarily interpretive. This hermeneutical approach is an efficient and reasonable way to address the research questions at hand, and has been used proven by numerous other studies utilizing frame theory (Bonfadelli et al. 2007; McCarthy 1994; Semetko and Valkenburg 2000). After these frames were identified, the second step of this process, content analysis of the U.S. print media, was undertaken.

U.S. Print Media Data and Sample

In this age of media saturation and rapidly expanding 'news' options, it may seem curious to choose such an ancient source as the newspaper for analysis. However, newspapers have two significant attributes that ensure their viability for this study: 1)

newspapers are still the primary source of information for most other news outlets, and 2) newspapers are subjected to a vetting process rarely found in Internet news providers. The second primary research question of this study, "To what extent are the frames employed by critics and advocates of GM incorporated into the U.S. print media's coverage of the issue?" is addressed through a content analysis of three major newspapers: the New York Times, USA Today, and Wall Street Journal. I selected this sampling frame for three main reasons: 1) these newspapers are available and read nationwide, 2) these are the top three most circulated newspapers in the U.S.[4], and 3) each is generally regarded as representing a distinct political viewpoint or slant, i.e. New York Times is relatively liberal, Wall Street Journal is relatively conservative, and the USA Today is somewhere in between. In other words, these selections were made in an attempt to analyze the newspapers with the highest readership, widest geographic distribution, and most diverse political viewpoints possible in order to best represent the overall print media in the U.S. within the limited time constraints of this study. This sampling frame allows for a more representative discussion of the U.S. print media than that of Nisbet and Huge (2007).

These newspapers were content analyzed for their coverage of genetic modification in the year's 2001-06. I selected this timeframe for three main reasons: 1) the relatively recent nature of the timeframe lends relevance to this study, 2) these are the same years the most comprehensive survey of U.S. consumer acceptance of GM foods was conducted (the Pew Initiative study), allowing for potential correlation between media framing and consumer acceptance, and 3) dating back to 2001 allows for analysis of media coverage following the notorious contamination of the food supply with StarLink corn.

The unit of analysis for this part of the study is the individual newspaper articles that contain the term "genetic modification" or "genetic engineering" or "agricultural biotechnology." I used the search engine LexisNexis Academic for the New York Times and USA Today, and Factiva for the Wall Street Journal to derive these units. The

[4] According to the Audit Bureau of Circulation (www.auditbureau.org/) as of March 31, 2006, the USA Today had the nations highest newspaper circulation 2,528,437, the Wall Street Journal was second at 2,058,342, and the New York Times was third at 1,683,855.

LexisNexis Academic search engine includes only the abstracts for the Wall Street Journal, necessitating the use of Factiva. The amount of articles meeting the above criteria varied significantly between the newspapers. The search yielded 1001 "hits" for the New York Times (NYT), 225 for the USA Today, and 118 for the Wall Street Journal (WSJ). To reduce the volume of New York Times articles to analyze, every 5th article was included within this study, beginning at the first appropriate article in 2001. These articles were then printed out and collated. Soon after beginning my content analysis I realized a significant amount of these articles were not relevant to this study because they focused on issues such as the genetic modification involved with stem cell research or steroid use in sports. These inappropriate articles were removed leaving a smaller sampling frame of 114 NYT articles, 98 USA Today articles, and 55 WSJ articles.

Within the texts of these articles, the key terms, "genetic modification" or "genetic engineering" or "agricultural biotechnology" were automatically highlighted, allowing for quick identification of relevant articles. When an appropriate article was found, the name of the newspaper, the date, and the article number were recorded in the coding form. The article was read in its entirety and examined for the frames it contained.

Although one of the main criticisms of frame theory is its lack of empirical credibility, I chose not to investigate frames in a more empirical manner such as recording the frequency of key words or strings of words within a newspaper article, as numerous problems have been noted with this approach (Koenig 2004). Notably, the issue of researcher fiat is not eliminated as the very decision of which keywords to include in the search is subjective. In addition, context and nuance are lost in this manner. For example, a keyword search of "risk" in an article dealing with genetic modification may yield numerous "hits", possibly leading one to assume that the article may be focusing on the numerous risks of GM and incorporating a "risk frame". However, the term risk may be repeatedly prefixed by "is not a", casting the issue in an entirely different light, perhaps a "benefits" frame.

I numbered the dominant frames identified in the websites of critics and advocates mentioned above, and created a subset of more detailed ideas/aspects within this rubric. For instance the risk frame was further divided into "environmental risks", "health

risks", "economic risks" and "unknown risks", allowing for further detailed analysis. Following the operationalization scheme of Nisbet and Huge (2007:211), each of these frames was coded as " 'not present (0)', 'present (1)', or 'outstanding focus/appearing in the lead (2)'. As the authors note, this scheme facilitates the derivation of "a mean score for each frame across years, rendering a relative indicator of frame prominence" (Nisbet and Huge 2007: 211). In other words, the use of a '2' for the dominant frame gave appropriate weight to more salient frames and avoided reducing all frames to equal importance within each article. After all the articles were scored according to frequency and salience, another coding sheet was created that removed the saliency aspect of the scoring and merely noted the presence or absence of a frame. This strategy allowed me to measure frequency and then observe the impact of saliency on the importance of these frames within these articles. After the two stages of coding were completed for each newspaper and for each year, these data were collapsed to give an overall picture of the frames employed by the U.S. print media. The dominant frames used by the media in their coverage of genetic modification emerged and were measured, while variances in the frames employed between newspapers were analyzed.

Chapter Four: Results

To answer Research Question 1, "What are the dominant frames found in the websites of environmental and consumer organizations opposed to the genetic modification of food?" and Research Question 2, "What are the dominant frames found in the websites of the transnational biotech companies promoting this technology?", I examined the websites of numerous anti-GM environmental and consumer organizations and those of major transnational biotech companies, particularly Monsanto. Following Goffman (1974), I hold that these websites are well thought out presentations of self that these organizations use to frame genetic modification in a way intended to influence their audiences[5], and an appropriate source for analysis.

Not surprisingly, these heavily invested actors frame genetic modification in very different ways. For instance, the DuPont website states that "Biotechnology holds a great deal of promise to enhance our lives and planet…biotechnology offers new potential for meeting the world's demand for food, feed, fuel, and materials while reducing our footprint on the planet" (www.dupont.com). On the other hand, critics claim that "Frankenfoods" are malignancies in our food supply that threaten human, economic, and cultural well being worldwide and "loom as one of the greatest and most intractable environmental challenges of the 21st Century" (www.centerforfoodsafety.org/geneticall7.cfm).

A key aspect of this study is the identification of the dominant or 'master frames' employed by these actors. According to Benford and Snow (2000: 619), only a handful of overarching frames are "sufficiently broad in interpretive scope, inclusivity, flexibility, and cultural resonance to function as master frames." Master frames focus on core issues relevant to social movement studies, and include: rights frames, choice frames, injustice frames, environmental justice frames, culturally pluralist frames, sexual terrorism frames, oppositional frames, hegemonic frames, and "return to democracy" frames. Bonfadelli et al. (2007) identified, "public accountability", "progress", "ethical", "economic", and "Pandora's Box" in their study of the print media's coverage of biotechnology. In their

[5] As noted previously, Goffman's notion of framing did not involve the conscious and active process of framing described here.

study on plant biotechnology, Nisbet and Huge (2007: 210-11) divided the frames they identified into two typologies, *more technical* ("new research", "scientific background", "policy and/or regulatory background", "market/economic prospects or international competitiveness", and "patenting, property rights, ownership and access") and *more dramatic* ("ethics and/or morality", "scientific uncertainty", "political strategy and/or conflict", "public engagement/ education"). For these and other authors, master frames are familiar stories that allow an audience to receive a message in a package they have encountered and digested before.

Critics typically frame genetic modification as an immoral technology fraught with risks that tramples the rights of farmers, consumers, and the environment, while only benefiting transnational biotech companies. Advocates typically frame genetic modification as a technology with unlimited potential to help farmers, consumers, the hungry, and the environment. Both sides seek to frame their position as inherently moral and outline their concern for farmers and the poor of the developing world. This section gives an overview of the dominant frames found within these websites, including quotes that exemplify how these actors frame the genetic modification of food.

Risk Frame

For critics of genetic modification, risk is the most important and commonly employed frame. After examining numerous websites, three main risks emerged: environmental, human health, and unknown risk, or "Pandora's Box." Economic risks were also identified, but to a lesser extent. The section below gives specific examples of these frames.

Critics typically frame genetic modification as a technology fraught with environmental risks. The Union of Concerned Scientists stress the environmental risks of the technology, noting that the transfer of genes from GM crops to their native relatives may lead to the creation of invasive and uncontrollable "super weeds" (www.ucsusa.org). The development of herbicide-resistance seeds enables farmers to maintain weed–free fields by broadcasting pesticide indiscriminately without damaging their crop. However, critics note that these crops are modified to be resistant to only one herbicide, Monsanto's Roundup, allowing weeds to rapidly evolve resistance. Friends of the Earth International

(FOEI) notes that the introduction of "Roundup Ready" crops and the adoption of the practice of "complete weed-kill" are responsible for a 15-fold increase in the use of the pesticide glyphosate (the active ingredient in Roundup) from 1994 to 2005 (www.foei.org). In addition, the intensity of herbicide usage per acre has increased 150% during this timeframe. FOEI explains that these herbicide resistant crops have "spawned an epidemic of herbicide-resistant weeds in the U.S., Argentina, and Brazil, thereby encouraging still greater use of chemicals to control them" (www.foei.org). The fact that Monsanto developed and produced the defoliant Agent Orange used by the U.S. military in the Vietnam War is not lost on critics, and comparisons between Roundup and Agent Orange are common (www.organicconsumers.org/gelink.cfm). Critics also note that fields containing GM crops lack biodiversity, and contain decreased numbers of birds, insects, and other animals (McGiffin 2005).

Genetically modifying crops to resist viruses is also a risky practice, according to critics, because of the potential for viral genes introduced to the crop to recombine with the related genes of incoming viruses, thereby creating new viruses. Crops modified for industrial or medicinal applications may contain compounds that endanger the animals that forage on these fields after they are harvested (www.ucsusa.org). Critics also note that eliminating wind pollination and completely removing an entire crop from a field, pollen, seeds and all, is virtually impossible. Because of this inability, scenarios are possible where the ingestion of food containing proteins intended for medicine or some other not-for-human-consumption form could prove deadly if unintentionally crossed with a crop for human consumption (www.percyschmeiser.com).

Aside from the inability to control the spread of genetically modified crops, critics assert that the technology is still experimental and dangerous. On their website the self described not-for-profit public interest research organization, EcoNexus, points out 'huge gaps in scientific knowledge and the need to greatly improve scientific assessment procedures before GM crops are licensed." The EcoNexus funded study conducted by Wilson et al. (2006) found "many hundreds of thousands of individual mutations scattered throughout the genome of each new transgenic plant." One of the authors later warned, "This genetic unpredictability should be treated very seriously indeed. Once inserted, the mutations highlighted in this report cannot easily be eliminated from

transgenic crops and nor can their consequences for food safety and the environment easily or reliably be determined" (www.econexus.info). Greenpeace's True Food Network highlights the unknown risks of the technology, contending, "genetic engineering is highly unpredictable. Contrary to industry claims, the techniques used in genetic engineering are random and imprecise. Because scientists still understand very little about how genes work, genetic engineers frequently find unexpected side effects when they move genes across species, or even within the same species" (www.truefood.org.au/q_and_a2.html?faqid=3).

Because of the relatively recent introduction of these organisms, long-term risks to human health are unknown, and this fact alone should preclude the introduction of these foreign organisms into the environment these groups contend. Noting that numerous parts of the world, particularly many European and African nations, and Japan, have adopted the 'precautionary principle' placing moratoriums on the cultivation and import of genetically modified organisms, critics assert that American consumers are essentially guinea pigs (www.percyshmeiser.org). Chief among the health risks cited by critics is the potential for serious allergic reactions to GM foods. Since genetic modification moves proteins into the food system that have never been used for food, there exists a great potential for many of these proteins to negatively affect human health. Without labeling these products, consumers do not know which products to avoid, as the Union of Concerned Scientists points out, "Mothers who know to avoid giving their sensitive children milk would not know to avoid giving them transgenic carrots containing milk proteins" (www.ucsusa.org/food_and_environment/genetic_engineering/).

The potential risk of allergic reactions due to GM foods gained much attention following the StarLink corn contamination (McGiffin 2005). On September 18th, 2000, Taco Bell taco shells were discovered to contain genetically modified corn approved for animal, but not human, consumption (Schmitz et al. 2004). This revelation alarmed consumers, threatened the food industry, and decreased corn exports (www.ucs.org). The developer of StarLink corn, Aventis, ended up losing over one billion dollars due to the recall of millions of corn-based products and the subsequent lost revenue (Nisbet and Huge 2007). Two years later, an environmental group tested the same brand of taco

shells and again found StarLink corn within the products, again leading to recalls and questions about the efficacy of U.S. food regulatory agencies (Nisbet and Huge 2007). Because labeling is not required, consumers with allergies to these products cannot know which products to avoid or whether GMOs are the cause of their reactions. Finally, these anti-GM groups note that the introduction of antibiotic-resistant genes within the food supply may lead to a reduction in the effectiveness of antibiotics in addition to creating human or animal pathogens that are impervious to antibiotics. (www.ucsusa.org/food_and_environment/genetic_engineering/).

Critics of GM provide a long and harrowing list of environmental, health, and unknown risks associated with genetically modifying agricultural products. These groups universally call for a halt to the further implementation of GMOs into the food supply and the adoption of the precautionary principle. Advocates of the technology, however, focus on the many benefits of GM, and also provide convincing arguments that are discussed below.

Benefits Frame

After examining the websites of several transnational biotech companies, it became clear that "benefits" is the most dominant frame they employ. The websites particularly emphasized the benefits realized by farmers, including economic benefits, increased yields, and additional "free" time. These companies typically devoted much attention to the benefits of GM crops and seeds for poor farmers in the developing world, and these arguments usually contained a moral component (which is discussed in more depth in the morality frame section of the paper). In addition, the potential health benefits for consumers and benefits for the environment, such as reduced pesticide usage, were highlighted. Examples of this frame are given below.

Monsanto frames genetic modification as a crucial tool that benefits the environment, consumers, farmers, and their families. By reducing the need for pesticides, irrigation, and fossil fuels, Monsanto claims that genetic modification has resulted in a 15.5% decrease in the environmental impact quotient, saving 289,000 metric tons of pesticide from being used, and preventing 10 million metric tons of greenhouse gases from being emitted through fuel savings (www.monsanto.com). In addition, GM

crops are more productive and conserve natural habitat for wildlife by reducing agricultural expansion. Consumers benefit from foods that are nutritionally enriched, last longer, contain lower levels of naturally occurring toxicants, and have reduced saturated fats and/or allergens (www.usda.gov). The development of novel, plant-based pharmaceuticals will also improve human health for GM advocates (Nevitt 2004). According to Monsanto, farmers reap significant professional and personal benefits from planting genetically modified crops, as they note:

> our work provides farmers with novel ways to get more out of each seed. Farmers use our seed-based products to help them protect their harvest from weeds and insects, produce healthier foods, more nutritious animal feeds, better quality fiber and renewable fuels" (www.monsanto.com/products/default.asp).

To emphasize the personal and familial benefits of GM crops for farmers, Monsanto provides video testimonials on their website. Waldir Mingotti, a Brazilian farmer extols the virtues of GM soy, explaining:

> Before we would spend 14 to 15 hours a day in the fields checking and trying to control weeds. Nowadays, it is possible to plan in advance for weed and disease control. It's amazing. With transgenic soy we just plant and never have to worry about weeds. This way we have more time to spend with the ones we love. (www.monsanto.com/products/benefits.asp).

American farmer Terry Wanzek cites the benefits for his family, noting:

> I get to know my kids. I think it improves the quality of their life as well. They get to see Dad more often. It has allowed us again to get closer to family. (www.monsanto.com/products/benefits.asp).

Spanish farmer Miguel Arazo concurs, stating:

> With biotech my quality of life has improved. You can sleep more soundly. You know that the corn borer will not attack your crop. You enjoy more free time for entertainment or your family. (www.monsanto.com/products/benefits.asp).

According to Monsanto, of primary importance for their company is aiding the 90% of biotech farmers who "are small, resource-poor farmers from developing countries" (www.monsanto.com/biotech-gmo/asp/default.asp). These farmers typically face extremely denuded soil and inhospitable climates that can, according to advocates, be overcome by genetic modification. For instance, the anticipated development of drought

tolerant corn varieties will help farmers "remove some of the uncertainty of farming by reducing some drought induced losses." (www.monsanto.com/biotech-gmo/asp/default.asp). With the help of Monsanto's Bt (insecticide) cottonseeds, Indian farmer, Keshavrao Pawar was able to pay off his loans, and notes:

> For the last fifty years our family had been into farming but we did not gain anything, we were living with loans over our head but because of this seed we can do so much… if we keep making profit, I can help my son and also my daughter become a doctor. If I keep getting income like this I can do all this. If the yield will be good we can do everything! (www.monsanto.com/biotech-gmo/asp/default.asp).

Genetically modified seeds have enriched South African farmer Bethuel Gumede's life and may allow him to send his children to school as he explains:

> I will be glad if in the future my kids will be able to go to university, and I am looking to my land to pay for all of that. With this new cotton, I was able to build a house, and buy a TV, and a refrigerator. And I was able to buy some goats and a cow with this money. I am able now to buy rice of high quality and I am able to buy maize meal with high vitamins. I am also able to buy apples, oranges, and salt so my family can be healthy. My life has changed. As you can see, my children are healthier than before. So with this genetic technology my life has changed completely (www.monsanto.com/biotech-gmo/asp/default.asp).

Another South African farmer Elizabeth Jele also makes a strong case for Monsanto's products claiming:

> With this new seed I don't have to buy the chemicals anymore, so I just plant it and leave it. And my life is now easier and better. With the profit I get from YieldGuard, I am able to buy seed for onions, spinach and tomatoes, which I sell. I take the profit from these vegetables to buy fertilizers and seeds so I can continue farming the next season. I am able now to take care of my family and my kids. Their future looks good because I am no longer spending too much time in the field managing my farm. We were struggling to keep hunger out of our houses. Now we have YieldGuard, so if someone came and said we should stop using it, I would cry. I would cry. (www.monsanto.com/biotech-gmo/asp/default.asp).

Monsanto Co. has framed genetic modification as a tool that benefits the environment, consumers, farmers and their families, and the poor of the world. The testimonials included above underscore the positive impacts of their products, while also incorporating the next frame identified in this examination, the morality frame. The issue of morality is a battleground of ideas for critics and advocates. For Monsanto and other transnational biotech companies, limiting the use of their products is immoral because it

reduces the ability of the farmers to be productive and take care of their families, and condemns the hungry and malnourished of the world to continued misery. Critics, on the other hand, frame genetic modification as a contrivance that does not help aid the hungry, indentures poor farmers, and benefits only transnational biotech companies.

Morality Frame

After analyzing these websites, it became clear that a battle for the moral high ground is taking place between critics and advocates of the genetic modification of food. As much of the literature on framing notes, the diagnostic task of framing is inherently tied to moral evaluations and casting villains (Hunt et al. 1994; Snow and Benford 1988). Critics frame this biotechnology as "playing God", an "unnatural" manipulation of life that disturbs and destroys the natural world, eradicates poor and family farmers, only profits transnational bio-tech companies, and does nothing to alleviate the suffering of the hungry. Advocates counter that this technology is the key to feeding the hungry, alleviating poverty, and helping poor farmers in the developing world attain the "American Dream" of self-sufficiency and economic success. Some examples of the morality frame are given below.

On Monsanto's website, Clive James of the International Service for the Acquisition of Agricultural Applications (ISAAA) notes:

> If you try and put the human face on poverty, poverty today is a rural phenomenon. Eighty percent of the poor people we have on this planet today are farmers or people that work on farms so it follows that if you can in fact find a product that will increase the income of these people, then you are making a direct contribution to the alleviation of poverty (www.monsanto.com/biotech-gmo/asp/default.asp).

Women and children are also primary beneficiaries of agricultural biotechnology, according to Monsanto as the introduction of Bt cotton in India has directly increased the amount of prenatal doctor visits, enrollment of children in school, and the number of children who are vaccinated.

Monsanto claims that only through increased advances in biotechnology will the world be fed and the suffering of millions be relieved. The adoption of genetically modified crops among resource-poor farmers is delivering unprecedented benefits that contribute toward the Millennium Development Goals of reducing poverty by 50 percent

by 2015 (www.monsanto.com/biotech-gmo/asp/topic.asp?id=2007GlobalReport). Cargill also frames their work as a way to help the world, describing their work as "Nourishing Ideas. Nourishing People." and prominently feature a young girl smiling and eating bread on their homepage (www.cargill.com/).

Critics counter that GM crops have not benefited the poor of the developing world or reduced hunger in any way. As Nnimmo Bassey of Friends of the Earth International's GMO coordinator in Nigeria notes:

> The biotech industry tells Africans that we need GM crops to tackle the food needs of our population. But the majority of GM crops are used to feed animals in rich countries, to produce damaging agrofuels, and don't even yield more than conventional crops (www.centerforfoodsafety.org).

In addition, FOEI declares:

> Biotechnology companies have not introduced a single GM crop with increased yield, enhanced nutrition, drought-tolerance or salt-tolerance. Disease-tolerant GM crops are practically non-existent. As in the past, virtually 100% of world acreage planted with commercial GM crops have one or both of just two traits: herbicide-tolerance and insect-resistance (www.foei.org; "Who Benefits From GM Crops?").

Greenpeace's True Food Network concurs, stating:

> There is no simple solution to end world hunger. Genetic engineering is not the answer, just as pesticides weren't the answer. Even increasing food production is not the answer. World hunger will only end when the underlying causes of poverty are addressed. Poverty prevents people from securing their basic right to food - either because they have no means to purchase food or they have no access to the farmland and natural resources necessary to meet basic food needs. Genetically engineering crops does nothing to address the poverty that causes hunger; in fact it threatens to make it worse (www.truefood.org.au/q_and_a2.html?faqid=11).

The "Manifesto of the Americas: In Defense of Nature and Cultural Diversity" declares that this technology only benefits the powerful:

> We strongly oppose the liberation of transgenic organisms in the environment, whether in Farms, plantations, ranching or whatever other activity in the environment. Beyond being unnecessary, they are essentially useless for anything other than transnational corporate profits (www.foodfirst.org/en/node/1470).

Employed by both critics and advocates alike, the morality frame is laden with emotion and visceral images intended to resonate with audiences. The rights frame is another

emotive frame that is used for these purposes, and is found predominately within the websites of anti-GM groups.

Rights Frame

In addition to the risk and morality frames, critics of the genetic modification of food frequently employ a "rights" frame on their websites. This frame emphasizes how the rights of consumers, farmers, and indigenous peoples have been trampled by the unfettered implementation of GMOs within the food system around the world. Of particular salience within this frame is the call for citizens to fight for "bio-democracy" and resist the patenting of seeds, life forms, indigenous knowledge, plants, and animals by transnational biotech companies. These anti-GM organizations also emphasize how farmers in developing countries have lost their right to save seeds and how farmers around the world have had their crops contaminated with GM crops through cross-pollination, and been sued for failing to pay for the technology. Some examples of the rights frame are given in the section below.

Critics of genetic modification point out that because labels are not required for foods containing GMOs; the right of consumers to choose food free from these products has been stripped away (www.organicconsumers.org; Herbert 2005; Stabinsky 2005; Caplan 2005). Poortinga and Pidgeon (2007: 22) claim "the introduction of non-segregated products can be considered as one of the worst strategies to force consumers to accept GM products, as it directly violates the basic consumer right to choose the products they want to consume." This claim is highly disputable, however, as this strategy has been exceptionally successful, with most Americans eating GM products every meal with little awareness or resistance.

The decision by the U.S. court system to allow GM seeds to be patented has essentially outlawed the ancient practice of seed saving and resulted in U.S. farmers being sued by Monsanto for millions of dollars for this "crime" (www.foei.org/en/campaigns/gmo). As the True Food Network explains:

> The agrochemical companies that produce GE seeds require farmers to sign legal agreements specifying how to farm and promising not to save seed. They also expect farmers to pay royalties. Companies such as Monsanto then aggressively sue farmers who

> they believe are using their seeds without signing such agreements. Unfortunately due to contamination many farmers are finding they have GE crops on their land whether they asked for it or not. In Canada, Monsanto sued a canola grower called Percy Schmeiser because GE canola was growing on his land as a result of contamination. Even though Schmeiser did not want the contamination Monsanto argued successfully that he owed them money anyway (www.truefood.org.au/q_and_a2.html?faqid=10).

Essentially, Monsanto is suing US and Canadian farmers for having their crops corrupted with genetically modified organisms, a fate especially devastating for organic farmers.

In reaction to the transnational biotech company's aspirations to obtain monopoly patents on seeds, life forms, indigenous knowledge, plants, and animals, critics of genetic modification have called for "bio-democracy." For these groups bio-democracy encapsulates:

> What the global grassroots stands for, democracy, and reverence for all living creatures, in opposition to Biotechnology or Bioimperialism, rule by the corporate technocrats, who basically believe that living live forms are just 'a bag of chemicals', as the head of the Biotechnology Industry Organization put it (www.organicconsumers.org/biobytes/1biob060122.cfm).

Stabinsky (2005) points out that the contamination of traditional Mexican corn varieties by genetically modified corn is "biocolonialism" that essentially strips away the ancient Mexican maize culture. In addition, she notes that standards of safety for GM corn are formulated according to an American diet, leading Mexicans in these corn-producing regions to consume these novel and untested proteins at unprecedented levels, with untold risk. Many scholars have also noted the injustices within the food system calling for a "genetic Bill of Rights" to help protect the "intricate web of relationships within the biological and social worlds" (Krimsky and Shorett 2005: 223). As I've shown, the rights of farmers, consumers, and the environment are of crucial importance for anti-GM groups. The rights frame is frequently employed to highlight the egregious disregard for these rights by transnational biotech companies, governments, and regulatory bodies.

Science Frame

In addition to the benefits and morality frames, an analysis of the websites of transnational biotech companies yielded a final frame, "science". This frame emphasizes innovation and discovery, highlighting the current research these companies are

undertaking. The application of biotechnology and the benefits it provides for the world are stressed, and is typically employed by advocates of GM.

For transnational biotech companies, innovation is the solution to advance agriculture and society, as Dow's agro sciences website notes, "Our vision is to shape the future of agriculture and pest management through innovation." (www.dowagro.com/science/index.htm.) Discovery and exploration are key themes within these sites, although the level of detail describing the actual processes involved varies between websites. The Dow website explains that "together, we use cutting edge science to discover and develop solutions for improving crop yield and human and animal health." and "combine the power of science and technology with the "Human Element" to constantly improve what is essential to human progress." However, not much attention is given to the "nuts and bolts" of biotechnology. In contrast, the DuPont website, gives a thorough primer on the scientific aspects of biotechnology, and the research conducted by their 1,800 researchers in 25 countries whom "work toward one common goal - bringing more value to the world's producers. They seek answers and develop solutions to unique challenges producers face today and will confront tomorrow."
(www2.dupont.com/Biotechnology/en_US/science_knowledge/index2.html)
For these companies, emphasizing the cutting edge science behind the genetic modification of food shows the public that they are innovating on behalf of society, and essentially provides their credentials and trustworthiness. As the DuPont website claims, "Biotechnology is the Science of Miracles", and these miracles are made by the biotech industry.

This section has listed and given examples of the frames employed by critics (risk, morality, and rights), and by advocates of GM (benefits, morality, science). It is important to note that these frames are not self-contained units, and all incorporate elements of other frames. For instance, when transnational biotech companies employ a benefits frame to highlight the way genetic modification helps increase yields of farmers in the developing world, a moral component is included in their the story and their emphasis on the power of the technology to help the poor. The science frame emphasizes discovery and the "power of science", but is only useful when the benefits these

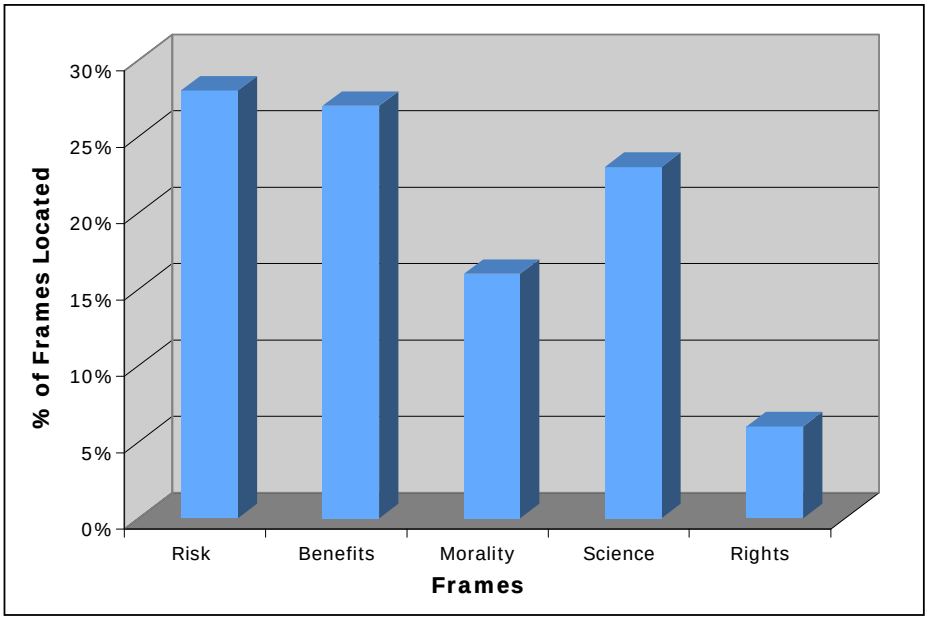
applications have for society and the environment are highlighted. When critics employ a rights frame in their discussion of the need to protect small farmers, issues of morality are never far away. In sum, this study found that critics of GM typically employ risk, morality and rights frames, while advocates typically employ benefits, morality, and science frames.

U.S. Print Media Findings

To address Research Question 3, **"**To what extent have these frames been incorporated into the U.S. print media's coverage of genetic modification?" frame analysis was conducted of relevant articles appearing in the New York Times, the USA Today, and the Wall Street Journal from 2001-06.

The most commonly employed frame of GM critics, risk, and the most commonly employed frame of GM advocates, benefits, were found at almost identical rates when the findings of all of the newspaper articles were collapsed (i.e. combined with no regard for year or newspaper). Of the 523 critic/advocate frames identified in these newspapers between 2001-06, risk accounted for 28% and benefits 27%. The science frame employed mainly by advocates of GM followed in prevalence at 23%. Employed by both sides of this issue, the morality frame, accounted for 16% of identified frames, while the rights frame made up only 6% (see Table 5).

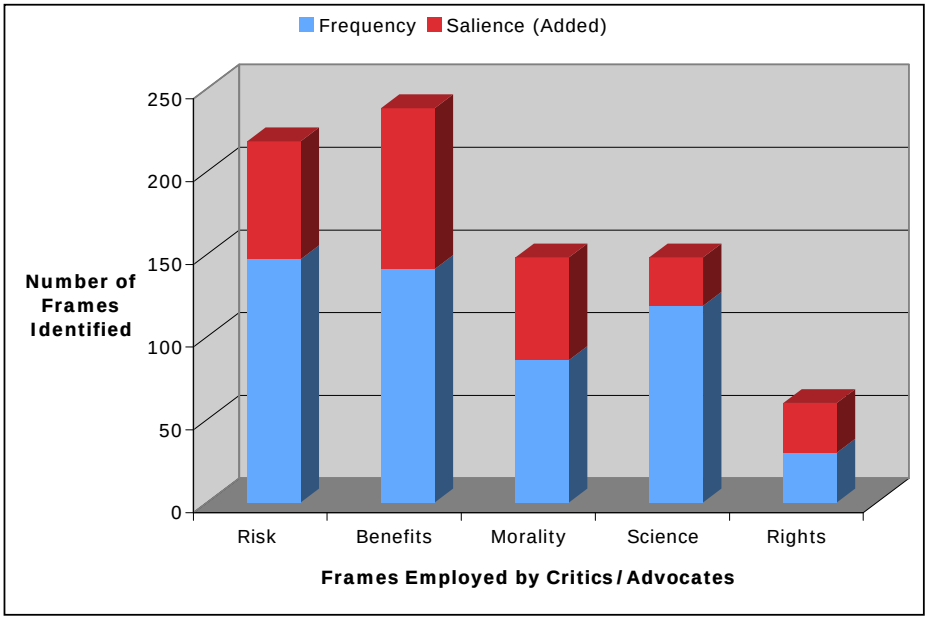
Table 5. Composite Percentage of Media Frames Located in NYT, USA Today, and WSJ, 2001-06



	Risk	Benefits	Morality	Science	Rights
Frequency	147	141	86	119	30
Total Frames	523	523	523	523	523
Percent	28%	27%	16%	23%	6%

When saliency is factored in, however, the incorporation of these frames within the media becomes closer to a risk-benefit dichotomy. In essence, risks and benefits were in focus or "in the lead" more so than the other frames, and at very similar rates (see Table 6).

Table 6. Composite Frequency and Salience of Frames Employed by Critics and Advocates in the NYT, USA Today, and WSJ, 2001-06

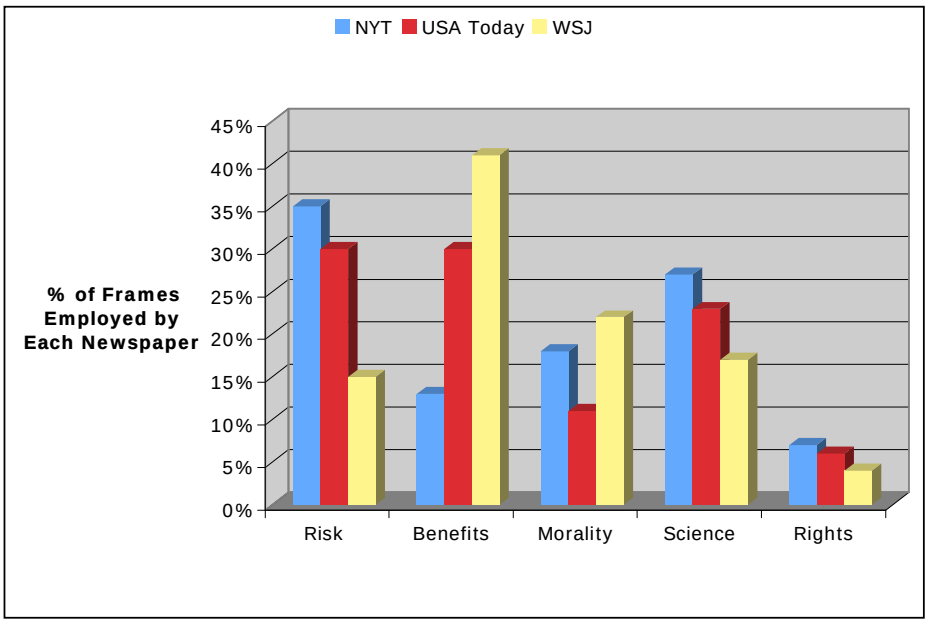


However, this study found that the use of frames does differ significantly between these three newspapers in their employment of frames, particularly the risk and benefits frames. This significance was determined by chi-square calculations, and revealed that risk and benefits were significant at the .01 level, while the other frames were significant only at a level greater than .5. These variances closely correlate with common perceptions of the New York Times as more liberal, the Wall Street Journal as more conservative, and the USA Today as somewhere in between. For example, the benefits frame accounted for 13% of the frames employed by the New York Times, while the Wall Street Journal emphasized the benefits of genetic modification 41% of the time. At the same time, the risk frame accounted for 35% of the frames located within the New York Times' coverage of the issue, while this frame made up only 15% of the frames employed by the Wall Street Journal.

In other words, the New York Times incorporates the frames of critics most frequently, while the Wall Street Journal incorporates the frames of advocates most frequently. These findings signify that the arguments made by environmental and consumer organizations are relatively prevalent within the New York Times' coverage of

the GM issue. On the other hand, the pro-GM stance of transnational biotech companies has found a home within the pages of the Wall Street Journal. According to these data, the USA Today does appear to be the most "balanced" when covering the genetic modification issue. The newspaper employed the risk frame and the benefits frame at identical levels, 30% (see Table 7).

Table 7. Percentage of Frames Employed by Each Newspaper, 2001-06



Media Frame	Risk	Benefits	Morality	Science	Rights
NYT	35%*	13%*	18%	27%	7%
USA Today	30%*	30%*	11%	23%	6%
WSJ	15%*	41%*	22%	17%	4%

*significant at .01 level.

As noted, the risk frame accounted for 35% of the frames employed by the NYT in their coverage of genetic modification. An article focusing on genetically modified fish on May 9, 2001, is a good example of how the NYT typically employed a risk frame in its coverage of GM:

> The (environmental) groups argue that the fish could damage the environment. Farmed fish they say, inevitably escape into the wild. Computer simulations have suggested that these fast growing genetically engineered salmon might out-compete natural salmon for food and mates.

At the same time, the risk frame accounted for only 15% of the frames employed by the WSJ, while the benefits frame accounted for 41%. As noted earlier, the benefits frame

(like all the frames identified) is often intertwined with another frame. For instance, an article in the WSJ on May 21, 2003 exemplifies how a benefit frame is interwoven with a morality frame:

> The science of biotechnology can make crops more resistant to disease, pests, and drought. By boosting yields, biotechnology can increase farmers' productivity and lower the cost of food for consumers. It can help the environment by reducing pesticide use and preventing soil erosion. And new crops offer the promise of something greater still: foods fortified with nutrients that could help stem disease—including saving the eyesight of over 500,000 children who go blind each year because they lack Vitamin A. Where food is scarce, or climates harsh, increased agricultural productivity could spell the difference between life and death, between health and disease for millions.

Highlighting the "selfishness" of GM critics, the WSJ typically argued that impeding the development and implementation of GM foods was immoral.

Often representing the opposite position, the NYT presented the argument that the introduction of genetically modified seeds into the developing world has frequently decimated the lives of many farmers, noting that in India the failure of GM seeds has lead to "17,107 farmers commit(ing) suicide in 2003, the most recent year for which government figures are available. Anecdotal reports suggest that the high rates are continuing." (www.nytimes.com/2006/09/19/world/asia/19india.html?th&emc=th). However, the heavy focus on morality found in the websites of environmental and consumer groups and of transnational biotech companies was less common in the print media. Of the five frames identified, the morality frame ranked second in prevalence in the WSJ, third in the NYT, and fourth in the USA Today.

Although the rights frame is one of the most commonly employed frames by critics of GM, it has not been significantly incorporated into these three newspapers and is the least frequently employed frame. The rights frame accounted for 7% of the frames employed by the NYT, 6% for the USA Today, and 4% for the WSJ. This finding is somewhat surprising because of the numerous issues that seemingly hinged on matters of rights, notably the labeling disputes over claims for the right to GM free food and the conflicts of patent rights around the world.

The genetic modification frames found in the U.S. print media varied dramatically from 2001 to 2006, but these findings are limited by the dearth of articles meeting the

necessary criteria in the WSJ and the USA Today in the latter part of the sampling frame. As the issue has seemingly recessed in importance for the American public, so too has the number of articles focusing on GM. For instance in 2005 both the USA Today and the Wall Street Journal printed only five articles that focused on the genetic modification of food. This fact significantly reduces the utility of deriving the percentages of frames employed for these two newspapers in 2005 and 2006. However, this absence of articles is a significant finding, revealing that this issue is increasingly "off the radar screen", and may contribute to the lack of awareness of this issue for the American public, and consequently "dampen" resistance.

In the immediate aftermath of the StarLink corn contamination in September 2000, the risks of genetic modification were extensively covered, evidenced by the large percentage of risk frames identified within the New York Times (55%) and the USA Today (49%) in 2001. The Wall Street Journal, however, did not focus on the risks of genetic modification as the risk frame accounted for only 13% of the frames employed within its pages. Following the novel and sensational nature of the StarLink contamination, the NYT and the USA Today trended downward in very similar patterns, while the WSJ continued to de-emphasize the risks of genetic modification, aside from a spike in 2004 (see Tables below).

Table 8. Percentage of Total Frames employed by New York Times by Individual Frame by Year

Year	Risk	Benefits	Morality	Science	Rights
2001	55%	2%	7%	34%	2%
2002	52%	16%	12%	20%	0%
2003	27%	17%	20%	32%	5%
2004	33%	5%	43%	10%	10%
2005	7%	22%	22%	30%	19%
2006	30%	20%	17%	23%	10%

Table 9. Percentage of Total Frames employed by USA Today by Individual Frame by Year

Year	Risk	Benefits	Morality	Science	Rights
2001	49%	20%	7%	24%	0%
2002	37%	39%	4%	18%	4%
2003	20%	26%	14%	34%	6%
2004	21%	36%	29%	7%	7%

2005	13%	63%	0%	25%	0%
2006	17%	17%	33%	0%	33%

Table 10. Percentage of Total Frames employed by Wall Street Journal by Individual Frame by Year

Year	Risk	Benefits	Morality	Science	Rights
2001	13%	61%	19%	6%	0%
2002	17%	23%	30%	20%	10%
2003	10%	41%	17%	24%	7%
2004	41%	41%	18%	0%	0%
2005	0%	53%	33%	13%	0%
2006	13%	25%	13%	44%	6%

Like the risk frame, the employment of the benefits frame varies significantly between these newspapers over time. The gulf between the perspectives of the NYT and WSJ is most evident in 2001, with the benefits frame accounting for only 2% of identified frames in the NYT, while this frame made up 61% of the frames employed by the WSJ. In 2002, the amount of benefits frames employed dramatically dropped in the WSJ while simultaneously rising dramatically in the USA Today. The main finding here is that while the USA Today and the WSJ have fluctuated dramatically in their use of the benefits frame, they have consistently emphasized the positive aspects of genetic modification more so than the NYT, which has been consistent in its low amount of benefits frames (see Table 6).

As previously noted, within the websites of GM critics and advocates, the morality frame is of great importance. Analysis of the frames within these newspapers is difficult to interpret, with dramatic crests and troughs. This is likely due to the lack of articles from the USA Today and WSJ focusing on genetic modification in the latter part of the study timeframe. However, it appears that the New York Times' usage of the morality framed rose steadily until 2004, culminating in several articles about the suicides of Indian farmers, and has since dropped off. In general, the USA Today utilized the frame less than the other two papers.

These three newspapers employed the science frame approximately the same percentage of the time. When this usage is tracked over the timeframe, it reveals that they also employed the frame at roughly the same amounts through the timeframe. The

NYT and the USA Today trend very closely, while the WSJ exhibits similar patterns, particularly 2002-05. A significant drop in the usage of this frame occurs in 2004, roughly correlating with a rise in the usage of the morality frame. Further research is needed to determine the context of events that created the fluctuations, although a negative correlation between science and morality appears possible (see Table 8).

For all three newspapers the rights frame was seldom employed. Of the frames employed by the WSJ, the rights frame accounted for 0% in 2001,2004, and 2005 and peaked at 10% in 2002. Discounting an apparent anomaly due to a lack of articles in 2006, the USA Today remained at 7% or below throughout the timeframe. The NYT usage of the Rights frame trended upwards steadily, peaking at 19% in 2005, before dropping to 10% of frames employed in 2006. The next chapter further analyzes these results, addresses the limitations of the study, and points to avenues for further research.

Chapter 5: Discussion and Conclusion

Despite the increasing prevalence of GMOs in the U.S. food supply, consumer awareness and resistance has remained limited. Numerous scholars have pointed out the critical role the media plays in affecting public opinion of an issue (Gamson 1992; Gitlin 2003; Tuchman 1978), and this study addresses the media's coverage of the genetic modification of food. This suggests two possibilities (alone or in combination) that might help us understand U.S. consumers' quiescence. First, the media are not representing the views of critics of genetic modification as frequently as they are representing those of advocates. Second, critics' views do not resonate with issues that consumers feel are important. Utilizing frame theory, an approach that has shown the importance of information presentation and packaging, this study focuses on the first possibility, and addresses some aspects of the genetic modification debate that have been glossed over in the literature by answering two overarching research questions: (1) How have critics and advocates of genetic modification framed the issue? And (2) To what extent have these frames been incorporated into the U.S. print media's coverage of this issue?

I began by analyzing the websites of numerous environmental and consumer organizations and transnational biotech companies. I determined that the dominant frames found within the websites of critics were risk, morality, and rights, while advocates typically employed benefits, morality, and science frames. These frames were then searched for within the three most widely circulated newspapers in the U.S. from 2001-06.

Before conducting this study, I believed that the U.S. print media's coverage of this issue had, in general, been relatively positive (and thus portrayed the views of advocates more frequently) and disregarded important, negative aspects of the technology. However, these findings show that *overall* (when the findings of the three newspapers over the sampling timeframe are collapsed), the U.S. print media has employed the frames presented by critics and advocates at nearly identical rates, with the risk frame employed by critics accounting for 28% of all frames employed and the benefits frame employed by advocates accounting for 27%. In other words, arguments that the media has been complicit in silencing criticism and downplaying the risks of this

technology appear to be untrue when the findings of these three newspapers are collapsed.

However, significant differences were found in the employment of these frames by the individual newspapers. For instance, while the risk frame accounted for 35% of the frames employed by the New York Times and the USA Today, the Wall Street Journal employed the risk frame only 15% of the time. Conversely, while the benefits frame accounted for 41% of the frames employed by the Wall Street Journal and 30% of those employed by the USA Today, the New York Times employed it only 13% of the time. These findings support my hypothesis that significant differences would be found in the use of the frames employed by these three newspapers, with the New York Times incorporating the frames of critics most frequently and the Wall Street Journal incorporating the frames of advocates most frequently.

Although this finding is unsurprising, it suggests a link between powerful interests in the business world (the corporate elite) and the general perspective of one of their leading information sources. Stated another way, the Wall Street Journal is an indicator of the viewpoint of the economically invested players in the GM debate. The influence the corporate elite has in the realm of policy formation is undeniable (notably through lobbying), and likely has contributed to the U.S. Government's decision to place the burden of proof on those concerned of the consequences of GM, *not* on the developers of this technology. Having the second most widely circulated newspaper in the nation serve as a mouthpiece for transnational biotech companies can only serve to further their goals of spreading this technology globally, and to eventually "own food". Although it is impossible to determine the extent this media source factors into opinion formation, or conversely, the extent to which invested actor's influence the framing of the issue within this newspaper, by highlighting the potential benefits and downplaying risks, the Wall Street Journal does provide advocates with discursive ammunition for furthering the implementation of this technology.

When these frames are further broken down by their individual categories and analyzed, other significant differences between these outlets standout. Within the benefits frame, the most commonly discussed benefit of GM was that to human health, accounting for 35% of its usage. However, this frame was utilized at a much higher rate

in the USA Today (47%) and the New York Times (44%) than in the Wall Street Journal (18%). In its coverage, the Wall Street Journal most frequently focused on the increased yields made possible by GM (28%). By framing genetic modification as a technology that has great potential for increasing productivity and, thus profit, the pro-business nature of this outlet is, again, highlighted. In addition, the Wall Street Journal focused on the economic benefits of GM more frequently than the other outlets, (18%), USA Today (15%), and the New York Times (8%).

Although these three newspapers varied greatly in their usage of the risk frame, the percentage of focus on each of the constituent categories that composed the risk frame is strikingly similar. For instance, the most common risk frame employed by these three newspapers in their coverage of GM was the risks to human health at 35%, which accounted for 38% of the risk frames employed for the USA Today, 33% for the Wall Street Journal, and 32% for the New York Times. The risks to the environment accounted for 32% of the risk frames for these newspapers, making up 35% of the risk frames for the New York Times, 30% for the USA Today, and 29% for the Wall Street Journal. These findings suggest that these two issues, risks to human health and the environment, are the dominant issues associated with this technology, and regardless of the slant of the media outlet are recognized as important and worthy of coverage.

Unlike the risk frame, the morality frame reveals stark differences in the underlying perspectives of these newspapers. While the most common employment of the morality frame for the New York Times and the USA Today came under the "playing God" category, at 35% and 32% respectively, the Wall Street Journal employed this negative frame only 5% of the time. In addition, the vast majority of morality frames employed by the Wall Street Journal focused on feeding the poor and malnourished of the world (55%), while this frame accounted for 23% of the morality frames for the USA Today and 17% for the New York Times. Further, the Wall Street Journal focused on the ways the technology has helped farmers nearly twice as much as the ways in which it has hurt farmers. By contrast, the USA Today and the New York Times focused on the ways this technology has *hurt* farmers nearly twice as much as the ways in which it has helped them. Overall, these findings suggest that the categories housed within these dominant

frames add nuance to the story, and further reveal the disparate messages, and perhaps the different motivations of these three media outlets.

In general, this study did not find a print media that is likely responsible for "dampen(ing) wider social excitement and American concern" as Nisbet and Huge (2007:217) claim. The USA Today and the New York Times consistently highlighted the risks and the moral hazards of the technology, while all three newspapers routinely framed the genetic modification of food in an emotive manner. Such issues as the intractable trade dispute between the U.S. and the European Union, risks to human health and the environment, the refusal of food aid by African countries, and the suicides of scores of Indian farmers provided the print media with numerous dramatic and controversial topics to cover. Despite the fertility of this subject for evocative stories, however, the rights frame was noticeably absent from most of the articles analyzed. For instance, the highly charged confrontation between the U.S. Government and the European Union following the rejection of genetically modified American food aid by Zambia was typically framed as a risk or morality issue by these newspapers. However, just as easily a rights frame could have been employed that highlighted the right of Zambia and other African nations to food free of genetic modification regardless of their dire situation. In addition, the likelihood that some of this corn would be planted and usher in the production of GM corn in a nation where it had never existed, effectively reducing Zambians to the role of guinea pigs for this unvetted technology, could also have been framed as an issue of rights. In this manner, the dearth of the highly emotive rights frame does support Nisbet and Huge's claim of media dampening.

As these authors note, this issue has not received "celebrity status" in the media. This statement is strongly supported by this study, and evidenced by the lack of articles in the U.S. print media focusing on genetic modification and agricultural biotechnology. While significantly limiting this study, this finding clearly indicates that this issue is "off the radar screen". This is particularly true of the Wall Street Journal and the USA Today, where only 55 and 98 appropriate articles respectively, were found between 2001-06. In contrast, the New York Times ran over ten times as many articles discussing this technology over the same timeframe. By ignoring this critical topic, it must be concluded that the U.S. print media (at least its two most widely newspapers) has contributed to the

acquiescence of the American consumer, although the extent of this influence remains unclear. It is possible that, as a revenue-driven business, newspapers also choose to report fewer stories on this topic, based on a presumed lack of consumer interest. Nevertheless, with regard to the consumer acceptance of this technology, it is possible that what these newspapers have *not* said is as important as what they have said.

Limitations and Future Research

Although numerous examples emphasizing the importance of media framing have been highlighted in this study, the ability of the media to sway American consumer opinion on this issue remains unclear, and further research is required before the findings of this study can be adequately contextualized. As noted earlier, some scholars have argued that the media functions as a reinforcer of existing opinion rather than an as an instrument of persuasion. Do consumers seek out information sources that reinforce their existing opinions? Because readers who buy newspapers generally recognize their political slant, these newspapers may merely be preaching to their respective "choirs", and not significantly altering opinions. If this proves to be the case, the manner in which the media frames an issue would be relatively unimportant, and superceded by the pre-existing notion of the consumer. In this case, it would be imperative to determine the elements that do affect opinion formation and how these elements interact. Additional survey research is needed to quantify the extent to which American consumers believe their opinions are influenced by the media and other sources. Further research that identifies which issues best resonate with consumers is also needed to evaluate the efficacy of the current framing techniques of critics and advocates.

An analysis of the U.S. print media through a cultural lens would shed light on *why* these media outlets and the journalists who work for them frame the genetic modification of food in the way they do. In addition, this framework would also help determine the extent to which *consumers* influence the media. This framework would not gloss over the importance of underlying power structures that influence what is "newsworthy" and what is ignored, and contribute significantly to the literature.

Finally, this study is subject to the same criticism countenanced by all studies that utilize frame analysis, that being a lack of empirical credibility. Despite attempts to

combat this criticism by deducing frames from discourse directly related to this specific topic rather than applying frames a priori, this study remains eminently subjective. Another researcher may have uncovered alternative frames, and/or measured them in a different manner. In addition, frames often "bled" together, necessitating further subjective judgments of scoring and weighting, while greater nuance could have been achieved by further breaking down the constituent elements of the frames identified into sub-categories. For instance, the environmental category contained within the risk frame rubric could have been further divided into categories such as "loss of biodiversity", "development of super bugs", "development of superweeds", "dangers to animals ingesting GM crops", and so on. Nevertheless, this study successfully addressed a lacuna in the literature by showing how critics and advocates have framed genetic modification, and the extent to which these frames have been employed in the U.S. print media.

This study has attempted to provide a small piece of the larger puzzle of why Americans have acquiesced to the genetic modification of their food and to suggest further avenues for research. To this end, the most pressing need for scholars addressing the intersection of the media and biotechnology is additional research that sheds light on the actual effects of the media on consumer opinion. As noted earlier, consumers are not passive receptors but active interpreters. The challenge for researchers is to sort out the myriad elements that go into affecting the consumer acceptance of genetic modification of food in the U.S. This is especially difficult because the interactions of the elements that affect opinion, such as the input of family and friends, the media, religious beliefs, etc., and the individual topics that resonate with the American consumers, undoubtedly synthesize and interact in unclear ways. However, untangling these webs of factors would allow researchers to better understand the actual importance of the media in general, and framing, in particular.

To what extent do the frames employed by media outlets sway or reinforce audience opinion? This question needs to be answered before the results of this study can be fully contextualized or possibly disregarded. Empirical studies that involve surveying subjects before and after exposing them to predetermined media frames could prove beneficial in answering this question, although more questions may be raised than answered. Nevertheless, contributing to the literature in this way would better allow

scholars to know whether this field of research is worth pursuing, or rather a black box that is unknowable, or as Goffman (1974:13) phrased it, nothing "more than another mentalistic adumbration."

Suggestions for Anti-GM Organizations

This study has highlighted the fact that while genetic modification of food is increasingly absent in public discourse, GMOs are increasingly prevalent in the American food supply and farm. If this trend continues, genetically modified food will soon be considered the status quo. The onus is on critics of this technology to bring the issue to the attention of the American consumer, or face the possibility of a country where all crops will be genetically modified, every food product full of GMOs, where organic agriculture is a thing of the past and the role of the American consumer as lab rat continues. To avoid this scenario, anti-GM organizations must frame the issue in a way that resonates with American consumers. As the Pew study (PIFB 2006) found, the most important factor determining support for biotechnology is "the impact on you and your family." Critics of GM should continue to rely heavily on the risk frame and focus more intensively on how this technology poses personal risks to consumers and their *families*. As the Pew study showed (pg 18), issues of morality and ethics are not of great concern for most Americans with regards to biotechnology, and anti-GM organizations would be better served to frame the issue in a less ideational manner that highlights the credibility of their sources of information. Because consumers are generally uninformed about this technology, organizations opposed to GM still have an opportunity to resonate with the American public by highlighting the dangers GM food poses. Monsanto has realized the importance of the family in affecting consumer opinion and structured their website around the benefits GM has for the families of consumers, farmers, and the poor in developing countries. Anti-GM groups must frame genetic modification in a similar manner, allowing the "average" American to see their self and their family in the GM story.

Conclusion

This study used the findings of many studies that note the American public is generally unconcerned with the rapid increase of genetically modified organisms within their food supply. In addition, numerous other studies, particularly in the media and social movements, have highlighted how framing significantly influences public opinion. To ascertain if the print media's framing of this issue plays a significant role in this general acquiescence as some have suggested, I first examined the websites of several anti-GM organizations and pro-GM advocates to determine the ways they have framed this issue in their attempt to influence the American consumer. After locating the dominant frames employed by critics (risk, morality, rights) and those of advocates (benefits, mortality, science), I measured how frequently these frames appeared within the U.S. print media's coverage of genetic modification. Disproving my hypothesis, was the finding that, overall, the U.S. print media has employed the frames of critics and advocates at similar rates. However, substantial differences were identified between the three newspapers examined, with the New York Times generally the most critical of GM, the Wall Street Journal generally the most supportive, and the USA Today somewhere in between. The vast differences in the volume of coverage between these media outlets, was the most telling finding, with ten times as many genetic modification articles found in the New York Times than the Wall Street Journal during this timeframe. In sum, it appears that the U.S. print media's framing of the genetic modification of food is likely a less significant factor in the acquiescence of American consumers to GMOs in their food supply than the general dearth of coverage. Further research is needed to identify the factors that most affect consumer opinion and effectively resonate with consumers. In addition, the ability of these media outlets to sway an audience rather than simply re-enforce existing opinions is murky and in need of further study. Finally, the influencing power of new on-line information sources is still unclear, and is an area ripe for continued study.

Appendix

Sample Newspaper Coding Form

Newspaper	
Article #	
Date	
1. Risk Frame:	
1.Environment Risks	
2.Human Health Risks	
3.Unknown Risks/ “Pandora’s Box”	
4.Economic Risks	
2. Benefits/Progress Frame	
1. Increased Yields	
2. Economic benefits for farmers	
3. Other benefits for farmers	
4. Potential Health Benefits	
5. Environmentally Friendly/Beneficial	
3. Morality Frame:	
1.“Playing God” (negative)	
2. Disturbing/ Destroying nature	
3. Hurting small/family farmers	
4. Helping poor farmers	
5. Helping feed the poor and/or malnourished	
6. Animal welfare	
4. Science/Technology Frame	
1. Emphasis on innovation/ discoveries	
2. Description of the process	
3. New Research	
4. Applications, current or proposed	
5. Rights Frame	
1. To have GE free food	
2. Protect small farmers	
3. Protection of culture	
4. Patent rights	

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