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Genetically Modified Food in the US and the UK: Proponents, Dissenters and Media Coverage

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Genetically Modified Food in the US and the UK: proponents, dissenters and media coverage

A Thesis
Presented to
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Master of Arts

by
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Abstract

This research is a qualitative study examining the communication surrounding the issue of genetically modified food in the UK and the UK from October, 2011 through September, 2012. Material from biotechnology industry organizations, industry-funded non-profits, groups campaigning against the continued use of the technology, and mainstream media coverage of the issue in both countries during this time was examined using thematic analysis. The issue is analyzed through the lenses of Herman and Chomsky’s propaganda model, agenda building and framing theory. The research finds support for agenda building as well as a modernized understanding of the propaganda model, which the researcher argues are complementary theories.
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Chapter 1: Introduction

As global wealth is amassed in the hands of a few\(^1\) and global food prices have continued to spike and dip, generally rising over the last twenty years\(^2\) and exacerbating food shortages in much of the developing world, food riots have broken out among the poorest populations and public debate is very heated regarding how food will be produced, regulated and sold.\(^3\) Every year five million children die from illnesses related to under-nutrition\(^4\) while huge amounts of food are wasted daily in the US\(^5\) and in other parts of the developed world. The 21\(^{st}\) century has also seen the rise of the organic food industry as a response to the more developed world’s anxiety about contamination, pesticide use and genetic modification. All of these factors, when assembled as a snapshot of the state of the global food system, indicate that there is something wrong with the mechanisms that control food access, food quality, how and where food is grown and who controls it. The ability to feed oneself is a basic human right according to the United Nations Universal Declaration of Human Rights,\(^6\) but 925 million people are deprived of it every day, 98% of whom are in the developing world.\(^7\)

The US government plays a significant role in promoting the ideology of free trade in the international marketplace, especially with regard to the global food system, while also pursuing policies that arguably undermine the actualization of truly free markets. One ready example of this is the US government subsidization of the production of corn, while leading the way and signing on to the North American Free Trade
Agreement, ultimately sabotaging Mexico’s ability to compete even in its domestic markets for corn, let alone international markets. While politicians give lip service to the idea of a free market, the reality is clear that truly free markets do not exist anywhere, nor are the mechanisms being put in place to implement such a system by those who promote the idea most vocally. This seeming contradiction is at the heart of the problem of the global food system.

Some questions that present themselves, then, are who benefits from the promotion of this ideology by the same players whose policy implementation is in direct contradiction to its basic tenets, and how does the ideology of free market capitalism still hold sway in global discussions of how to solve the world’s food problems?

Some of the most powerful forces in the global food industry are those corporations that are on the forefront of the technological frontier to genetically modify and patent seed. Corporate giants such as Monsanto, Dupont, Syngenta, Bayer and Dow, have not only worked to patent hybrid and genetically modified seeds and created seeds that do not reproduce in order to prevent seed saving and reseeding, but they have been progressively buying up smaller seed production and distribution companies, resulting in the global market dominance of these few major seed producers. There is a growing body of research that examines the scientific complexities surrounding genetic modification of crops, seeking answers to such questions as whether they are safe to introduce to the biosphere, if they are safe to consume, if they are effective in increasing yields and decreasing the use of agricultural chemicals, as well as the social effects and ethics of patenting genetic material in the first place. But the US and much of the developing world are not waiting to learn the outcome of this scientific debate. Although
scientific research does play a role in the important decisions that are made with regard to food and agriculture policy, scientific analysis takes longer than most policy makers, corporations, consumers and markets are willing to wait.

New technologies are consistently introduced in many countries including the US, Argentina and India, before their effects on human health and the environment can be effectively assessed, and it is frequently unclear what harm will come to the environment through human actions until that harm is already done. As David Leonard Downie articulates in his analysis of global environmental policy, “new environmental issues often exist, almost by definition, at the edge of current knowledge of chemistry, biology, physics, and natural systems.” An obvious example of this phenomenon is the multitude of cases in which exotic species have been introduced into a foreign environment, either accidentally or deliberately, with disastrous unintended ecological and economic consequences. For example,

in the case of cotton, the total accumulated cost of the boll weevil, which arrived in the U.S. from Mexico in the 1890s, now exceeds 50 billion dollars. Leafy spurge, an unpalatable European plant that has invaded western rangelands, caused losses of $110 million in 1990 alone. In eastern forests, losses to European gypsy moths in 1981 were $764 million, and the list goes on.

The introduction of GMOs into the various and endlessly different ecosystems has clear parallels to the many cases of the optimistic introduction of exotic species without specific knowledge of exactly how it will change that environment until the damage (or benefit) has been irrevocably done, such as. The questions of how GM crops will cross-pollinate with their conventional counterparts, or if herbicide resistant genes could spread
from food crops to weeds, and what the consequences will be of this potential gene-flow, remain unanswered.\textsuperscript{12,13}

Reminiscent of the endless cases of environmental damage from exotic species, the cases in which products were thought to be safe for human consumption but were later discovered to be damaging to various degrees, are equally numerous and catastrophic. One example is thalidomide, which, because it was believed to be nontoxic and to have no side effects, it was widely prescribed to pregnant women for relief of morning sickness and insomnia. However, thalidomide proved to be anything but nontoxic; more than 10,000 women who took the drug during pregnancy gave birth to children with severe birth defects.\textsuperscript{14}

Time and time again a tacit scientific consensus is on one side in an issue, only to be proven spectacularly wrong by the test of time.

Other factors, then, must greatly affect the decisions that are made by governments and consumers on a daily basis. What matters as much, if not more, than scientific evidence in such cases is the ability of the corporations that produce these products to convince governments and consumers of the benefits of their approval and consumption. This process is a multilayered one that involves lobbyists, media, government organizations, NGOs, farmers, scientists, and individual consumers. Therefore the various ways in which this public discussion takes place is what determines how the global food system has been and will continue to be shaped. This issue affects the entire global population, and thus a developed understanding of how these decisions are made is essential to comprehend how the food system will be affected by decisions made now, and how it might be improved for the benefit of future generations.
The manner in which such decisions are made in modern democracies depends heavily on how the media portray food related issues. As the literature review below will demonstrate, a significant body of research has made important connections between how the media portray an issue with how much and in what ways citizens think about various issues. Additionally, an extensive body of literature also reveals a strong correlation between policy and media coverage. Media coverage of biotechnology and GMOs is then highly relevant to an understanding of how different societies think about and regulate the food system. A critical analysis of the narratives that are predominant in the media regarding GMOs reveals important aspects of societal attitudes about food as well as the basis upon which policy is shaped and defended.

This research will contribute to this goal by examining the following question:

*How are the biotechnology industry, its products, and activist groups promoting and disparaging this technology covered by the mainstream media in the United States and the United Kingdom, and how is activist rhetoric on both sides incorporated in this coverage?*

This inquiry will be directed towards examining the ways in which US and UK media contribute to shaping communal understanding of what food is, how it is produced and who legitimately benefits from its production and distribution. Examining the manner in which the industry and its products are portrayed by the media and how different parties attempt to influence this portrayal will help form an understanding of why the food production system operates in the way that it does and how the inequalities
discussed above are justified and perpetuated by media coverage of the issue. The following section will examine the background of GMO research and evidence provided by the industry as well as independent researchers regarding their safety for human consumption and the environment. This background will serve to set up a scientific and political context in which the media coverage of the issue can be examined and understood.
Chapter 2: GMO Food Research

Biotechnology corporations produce and patent chemical herbicides and genetically modified (GM) seeds, which are predominantly engineered to be insect resistant or herbicide tolerant. The public discussion regarding industrial food production, especially with regard to genetically modified organisms (GMOs) is confusing and full of opposing claims, emotional arguments, and a level of mystery about which products contain GMOs and which do not, as well as what that means for consumers and the environment. US regulation relies on the principle of substantial equivalence, meaning that GMO foods are not substantially different from their non-genetically modified counterparts, allowing “existing food safety and environmental protection laws and regulations to” be applied to them. At the same time, biotechnology corporations operate on the assumption, accepted by the international community, that the genetically engineered seeds and subsequent food products are unique inventions and thus they are protected under international intellectual property rights regimes. The organic food movement appeals to a growing number of consumers who doubt substantial equivalence and who are concerned about potentially negative health and environmental effects of GMOs as well as the health risks associated with synthetic chemicals used in conventional agricultural production, among other concerns.

The European Union, in contrast to the US, bases its GMO policy on the precautionary principle and “has adopted a directive controlling the deliberate release of
The precautionary principle is an alternative to a bias that, Rosie Cooney argues, exists in many societies, jurisdictions, and contexts, there has long been a general presumption in favour of development. . . . Under this presumption, where there is uncertainty or ignorance regarding the impacts of activities such as release of pollutants, fishing, construction, or mining, the ‘default state’ is that activities can go ahead.

The precautionary principle operates in an alternative manner, shifting the burden of proof towards showing that environmental harm is unlikely to come from development operations, making room for policies that monitor and attempt to prevent potential environmental damage. The basis for the use of this principle is that in recent years, faced with the increasing scale of human changes and impacts on the human environment, and with growing awareness of its complexity, it has become increasingly clear that science, and human knowledge generally, cannot provide definitive evidence of all forms of harm in advance.

Jacqueline Peel describes the precautionary principle as “the most radical of environmental principles.” Peel explains, “Some invoke it to justify preemptive international legal measures to address potentially catastrophic environmental threats such as climate change. Opponents however have decried the principle, arguing that it promotes overregulation of human activities.”

The European Union uses the precautionary principle to justify strict regulation of GMOs, and in June 1999 the EU passed a moratorium on approvals of biotech products. In May, 2006 the WTO ruled on a dispute put forward by the US, Canada and Argentina against the EU’s moratorium on approval of biotech products, stating that “the general de facto moratorium . . . [is] inconsistent with the ‘sufficient scientific evidence’ and ‘risk assessment requirements’ under the SPS agreement.” The decision, which ruled the
The conflict between European Union GMO policy and US GMO policy has not only affected EU-US relations, but also contributes to the attempts at GMO regulation by the developing world. The US regularly donates GMO food and seed in its international food aid contributions. In 2002 Southern Africa faced the worst famine crisis in ten years and the US sent food aid in the form of whole kernel corn. None of the corn could be guaranteed GMO free, and as a result six Southern African countries refused the aid, sending back the shipments.\textsuperscript{24} This was in part as a result of the concern, voiced by Zambian president, Levy Mwanawasa, that the food is “poison,” but another crucial factor in the dispute was the fear “that southern African nations could lose lucrative export markets in Europe if they cannot certify that their crops are GM-free.”\textsuperscript{25} In this way the EU’s restriction and labeling practices regarding GM foods in combination with the active promotion of GMOs on the part of the US is affecting global trade not only US-EU trade.

**Biotechnology Industry Arguments**

The major arguments made by biotechnology corporations to promote GMOs and synthetic chemical pesticides are that this technology will be necessary to address poverty by increasing the available food supply to feed the ever-expanding world population, that they will do so in a more environmentally sustainable manner, while aiding the quality of life of farmers along the way.\textsuperscript{26} Monsanto’s website, for example, states:
In the hands of farmers, better seeds are helping the world grow more, while using less. Researchers around the world, in both the public and private sectors, are working to improve seeds through the use of advanced breeding and biotechnology. Together with better farming techniques, these advanced seeds can help farmers meet the world’s demand for food, clothing and fuel -- while also helping to reduce the need for water, land, pesticides and fossil fuels.²⁷

Monsanto also claims that the corporation is working towards the goal of “helping [to] improve the lives of farmers and the people who depend on them, including an additional 5 million people in resource-poor farm families by 2020.”

The first step in understanding how these claims fit into the public dialogue about the two major products that these corporations are promoting--GMOs and agricultural chemicals--is to look at how some of the most recent literature that is produced independently of the biotechnology industry on these topics evaluates the success of these stated goals.

Goal: “Helping to reduce the need for water, land, pesticides and fossil fuels”

The Rodale Institute has been conducting side-by-side studies comparing organic agriculture with conventional agriculture for 30 years, the longest running trial of its kind. The Institute’s 2011 report on the findings of these trials find that organic farming--differentiated from conventional farming in that it does not use synthetic chemicals--produced a number of benefits over conventional farming techniques: Organic methods used 45% less energy than the conventional methods and emitted a 40% smaller volume of greenhouse gasses; the soil health from the organically farmed areas increased over time, while remaining essentially the same in the conventionally farmed areas; and yields
reached the same level for both conventional and organic agriculture under prime conditions, but in years of draught organic outperformed conventional agriculture.\textsuperscript{28} These results, although they do not address GMOs, challenge the fundamental assumption that agricultural chemicals are necessary to efficiently produce food.

The importance of this finding is emphasized by a plethora of studies that show the human health impacts of the presence of agrochemicals in the environment. One such study exposed human liver cells to different formulations of glyphosate-based herbicides (the most commonly used in the world, and that which the “roundup-ready” soybeans produced by Monsanto are engineered to be tolerant of). The study “tested sub-agricultural dilutions and noticed the first toxic effects at 5 ppm, and the first endocrine disrupting actions at 0.5 ppm, which is 800 times lower than the level authorized in some food or feed” The study concludes that “glyphosate-based herbicides present DNA damages and CMR effects on human cells.”\textsuperscript{29}

Another study analyzes the concurrence between birth defects in the US and levels of agro-chemicals in surface water.

A significant association was found between the months of increased risk of a birth defect (April–July) and increased levels of nitrates, atrazine and other pesticides in surface water. Critical time periods before and after conception may link seasonal peaks in environmental contaminants to certain birth defects.\textsuperscript{30}

Philip Howard, in an analysis of seed industry consolidation, introduces the idea of 3 distinct “treadmills” observable in the agriculture industry. One of these that he discusses is the pesticide treadmill.

As the use of synthetic pesticides increases, populations of natural predators are reduced, and selection pressures lead to pest populations with resistance to these
compounds. This encourages applications of larger amounts of current pesticides, or the substitution of more toxic pesticides. \textsuperscript{31}

Indeed GM seeds have resulted in an increase in pesticide resistant weeds.

Dr. Vandana Shiva reviews evidence of increasing pesticide use around the world as a result of the adoption of various GM crops, highlighting the phenomenon of weeds that are closely biologically related to plants that have been genetically modified for herbicide resistance acquiring these herbicide resistant genes, producing a whole host of herbicide resistant “superweeds.” According to Shiva,

as a result of this weed resistance farmers are being forced to use more herbicides to combat weeds. As Bill Freese of the Center for Food Safety in Washington D.C., says “The biotech industry is taking us into a more pesticide dependent agriculture, and we need to be going in the opposite direction.”\textsuperscript{32}

The resistance to glyphosate that these weeds are acquiring results in the return to the use of “tillage and more toxic herbicides for weed control.”\textsuperscript{33}

Due to a lack of additional available land for conversion to agricultural uses in the US, Asia, and Europe, Latin America’s Southern Cone is the area in which GM soy production is expanding most quickly.\textsuperscript{34} Argentina was one of the early adopters of GM technology, which has lead to the domination of Argentine agriculture by the mechanized production of soy, which “now occupies more land in Argentina than all other crops added together.”\textsuperscript{35} Genetic modification of soy is heralded as a technology that will reduce overall pesticide use, but the experience in Argentina challenges this claim.

When genetically modified herbicide-tolerant (GMO) soy was introduced in 1998, it was rapidly adopted by Argentine farmers. The resistance of GMO soy to glyphosate facilitated weed control and by 2002, the adoption of GMO soy neared 100%. Between 1994 and 2003 the use of glyphosate rose from 1 to 150 million litres. The widespread and often indiscriminate use of glyphosate has caused dozens of cases of intoxication and is blamed for the destruction of soil microbial life, leading to sterile soils where crop residues are no longer decomposed. Weeds
that have developed glyphosate resistance require cocktails of highly toxic herbicides such as atrazine to control. Intoxication of rural workers and neighbouring communities have been reported throughout the soy producing provinces.\textsuperscript{36}

While it could be argued that the increase of the amount of glyphosate used is a logical result only of the expansion of the agricultural sector,

the fact that the GM crops may require fewer distinct applications of herbicide does not change the fact that their widespread adoption in the developing countries, where chemically intensive agriculture is not the standard, will increase the total quantity of chemicals entered into the environment.\textsuperscript{37}

Additionally, the increase in chemical use is not proportional to the increase in soy cultivation in many instances such as in Brazil, where “soy area has increased 71 percent but herbicide use has increased 95 percent,” and where, “in 2009, total herbicide active ingredient use was 18.7 percent higher for GE [genetically engineered] crops than conventional.”\textsuperscript{38} The increase in pesticide use has lead to dangerous levels of water pollution in Argentina and elsewhere in the Southern Cone: “Pollution of surface water with pesticides threatens human populations and aquatic life. Indigenous populations depending on fish for sustenance and river water as drinking water source are especially vulnerable.”\textsuperscript{39}

It is clear that the adoption of GM crops is increasing the amount of pesticides used in agriculture, not reducing them. This result isn’t surprising in that it is in the interest of companies such as Monsanto to increase, rather than decrease, the consumption of its products. Monsanto promotes the idea that its GMO seeds are environmentally friendly because they reduce pesticide use. While this claim remains contested based on the research, including that discussed above, revealing an increase in pesticide use with the adoption of GMO crops, the company represents the claim as
undisputed fact. An internal Monsanto document dating from 2002 describing the basis for the “Good To Grow” campaign launched by the company at that time cites requests by growers and the food industry to build support for biotechnology in order to reduce anti-biotechnology pressure on the industry, as well as noting that “Monsanto’s future is inextricably linked to global acceptance of biotechnology” and that “pesticide reduction has shown it is a powerful message.” This line of reasoning shows the more pragmatic side of Monsanto’s claims of the environmental benefits of its products, that messaging regarding pesticide reduction was not implemented as a result of field studies providing evidence that pesticide use has been reduced by the use of GMO seeds, but instead as a result of the discovery that the message was proven to be effective in garnering public acceptance of GMOs.

Argentina is in a unique position in that farmers do not pay royalties on intellectual property rights since national laws allow for farmers to save genetically modified seed from previous crops. This practice is illegal in the US and elsewhere, requiring farmers to buy GMO seeds each year, rather than implementing the previously common practice of saving seed from one harvest for use in subsequent planting seasons. This exception has made the cost of using this technology very low in Argentina, and combined with the increasing global demand for soy, has lead to the domination of soy in the Argentine economy.

To this end, the introduction of GE crops in Argentina and elsewhere in Latin America’s Southern Cone has lead to enormous deforestation.

By 2000, Argentina had lost 46% of its original closed canopy forest. At that time, 7.4 million hectares (ha) or 2.7% of the total land area remained. The deforestation between 1990 and 2000 has been estimated at 10%. In 2000, Fundacion Vida
Silvestre indicated that soy is a major threat to biodiversity in the Chaco and Atlantic rainforest ecosystems.\textsuperscript{42}

Not only does the expansion of GM soy production lead to increased use of agrochemicals, but it is also a major contributing factor in deforestation in areas where the soil is not ideal for agriculture, resulting in a situation where “the most marginal (and often most vulnerable) lands will be abandoned shortly after having been cleared”\textsuperscript{43} The reality of unnecessary deforestation, an increase in the use of toxic agrochemicals, and water pollution resulting from farming practices associated with GM technology and the use of synthetic agro-chemicals, combined with the Rodale Institute’s findings that organic agriculture uses much less energy and produces equal and sometimes better yields, brings into question Monsanto’s claims for the environmental benefits of its products.

Goal: “Helping improve the lives of farmers and the people who depend on them”

Biotechnology corporations claim to be “helping improve the lives of farmers and the people who depend on them, including an additional 5 million people in resource-poor farm families by 2020.”\textsuperscript{44} Such claims are complicated by evidence that genetic patenting directly negatively affects farmers worldwide in that the price for soy and corn seeds more or less doubled between 1996 (when GE seeds were introduced) and 2007. In comparison the prices of seeds for wheat and rice (for which genetically engineered seeds are not prevalent) were increasing much more slowly during that time period of time.\textsuperscript{45}
While farm incomes remain stagnant, seed and chemical corporations, most notably Monsanto, continue to report increased profits.\textsuperscript{46}

Howard puts forth a set of theoretical treadmills to provide an explanation of how farmers are affected by the increasing industrialization of agriculture as well. The technological treadmill was originally developed in 1958 by Willard Cochrane, according to Howard.

Cochrane suggested that because demand for food is relatively inelastic, any increase in production is likely to reduce the prices farmers receive for their crops. . . . Practices that increase production (which are tied to off-farm inputs) may initially accrue financial benefits for a small number of early adopters who are able to stay slightly ahead in this process. For the majority of farmers, however, the result is that they must constantly increase yields in order to simply maintain the same revenue.\textsuperscript{47}

Howard uses this concept to explain why farmers accept the increasing subjugation to seed and biotechnology companies despite the trend of farmers becoming more and more dependent on these corporations, with little or no material benefits for themselves.

Additionally, Monsanto has waged economically devastating legal wars on farmers who choose not to use Monsanto’s genetically modified seeds, but whose crops have been contaminated by cross-pollination with genetically modified crops cultivated within range of pollination by insects and wind in countries such as the US and Canada that support the industry’s claims to intellectual property rights for seed.\textsuperscript{48} The aggressive legal action taken by Monsanto contradicts its self-reported interest in improving the lives of farmers.
Goal: “Feeding 9 billion people”

The 2009 analysis of GM crop yields entitled “Failure to Yield,” produced by the Union of Concerned Scientists, challenges the industry’s claim that GM crops provide higher yields. The report reviews an extensive body of literature that compares yields of genetically modified soy and corn with their conventional counterparts. Distinguishing between the concept of intrinsic yield—the highest that can be achieved under ideal conditions—and operational yield—the actual yield produced in the field, the authors find that “there have been no apparent overall yield increases, operational or intrinsic, from [herbicide tolerant] corn and soybeans.” The pest resistant (Bt) corn trials revealed some yield increase as a result of the technology, but this increase accounted for “only about 14 percent of this overall corn yield increase, with 86 percent coming from other technologies or methods.”

The argument made in the report is that conventional selective breeding techniques and other non-genetic engineering methods have historically accounted for great yield increases and continue to do so above and beyond the small contribution that genetic engineering has made to these efforts through some of the GMOs that have been produced. The authors suggest that it would be prudent for the U.S. Department of Agriculture, state and local agricultural agencies, and public and private universities [to] redirect substantial funding, research, and incentives toward approaches that are proven and show more promise than genetic engineering for improving crop yields.

The report recommends that these other approaches include “modern methods of conventional plant breeding as well as organic and other sophisticated low-input farming
practices.” Although the biotechnology industry claims that its technology will be instrumental in feeding the expected 9 billion people, its products have been shown to contribute much less significantly to increasing food production levels than this claim would imply.

An examination of the direct social impacts of the spread of the cultivation of genetically modified crops further challenges the credibility of the biotechnology industry’s claims that it is helping to feed the increasing world population. The reality of the expanding world population is that expansion is occurring almost entirely in the developing world, while population growth in the developed world is stagnant or actually negative in many cases. Thus in order for Monsanto to be contributing to feeding this growing world population the contribution will have to be towards feeding those in developing countries, who are already most in need of increased food supply.

Debbie Barker points out, “even though we currently grow enough food to feed the world, more than one billion people still go hungry.” Her argument is that “the current system of relying on global markets and import/export models has dismantled food security at the household level where it must begin.” A further analysis by Marcela Valente describes the social inequity created by the evolution towards industrial soy based agriculture in Argentina:

While soy output has skyrocketed, so have poverty rates in that region, which is home to four million of Argentina's 37 million people. Between 1998 and 2002, the proportion of the population living in extreme poverty increased from eight to 29 percent in Catamarca, from 20 to 36 percent in Jujuy, from 12 to 43 percent in Salta, from 15 to 32 in Santiago and from nine to 34 percent in Tucumán. Although a direct causal relationship between increase in soy production and increased poverty rates would be difficult to prove, it is clear that what benefits from the mass-
production of soy in these areas may exist, they are not contributing positively to the quality of life of the majority of the population.

Richards adds to this argument by pointing out that Monsanto’s “biotech revolution” has been focused on corn, soybeans, canola and cotton—highly commercialized crops that are grown primarily for commercialized processing and not for direct human consumption. As a result of the expansion of these crops in the developing world, more of the food produced in these countries is exported to developed countries and land that was previously dedicated to growing crops for local consumption is being taken over for industrial agricultural production, while crops for local consumption are being rendered economically unviable by market mechanisms. Richards points out:

Far fewer resources and effort have been invested in crop varieties that have markets centered on the less developed countries themselves. Crops such as cassava, sweet potato, millet, tef, and yams have high nutritional value and are grown in the harsh kinds of environments frequently encountered in the Third World. Agribusiness TNCs like Dupont, Monsanto, Cargill, and Pioneer, however, have an interest in actually transforming the agriculture of less developed countries in a manner such that it comes to resemble as closely as possible that of the developed countries. In so doing they create markets not only for their patented seeds, but also for all manner of capital and chemical inputs that complement the seed technology.\(^{55}\)

Dros makes similar conclusions in his analysis, pointing out,

the combination of economic crisis and expulsion of small farmers and rural workers by mechanized soy farming has led to a decrease in food sovereignty, increased poverty and hunger. Food and dairy production for the domestic market dropped, the use of agrochemicals, human intoxication and water pollution increased.\(^{56}\)

The products and agricultural model promoted by the biotechnology industry are thus doing more to exploit the resources of developing world in the interest of producing
profits and any increase in food production is going to the developed world rather than making a contribution to the quality of life of the growing population in the developing world that the industry claims to be working towards feeding. This contradiction between stated goals and the complicated reality of the effects of the actions of these global seed giants on the ability of the global agricultural system to effectively function raises important questions regarding how government and society monitor and regulate the balance between the interests of citizens and corporate giants like Monsanto.
Chapter 3: The Rhetoric of GMO Food

It is important to recognize that these instances regarding the loss of land and resources by small farmers in the developing world in favor of large-scale production that goes towards feeding wealthier populations of the developed world are not unique. They are part of larger ongoing trends that many scholars discuss in terms of a North-South dichotomy, perpetuating dependency relationships that define a new type of colonialism. In a 2003 article addressing global human rights, Vandana Shiva frames the issue in this way:

The North has dominated the South by systematically denying full human status to the Southern peoples. This was first done through the West’s ‘civilizing mission’—the white man’s burden [emphasis in the original]; now it is done through globalization and free trade.  

Shiva describes free trade as having “substituted corporate for personal freedom, and passed off increased freedom for corporations as the expansion of democracy and human rights.” Shiva develops an argument that the right of trade is trumping the human right of access to food and livelihood. This concept highlights the values that lie behind arguments made in discussions of food access and production in the global market. When GDP and total crop production figures are used as evidence of the success of certain technologies or policies, often the quality of life of large portions of the population can be overlooked. Social and health issues are outweighed by big picture financial statistics that are by their very nature blind to other costs. This analysis will look at media
The issue of the safety of consuming food that is produced by GM seeds and application of synthetic chemical pesticides is also of relevance to this discussion. The biotechnology industry may be feeding some section of the growing world population, but if the food consumed by that population is contributing to illness and is dangerous to human health, then the value of this contribution is highly questionable.

The safety of GM food for human consumption has been an especially contentious part of the public discussion of this technology. Dr. Shiva reviews a study done on rats fed GM potatoes whose pancreases became enlarged, brains shrunk and immunity became damaged. She also discusses data from Monsanto’s own feeding trials that were accessed by a European Council order that demonstrated that rats fed GM corn had damaged kidneys, livers, hearts, adrenal glands, spleens and haematopoietic systems. The analysis goes on to detail a list of other studies that display the organ and immune damage observed in rats and mice as a result of consuming GM foods. Shiva also states that “The Biotechnology Industry attacked [the scientists who executed these studies] and every scientist who has done independent research on GMOs.”

This last point is further reinforced in much greater detail by Jeffrey M. Smith in his book, Seeds of Deception, in which he discusses a number of cases in which studies were halted and scientists were silenced by Monsanto and other industry players. Smith asks “how does the biotech industry do it? How do they continue to virtually dictate policy to the U.S. regulatory agencies in spite of such serious and blatant past
transgressions?” Smith proposes that the industry accomplishes these goals through campaign contributions and lobbying:

In 1994, 181 congressmen co-sponsored a bill that would require labeling of GM foods. But the twelve member Dairy Livestock and Poultry Committee stalled the bill until the end of the 1994 session—effectively killing it. In testimony before an FDA panel, Robert Cohen said ‘I investigated these twelve men and found that collectively they took $711,000 in PAC money from companies with dairy interests and four of the members took money directly from Monsanto.’ . . . Lobbying is another way the biotech industry exerts influence. According to the Center for Responsive Politics, between 1998 and 2002, the industry spent $143 million on lobbying. This includes the Biotechnology Industry Organization (BIO), which lobbies and advertises on behalf of the whole industry.

Smith and others have also suggested that Monsanto goes to great lengths to suppress negative media coverage of its products. For example, a 2007 Fox news story delved into why Monsanto (the creator and manufacturer of rGH growth hormone, for increasing the milk production of dairy cows) sued dairies for trying to label their milk non-rGH. Producers of this same news story investigated claims that the corporation threatened the jobs of Canadian health regulators and tried to bribe them into fast-tracking the drug for approval. But the story was produced and then never aired, and the news anchors were fired for objecting to the censorship. The change of plan was the result of intervention on the part of Monsanto’s lawyers that threatened costly litigation against the television network, Fox, on which the report was set to air. Fox lawyers were quoted as having told TV reporter Jane Akre and investigative reporter Steve Wilson “‘you guys don’t get it. It doesn’t matter whether the facts are true. This story isn’t worth a couple of hundred thousand dollars to go up against Monsanto.’”
The Propaganda Model

In *Manufacturing Consent: The Political Economy of the Mass Media* (1988), Herman and Chomsky lay out what they call “a propaganda model,” which focuses on [the] inequality of wealth and power and its multilevel effects on mass media interests and choices. It traces the routes by which money and power are able to filter out the news fit to print, marginalize dissent and allow the government and dominant private interests to get their messages across to the public.

Herman and Chomsky set up five basic “filters” through which this process occurs. These filters remain a relevant basis for considering the way in which the mainstream media is influenced by societal structures, and are thus individually elaborated below.

The first of these filters is “size, ownership and profit orientation of the mass media.” Here the authors present the manner in which start up costs and costs of operation serve to limit who is able to produce media on a mass scale, resulting in the concentration of media ownership in the hands of a relatively small elite. Additionally Herman and Chomsky go on to point out that the fact that media conglomerates are publicly traded results in a greater focus on turning a profit than in providing a public service.

In order to turn a profit, media companies rely on advertising revenues, which are selectively withheld if news content is unsatisfactory to advertisers. This leads to the second filter: “the advertising license to do business.” The authors argue, large corporate advertisers on television will rarely sponsor programs that engage in serious criticism of corporate activities, such as the problem of environmental degradation, the workings of the military industrial complex, or corporate support of and benefits from Third World tyrannies.
Since news of this kind will not sell advertising, and may offend significant sponsors, it would have to be run at a financial loss, an unlikely move for a publicly traded corporation with a responsibility to shareholders to maximize profit. Media content, in that it is a commodity for the purpose of creating profits, is also more effective for advertisers if it maintains what the authors call a “buying mood.” Advertisers “seek programs that will lightly entertain and thus fit in with the spirit of the primary purpose of the program purchase—the dissemination of a selling message.” In buying advertising time or space, advertisers are not only interested in the size of audiences, but also the quality of audiences--their power as consumers. Thus news outlets that succeed in a free market tailor their content to more affluent demographics, inherently marginalizing publications with messages that are more relevant to working class and less affluent members of society. The authors attribute the death of working class-targeted publications in the UK, *The Daily Herald, News Chronicle,* and *Sunday Citizen,* to “progressive strangulation by a lack of advertising support,” noting that the Herald had “almost double circulation of *The Times, The Financial Times* and *The Guardian* combined.” The authors use this evidence to argue that the dependence on advertising to support the news industry renders advertisers more the target audience of media content than the general public.

“Sourcing mass-media news,”70 is the third filter theorized by Herman and Chomsky. This is based on the time and money constraints put on the mass media by the need for a constant reliable flow of news material. The credibility culturally inherent in government and corporate association makes sourcing news from these “experts” more efficient than going to other sources that would have to be fact-checked and corroborated
much more exhaustively. The White House, the Pentagon and the State Department are also reliable sources of a large quantity of relevant news and thus are regular news beats for reporters.

Flowing in the other direction, these large bureaucracies have a strong interest in getting their messages to the public and dominating public dialogue on certain issues, and thus they dedicate massive amounts of money to provide the mass media with easy to process press releases and sound bites. This is the basis of a bureaucratic symbiotic relationship, according to Herman and Chomsky, that favors the perspective of the government and the private sector over less easily accessible and less wealthy actors.

Additionally, as part of this filter Chomsky and Herman explain the process by which the corporate world co-opts the experts, in that to avoid highly respected academics and scientists from undermining corporate messages in the media, corporations put these valuable spokespeople on payroll as consultants, funding their research, and organizing think tanks that will hire them directly and help disseminate their messages. In this way bias may be structured, and the supply of experts may be skewed in the direction desires by the government and ‘the market.’

The fourth filter is “flak and the enforcers,” and consists of legal, political or social objections, either direct or indirect, from powerful actors, regarding the content of mass media coverage. “The ability to produce flak, and especially flak that is costly and threatening, is related to power. Serious flak has increased in close parallel with business’s growing resentment of media criticism and the corporate offensive of the 1970s an 1980s.” The authors discuss the corporate sponsored growth of institutions
specifically organized for the purpose of producing flak, such as Freedom House, the Media Institute the American Legal Foundation, Accuracy in Media, the Center for Media and Public Affairs and others.

Herman and Chomsky’s fifth filter, “anticommunism as a control mechanism” refers to the “national religion” of anticommunism, which serves to dichotomize the word into an “us vs. them” mentality, and is used loosely as a term to vilify populist leaders abroad and put liberals in the west on the defensive.

The anti-communist control mechanism reaches through the system to exercise a profound influence on the mass media. In normal times as well as in periods of Red scares, issues tend to be framed in terms of a dichotomized world of Communist and anti-Communist powers.

This framework is then used to justify US intervention abroad as well as support for fascist dictators who are “lesser evils” than their communist alternatives.

Herman and Chomsky conclude their dissection of these mechanisms of influence with a number of predictions based on their model. They premise these ideas on how victims of foreign dictators will be portrayed in the news, as these are the nature of the subsequent case studies that they analyze, but their concepts can be usefully extrapolated to a broader context. They propose that the press covers the victims of foreign dictators differently when it is useful to US politics to condemn them, termed by the authors “worthy victims,” versus when the US is friendly with those dictators, termed “unworthy victims.” They predict 

we would not only anticipate definitions of worth based on utility, and dichotomous attention based on the same criterion, we would also expect the news stories about worthy and unworthy victims (or enemy and friendly states) to differ in quality. That is, we would expect official sources of the United States and its client regimes to be used heavily—and uncritically—in connection with one’s own
abuses and those of friendly governments, while refugees and other dissident sources will be used in dealing with enemies.\textsuperscript{76}

These distinctions of who is quoted when and with what level of criticism, in conjunction with their subsequent predictions regarding uncritical acceptance of certain premises, “such as that one’s own state and leaders seek peace and democracy, oppose terrorism and tell the truth,”\textsuperscript{77} will be useful in creating a nuanced framework of how biotechnology and the groups that have a voice in the debate are represented in the mass media.

\textbf{Updating The Propaganda Model}

Many scholars have used the propaganda model as a basis for media analysis since its introduction in 1988, going beyond the application to foreign policy by Herman and Chomsky. For example, in 2008, Jennifer Ellen Good\textsuperscript{78} analyzed how mainstream print media in the US, Canada, and other international news sources cover global warming. Good found that Canadian papers are three times as likely as US American papers to include articles about climate change, and that international papers are almost 30\% more likely to print such stories, using this evidence to make her case that “it would seem that the underlying message from newspapers in the United States is that climate change is not all that important.”\textsuperscript{79}

Good found that U.S. media frame climate change stories with a science-oriented frame more often than do Canadian media and others, while non-American media frame climate stories around the Kyoto Protocol. This focus on science centers on the question of whether climate change is real in the US media, as opposed to discussing solutions
such as Kyoto. Based on her findings and the propaganda model, Good predicted that US elites are the group with the strongest interest in maintaining the status quo with regard to climate change. She noted that debate, criticism and dissent all play a role in maintaining the status quo, as argued earlier by Herman & Chomsky.

The analyses presented here highlight that the story of climate change is being told (even within the United States, albeit somewhat less frequently) and that there is debate, criticism, and dissent. When the news frames move into more potentially threatening territory, however, such as the linking of climate change with extreme weather events or decreasing/different energy use, the story frequency plummets. Good finds the propaganda model to be a good analytical tool for analysis of the imbalance of article volume and framing of climate related issues.

Several scholars cite the most notable weakness of the propaganda model as being the lack of explanation given by the model for variation in coverage that is evident in mainstream media. Others note that the fact that the way an issue is covered changes over time is not accounted for in the model. Still other scholars argue that the propaganda model is too structural and does not allow for the individual agency of journalists.

These weaknesses are addressed and reconciled by these scholars in a number of different ways. In 2009, Des Freedman addresses the critics of the theory by focusing on an occasion of notable breakdown of the propaganda model in the UK. He examines the lead up to the war in Iraq and the fact that the Daily Mirror, usually a tabloid about celebrities and other less serious issues, turned its full attention towards editorializing against Britain becoming part of US President Bush’s “coalition of the willing” by joining the US in the invasion, and gathering signatures for a petition against it.
Freedman argues that the propaganda model focuses on the sameness of the media, whereas looking at the exceptions to this sameness is more enlightening:

Because they are about times at which established structures start to wobble, when previously hidden tensions emerge and when new actors are called for, abnormal circumstances are crucial in alerting us to the possibilities of both new kinds of political action and new kinds of media coverage.\(^{86}\)

He suggests that competition for different audiences and an attempt by the *Mirror* to differentiate itself from competitors contributed to this seeming rebellion against the typical kind of coverage.

Freedman does not accept the explanation included in the propaganda model for such variance, that such events are a consequence of a divided elite, and serve only to create the illusion of a dynamic and independent media. Freedman argues instead that at certain times there is

a willingness on the part of large numbers of people to participate in campaigns and movements that expose them to new ideas and generate this need for more challenging media frames. Their experience, in other words, pushes them to challenge received ‘wisdom’ and to make more demands of their media.\(^{87}\)

Through this analysis Freedman arrives at the conclusion that the propaganda model is effective in identifying systematic and everyday deficiencies in the corporate media, but that it is not as useful in theorizing change and exceptions, those events that open avenues for dissent.

We need an approach to the media that focuses on its internal contradictions – tensions that are most clearly expressed in moments of crisis – that not only explains the generally lousy performance of the mainstream media, but also encourages us to mobilize with others in seeking to open up critical spaces, to press for more accountability, and to inspire a democratic and genuinely diverse media.\(^{88}\)
In this way Freedman acknowledges that the model works up until a certain point, but that it does not allow for specific contexts—and as he says, the most interesting kind of context—where the status quo is challenged.

In 2007, Colin Sparks provided a detailed criticism of the propaganda model, reviewing its history of neglect as well as a tendency in critical scholarship to discuss a similar conceptual framework while ignoring the existence of the model in the first place. Sparks approached the propaganda model from a more Marxist framework, which assisted him in making distinctions, such as: “On the grounds of economic theory, we would expect capitalist-owned media to be united in opposition to threats from the working class, but deeply divided in terms of the interests of different groups of capitalists.”

Sparks also argues that the great variety of audiences targeted by news producers results logically in a greater variety of views that will be expressed in the mainstream media than the propaganda model allows for. The disproportionate focus by the model on the specific characteristics of the US media also makes it weaker according to Sparks. Another important flaw in the propaganda model arises from Herman and Chomsky’s assertion that journalists are middle class and thus aligned with the views of the elite. Sparks positions journalists instead as part of the working class, and thus much more active as potential agents of dissent than in the original model. These criticisms and others lead Sparks, in a similar vein as critical scholars cited above, to propose a model more open to change and accounting of a multiplicity of voices.

The central departure from the classical formulations of the PM is that, in place of the stress it gives to the uniformity of the media, we now expect to find diversity. The divided nature of the capitalist class, the presence of powerful critical currents
which find legitimate public expression in a capitalist democracy, the need to address the concerns of a mass audience, political differentiation as a marketing strategy, all point to the necessity for any viable media system to include a range of different opinions.  

In amending the model Sparks brings a comparison between the US and other democratic countries, such as those in Western Europe. Sparks proposes that the differences therein are the key to expanding the model, understanding the greater diversity of news than the propaganda model originally theorized and in conceptualizing how change can be realized even within a system that is so controlled by money and power. “The degree to which the mass media in a capitalist democracy will be open to dissenting voices cannot be specified in advance. It depends in part on the political structure of the society, the nature of its media market, and the issues under discussion.”

Under this readjustment Sparks proposes that the US is particularly constrained by the forces proposed in the propaganda model, but not stuck in them. Evidence of some diversity of viewpoint in the US media and a greater diversity in societies where there is public service broadcasting, a wider range of official politics, indicates the fluidity of the system. “If we modify the model to allow for the systematic representation of diverse opinions within the spectrum of legitimate politics, rather than positing the unified propaganda function of the media, then we can give a much better response to critics.”

Sparks sees this modification of the model as an opening for journalists to organize and revolutionize the media, taking over the media and attempting to run them along different lines, although he concedes that this is a distant prospect. The general tendency is for interested scholars to take this model and find where, when and how deviations from Herman and Chomsky’s model occur, ultimately tying these back to the
model as an explanatory device. This technique is especially relevant to this study in that the debate over GMOs has evolved over time, and coverage is bound to vary over time and certainly between the US and the UK, as other research has established. It will be important to look at differences as well as consistencies over time and location. The filters as presented in the original theory, in conjunction with more recent criticism and development will inform this analysis greatly.

The propaganda model lays out a theoretical framework that is highly political, and in certain parts, very specific to the time period in which it was developed. The model contributes insight onto the original form of a media system that has been changing at a rapid rate since the conception of the model, and thus while it contributes to the theoretical basis for this analysis, it cannot alone structure a modern analytical approach towards a media and information environment that has been largely affected by the internet and more accessible alternative information sources. The propaganda model, then, serves as a starting point from which to develop a framework under which to study the most recent developments in the GMO food debate.

**Agenda Building & Agenda Setting**

The ability of corporations to significantly influence how they and their products are covered by the mainstream media can be best examined through the theoretical lens of agenda building. As exemplified by the case of Monsanto’s successful bid to block the broadcast of Akre’s story, and further elaborated by Herman and Chomsky’s insightful analysis, wealthy and powerful corporations have a disproportionate power to influence what kind of stories the media publish and broadcast, and the extent to which this
influence is a major organizing force in media production is the topic of extensive research. Agenda building theory provides a theoretical basis for analyzing what powers influence the news that the public consumes and in what ways. Agenda setting theory, in turn, deals with the manner in which the media shape what the public thinks is important and how these issues are discussed.

Temporally, agenda building occurs prior to agenda setting. Whereas agenda setting relates to how the media agenda affects the public’s perception of issue salience and how the public processes news information, the central point of agenda building research is how some news items get on the media agenda while others do not.94

A fundamental aspect of how agenda building and agenda setting play out in news reporting is in how stories are framed.

Framing involves organizing and structuring information so that it is socially shared and provides meaning to reality, i.e. issue or event. This involves deliberate identification of an aspect of a perceived reality, and giving interpretation and evaluation of that reality.95

The sources of information that a journalist accesses in crafting a story, the language that the journalist uses, the sources that the journalist quotes, the tone that is taken as well as what information is included or emphasized and what is left out or passed over briefly, all make up the frame of the story. Even as journalists strive to report news in an impartial way, framing theory posits that all articles are filtered through a human lens and the choices that are made in composing the article/production have a significant influence on how a reader will interpret the information presented in the article. While the ostensible goals of journalism are to inform the public of newsworthy information external forces and expedience often shape news much more. “As news environments become more fragmented, public relations grows more sophisticated and
editorial systems weaken, the impact of PR on news becomes greater and more diverse. The sources of information that are more available, seem more credible, or seem to provide a more compelling news piece can thus have a stronger influence on how a story is framed than other sources. In this way, agenda building theory posits, industry organizations, activist groups and other organizations that are external to the media provide conveniently packaged information that is easily converted into news stories, and likely has an influence on how the information is framed.

**Public Relations & Corporate Social Responsibility**

Agenda building is closely tied to public relations, in that activist and industry groups of all kinds include media relations prominently in their public relations strategy. Agenda building is, then, often the result of coherent public relations strategies designed to achieve specific organizational goals. The public relations (PR) textbook *Strategic Communications Planning for Effective Public Relations & Marketing*, defines Public Relations as “an organization’s efforts to establish and maintain mutually beneficial relationships in order to communicate and cooperate with the publics upon whom long-term success depends.” This definition allows this analysis to establish a starting point for how PR practitioners would like the public to conceptualize their practices. James E. Grunig gives a more nuanced analysis of the role PR plays in the international arena, defining several types of PR practice. He defines *two-way asymmetrical* model as one that “uses social science research to identify attitudes and to develop messages that appeal to those attitudes that persuade publics to behave as the organization wants.” Grunig goes on to point out that this model only
seems to work reasonably well when the organization has little conflict with a public. When the organization and the public disagree, however, the model usually exacerbates the conflict and often leads to campaigning against one another, litigation and regulation.

Grunig proposes that “the two-way symmetrical model, overcomes these deficiencies. It describes public relations that is based on research and that uses communication to manage conflict and improve understanding with strategic publics.”

Evidence provided here suggests that the biotechnology industry currently relies on one-way symmetrical communication in that it uses very sophisticated methods to understand its publics and try to get them to bend to the will of the industry, but seems unwilling or unable to make that potential for change go in both directions.

Jonathan Matthews recounts an example of the biotechnology industry’s efforts to shape press coverage of the GMO issue, while displaying a highly developed understanding of the publics with which it is trying to communicate, a strong resistance to internal change, and a focus on changing public perceptions of global attitudes towards genetically modified organisms. Matthews describes a demonstration at the 2002 Earth Summit in Johannesburg in which poor farmers from India, Indonesia and three other developing countries marched and held signs decrying “the eco-agenda of the Green Left.” The protesters were ostensibly outraged that green activists were depriving them of the access to technology that could alleviate their poverty. Articles covering the protest were printed in newspapers all over the world with titles such as “I do not need white NGOs to speak for me.” What Matthews documents, however, is that the spokesman quoted as a poor Indian farmer, Chengal Reddy, is a wealthy lobbyist for large commercial farms in India. The media contact on the press release was Kendra Okonski,
a wealthy US citizen and right-wing NGO representative who also previously “ran the website counterprotest.net which specialized in helping right-wing lobbyists take to the streets in mimicry of popular protesters.” 100 It turned out that poor farmers sporting anti-environmentalist t-shirts and pro GMO signs did not, when approached by reporters, know English well enough to know what they were representing and these props had been given to them by the protest organizers and their travel expenses paid by groups such as Monsanto-funded, AfricaBio. Matthews argues that this is just one example of “the effort to position Monsanto’s soap box behind the black man’s face,” 101 going on to document repeated fake demonstrations with hired minority demonstrators and other direct attempts by the biotechnology industry to construct the illusion of popular support for the cultivation of GMOs. One of these techniques is the creation of supposedly independent organizations “such as CropGen and the Agricultural Biotechnology Council, both of which are run out of the office of the same central London PR agency.” 102 These organizations publish reports and are designed to be viewed by the public as independent scientific organizations that support biotechnology based independently on its scientific merits. This effort, according to Matthews, came out of the realization that a major reason for the failure of public acceptance for GMO foods in the UK was that the defense for these products was fronted by Monsanto and AstraZeneca. 103

In “Marketing Science: The Corporate Faces of Genetic Engineering,” Fennell 104 describes some of the tactics used by biotechnology companies to sell their arguments about GM food as truth. She argues, “somewhat paradoxically, companies attempt to juggle the multiple tasks of branding/selling a unique product while acting as a teacher to the general public and presenting seemingly unbiased and objective knowledge.” 105 She
positions biotechnology companies as using PR to create a false sense of two-way communication, while framing the issue as one in which “science is a sphere outside of rhetoric and that any complaints stockholders like consumers have is the result of a lack of understanding of science or expertise.”\(^{106}\) Fennel also cites numerous “reports of biotechnology companies attempting to smother the dissemination of research and engaging in questionable tactics while trying to influence policy.”\(^{107}\)

In a 2001 study of the source material used in environmental journalism Curtin and Rhodenbaugh\(^{108}\) examine whether the PR communication from corporations with a strong interest in refuting scientifically grounded claims of the destructiveness of their industries are more influential than PR materials from environmental organizations. They conclude that “within the distribution channels examined here, backlash materials are reaching journalists more frequently than are materials from environmental groups, demonstrating that backlash groups are more effectively forwarding their agenda to journalists.”\(^{109}\)

Corporate Social Responsibility is a term used in public relations literature that has become more important with increased public awareness of environmental problems and the trend of consumers trying to vote with their pocketbooks and boycott corporations whose actions are morally reprehensible or risky for human health and the environment. Corporate social responsibility can range from funding of community groups and projects to environmentally minded changes to corporate policy. According to Hildebrand et. al.\(^{110}\)

companies are increasingly interpreting CSR in terms of the interests of a specific but large and diverse set of stakeholder groups (e.g. consumers, employees, investors, communities, government, environment, etc.) and their efforts are
shaped by the strong belief that its endeavours in the CSR domain can elicit company-favouring responses from these stakeholder groups.¹¹¹

Some see corporate social responsibility as the exercise of consumer power to keep corporations in check, and thus as a positive development for society. This perspective is contested for a variety of reasons.

Karnani,¹¹² in his 2010 *Wall Street Journal* analysis of CSR, notes that the easiest way for companies to “do well by doing good” are those practices that are just good business. When companies’ bottom lines benefit from environmentally friendly practices it makes sense for them to carry out these practices even without social pressure to behave in a more environmentally friendly manner, but

in most cases, doing what's best for society means sacrificing profits. This is true for most of society's pervasive and persistent problems; if it weren't, those problems would have been solved long ago by companies seeking to maximize their profits. A prime example is the pollution caused by manufacturing. Reducing that pollution is costly to the manufacturers, and that eats into profits. Poverty is another obvious example. Companies could pay their workers more and charge less for their products, but their profits would suffer.¹¹³

It is in areas that are not so business-friendly that corporate social responsibility fails to fulfill the necessary functions that a lack of government regulation leaves unaddressed.

Vogel,¹¹⁴ in his 2006 analysis of the effects of CSR on labor conditions, points out,

There is a systematic variation in the pattern of compliance with specific standards. Compliance appears to have been greatest with respect to child labor and health and safety conditions, and least strong in the areas of wages, overtime restrictions, and freedom of association . . . [these areas] are more difficult to monitor, and compliance usually increases production costs.¹¹⁵
According to Vogel, many corporations have picked the low hanging fruit of CSR practices that are economically attuned with the company’s other goals. While reporting attempts to achieve the more costly and difficult to attain goals, they use the publicity of what they have achieved as evidence that headway is being made and that they have become newly dedicated to behaving in a socially responsible manner.

Debashish and Kurian argue,

while much has been made of ‘consumer power’ there seems little evidence yet of fundamental changes in corporate practice, especially where such ‘dirty’ industries as oil, gas and mining are concerned. What is evident in the wake of four decades of environmental activism, and recent anti-globalization protests that have swept the First World, is the need for a repackaging of corporate images to create public goodwill. These authors argue that two-way symmetrical communication is a western-centric and colonial concept, ignoring power differentials in society and favoring certain publics above others. Within this framework, then, corporate social responsibility is impossible in any real sense, according to the authors.

It is in the interest of the dominant organizational core that public relations “manages” the corporate image through an asymmetric hierarchy of publics: (1) the predominantly Western shareholders; (2) the Western consumer public/the global middle-class consumer; (3) the Western activist public; (4) the vast numbers of Third World workers who produce the goods for consumption by others; and (5) the even greater numbers of Third World citizens too poor to consume. The first is obsessive about profits and share values, the second consumes blindly, and the third provides resistance from within the West, while the last two fall below the corporate radar. Corporate PR efforts, therefore, focus on undercutting the protests of the third public to appease the second public and directly benefit the first public. Its agenda has no place for the colonised fourth and fifth publics.

For these authors corporate social responsibility is simply another strategy to allow corporations to continue to exploit less advantaged third world populations and thus continue historical colonial practices.
Clapp and Fuchs\textsuperscript{119} argue that the trend towards corporate social responsibility results in corporations having a disproportionate influence over the focus and content of the rules as well as which standards are widely adopted.\textsuperscript{120} These authors point out that reporting efforts that reflect corporate social responsibility have been increasingly adopted by major firms in the food and agriculture sector, which argue that it demonstrates their commitment to sustainability…But the proliferation of private certification schemes is seen by many to be pushing small farmers out of the market, particularly those operating in the developing world, in favor of large agribusiness and food processors.\textsuperscript{121}

In all of these arguments the effectiveness of corporate social responsibility to keep corporations from exploiting publics and damaging the environment is called into question.

**Research Findings From Agenda Building & Agenda Setting**

A significant body of research exists examining agenda building, proposed by Cobb and Elder in 1971,\textsuperscript{122} and even more on agenda setting, proposed in 1972 by McCombs and Shaw.\textsuperscript{123} A significant portion of this research looks at the effects of public relations on how specific issues and corporations are covered by the media, and subsequently, how this media agenda is translated into the public agenda, as reflected by public opinion research.

Examining both agenda setting and agenda building effects, Kiousis, Popescu and Mitrook\textsuperscript{124} conducted a quantitative analysis of public relations materials, media content (the *Wall Street Journal* and *New York Times*), public opinion and financial performance for 28 large companies. The most notable findings of the study with regard to agenda
building are a positive relationship between the amount of PR materials provided to the media and an increase of attention in print media, as well as “a positive correlation between public relations messages tone and media coverage tone.” In terms of agenda setting, the study found that agenda-setting effects were found for news coverage and financial performance, but only for Wall Street Journal content and not the New York Times. . . mentions of corporate vision and leadership (managerial traits) in the Wall Street Journal were significantly correlated with company revenues, profits, and assets, respectively. On the other hand, mentions of corporate social responsibility in The New York Times were correlated with the same financial indicators.

This variation in agenda-setting effects prompted the researchers to suggest that variation in news outlets could be based on the nature and focus of the publication. Kyle Huckins also examined agenda building from a quantitative perspective, but by way of a case study of one interest group’s changing agenda as reflected by its official publication and how that was reflected in media coverage of that group in major US newspapers. Huckins found highly significant correlations in changes of terminology and tone between the interest group’s official paper and mainstream US media coverage of the group, although no change in story construction was found. Both the study by Kiousis, Popescu and Mitrook and the Huckins study support agenda building theory and indicates that interest groups and corporations appear to have the power to influence how much and how mainstream media cover them.

Zvi Reich notes the increasingly fragmented news environment and the resulting insufficient nature of traditional PR release studies in identifying the level of influence that PR has over the news, choosing to use journalist interviews about their recent stories and the various inputs they may have had from PR professionals in
composing them. PR contacts such as phone calls and PR professionals setting up interviews for journalists and other technical services were discovered to be common exchanges for journalists and PR professionals. Reich finds that “only 40 percent of the items involve no direct input of information and no more than quarter of them are totally free of any kind of PR involvement, as far as reporters can tell.” Additionally Reich notes that journalists tend to hide this level of PR contribution and balance the level of PR input by finding at least one other source for their articles about 75% of the time. Reich concludes with three assertions based on the findings:

(1) PR and journalism are highly interdependent occupations; (2) PR’s constant advantageous access renders it a key player in blocking alternative sources indirectly; and (3) PR gains excessive access to public opinion in non-transparent ways that hamper public evaluation of the information and reassessment of source credibility.

The topic of health reporting is especially relevant to this study in that much of the discussion surrounding GMOs regards the potential human health effects of consuming GMO foods, and, more generally, is a scientifically focused conversation, thus involving “experts” of various kinds and a significant amount of technical and scientific information, much like health related issues.

Investigating health news coverage through journalist’s perspectives, Len-Ríos et. al. interviewed a large sample of healthcare journalists from throughout the US, and similarly examined the manner in which journalists come up with the ideas for health related stories—whether from PR or non PR sources—and how they perceive the acceptability of using PR sources in their stories as well as how they value expert sources and source characteristics. The authors found that ideas for health related journalism were more likely to come from other news reports, reader interest, and self-generated ideas.
than from PR sources. The significance of other news reports as seeding story ideas lead the authors to suggest, “it could be that intermedia agenda setting amplifies the voices of those organizations that successfully place their information subsidies.” The authors also suggest that self-reporting could lead to journalists underestimating the influence of PR on story concepts.

Andrea Tanner, also using a journalist interview format, explicitly examined agenda building with regard to television health reporters. Noting that the technical nature of health reporting influences what kind of sources these journalists access, Tanner analyzes what motivates these television news health reporters to cover a specific health topic, why a health reporter chooses to use a particular source when covering a health-related story, and how these sources of information affect a health reporter’s decision-making process as he or she decides what will ultimately be broadcast to the public.

Contrary to the findings of Len-Ríos et. al., Tanner found that more than half of reporters get ideas for reports from PR spokespeople that personally contact them, but also found that the other significant sources are viewer call ins and other news reports. The study also emphasized the lack of health and science training in many of these reporters, resulting in a reliance on health professionals and experts to explain technical concepts. Tanner also noted that although only 13 percent of respondents said their health sponsor affects their decision to cover a story, qualitative research from this study suggests that some health reporters feel obligated to use story ideas pitched by their sponsor or use sources only from the sponsor.

These findings suggest that in more technical and scientifically based areas, journalists are more dependent on industry representatives and experts of all kinds in order to
compose their reports, additionally these experts are often sourced from organizations and institutions that fund the journalistic enterprise. This indicates that through funding and/or owning a media outlet, private interests may contribute to building the media agenda in specific issue areas.

Wallington et. al.\textsuperscript{136} investigated how the structure of different news organizations and individual characteristics of journalists affect source and resource reliance and angles and priorities in health and medical science reporting. They asked a random sample of health journalists about information sourcing and their goals and priorities in developing stories, controlling for whether the media organization was publicly owned, owned by a group or chain, and staff size, as well as experience level, education level and perceived autonomy of the journalist within the organization. The study “showed that reporters with a bachelor’s degree or less rely on press releases, local health care providers, and patient advocacy organizations more often than reporters with master’s degrees or higher.” Those with a masters degree or higher were more likely to use scientific journals and non-government and non-industry sources.\textsuperscript{137} The study found no difference, however, predicted by organizational size or other characteristics in the likelihood of a reporter using industry scientists and spokespeople and scientists.\textsuperscript{138}

The ultimate goal of PR is clearly not just to set the media agenda. PR professionals operate under an assumption that the media in turn sets the public agenda, and can affect how the public perceives particular issues and groups. Agenda setting then is the other side of the coin, and conceptually equally important in understanding how PR efforts set the public agenda through the media. Not only the amount of attention and space devoted (or conspicuously not devoted) to an issue, but also the way it is framed,
has much to do with the manner in which agenda setting theory proposes that the media sets the public agenda. Largely, studies support this relationship through a combination of content analysis and public opinion research. Extensive research has been compiled in the last four decades showing the agenda setting effects of media exposure both experimentally\textsuperscript{139} and through public opinion research,\textsuperscript{140} and more recent studies in this area have aspired towards a more nuanced understanding of agenda setting.

In a 2012 study Corwin Smidt\textsuperscript{141} examines how different kinds of content in news reporting affect the public agenda. In this study Smidt looked at coverage of political elites, coverage of popular protests, or coverage of events related to a particular issue, in this case Smidt focused on the issue of gun control so these events were occurrences such as school shootings. Smidt finds that coverage of popular protest had more agenda setting effect than the other two types of coverage, and argues that it is commonplace for scholars to assert that the news media’s bias in covering governing officials increases their ability to shape public opinion. However, these claims overlook the possibility that the public agenda does not react similarly to all types of news coverage.\textsuperscript{142}

The implications of this research in terms of PR is that not all media coverage affects how the public views issues in the same ways, indicating that some kinds of PR will have less of an effect than others. This is especially interesting with regard to the fake protests, discussed above, that were staged and manipulated by the biotech industry and other interest groups in order to create the appearance of support for GMOs by poor farmers participating in popular protest.

Besova and Cooley\textsuperscript{143} base their 2009 agenda setting research on the theory positing that agenda setting effects vary depending upon the public’s familiarity with a
particular issue. Using what the authors term an unobtrusive issue, one that does not affect the daily lives of most members of US society, the study looks at coverage of foreign countries in US (The New York Times) as well as the UK (The Times). “The results of this study show a relatively clear relationship between media coverage of object nations and how individuals [in the US and UK] perceive those nations, a finding consistent with the previous literature on attribute agenda setting.”\textsuperscript{144} This study used frames to analyze the coverage of foreign nations in the two countries, finding that negative frames tend to have more significant agenda setting effect than positive frames, which appeared to have very little effect.

**Framing**

Framing of biotechnology by the media has received a fair amount of attention by scholars over the past decade. In a study examining coverage in the New York Times (1971-2001) and the Washington Post (1977-2001) of biotechnology and genetics related issues, Eyck and Williment\textsuperscript{145} approached the mass media as tools for legitimation. This study focused on what actors and spokespersons were seen as legitimate sources of information, based on more access to reporters for government and big business than for other groups such as activists, consumers and unaffiliated citizens. The study also examines the differences between articles about biotechnology in terms of food and in terms of medicine, asking if articles framed the issue as progressive or some other frame, such as economic. The study found that coverage of genetically modified food was consistently more negative than coverage of biotechnology for medical purposes, and less likely to be framed as progressive. Early coverage, between 1971 and 1991 tended first to
fall within a progressive frame the majority of the time, especially if medicine was the
topic of the article, and second

scientists and government officials were used as sources in a significant minority
of these articles, but they were by no means omnipresent. Much of the reporting
did not rely on experts to support or oppose a specific view. The second point is
that the intersection of medicine and genetics was prominent from the start, while
food issues were not. ¹⁴⁶

The researchers found that during this period experts were not relied on much in that
there was little controversy in the majority of articles because the technology was by and
large seen as progressive and potentially profitable.

For the time period from 1992 through 2001 overall coverage increased
significantly, and the economic frame became more prevalent. Food topics were
discussed more (although medical topics remained the majority focus), more articles
advanced a position and metaphors such as “frankenfoods” (a term used by anti-GMO
activists to disparage GMO foods) were used more. Government representatives and
scientists were heard from less during the later period, leading the authors to suggest the
possible explanation that more newsworthy groups, such as activists were getting more
attention. The authors concluded that "First, sources do not enjoy a homogeneous,
hegemonic position, even those holding government positions. Trajectories can and do
change. Technologies are not necessarily considered monolithic but reported in ways that
reflect larger social issues." ¹⁴⁷ This study relied largely on quantitative analysis, and thus
the authors did not significantly explore the use of language or how sources were
represented in a detailed manner, leaving some question as to the more latent details of
the coverage beyond descriptive statistics.
Marks et. al.,\textsuperscript{148} in their 2007 study, also looked at coverage of medical vs. agricultural biotechnology, comparing the coverage in the UK (London \textit{Times}) and the US (Washington Post) over the period from 1990-2001 in terms of risk based framing or potential benefit based framing. The research finds more coverage for agricultural biotechnology than medical biotechnology throughout the time period, with the public debate spiking in 1999, with more coverage in that period in the UK than the US, although both saw an increase. The authors find that the two sets of technologies have been framed differently—more positive for medical applications, more negative for agricultural biotechnology. This result holds over time and across different geographic locations. [They] also find that international events influence media coverage but have been locally framed. This local newsworthiness extends to both medical and agricultural applications. We conclude that such coverage could have led to differences in public perception of the two sets of technology: more negative (or ambivalent) for agricultural, positive for medical applications.\textsuperscript{149}

While the authors find some variation in coverage of biotechnology between the US and the UK, they attribute this to the tendency to give coverage a local frame, and don’t make any strong distinctions between coverage in the US and the UK.

Catherine Crawley,\textsuperscript{150} basing her 2007 inquiry on an existing body of research\textsuperscript{151,152} that finds a pro-biotechnology bias in the national news in the 1990s, as Eyck and Williment also found for this early time period, where voices besides government officials and industry representatives are largely absent. This results in the image of an American public receptive and even enthusiastic about biotechnology, and leads Crawley to ask whether these same qualities exist in local news coverage of the issue. Crawley establishes the basic premise that frames are often influenced by powerful elites in society, and that the media tend to uphold social norms and dominant
viewpoints, but she also cites research finding that traditional news values can be
exploited by less powerful groups to reframe an issue in ways that go against government
and industry elites’ preferred messaging.

Crawley looks at local coverage from Northern California—a region in which
agriculture is of high economic importance, and Missouri—the home of Monsanto
headquarters and strongly economically tied to the biotech industry, between 1992 and
2004, using quantitative analysis to examine word frequencies to define frames. The
study found that the framing of biotechnology issues varied on many different levels in
coverage between the two. Missouri had a higher concentration of frames regarding
economic significance and European fear of GMOs, while Northern California news
contained more frames regarding environmental impact and safety. Crawley also found
that government agencies were dominant news sources in both states, while in Missouri
private industry sources dominated more than in Northern California. Opposition groups
were featured more prominently in Northern California coverage than Missouri.

In her analysis of these findings, Crawley points out that “in this study, the
dominant news sources for the agricultural biotechnology story appeared to have the
financial or staff resources to devote to their various media campaigns,” concluding that
“Missouri’s more industry-oriented frames resonated with its more conservative leanings,
while Northern California’s more oppositional frames resonated with its more liberal
leanings.” With regard to the issue of the difference between national and local
coverage, Crawley states,

in contrast to those studies of biotechnology news content in the national, elite
press, this study suggests that a range of voices and perspectives about
biotechnology do in fact exist in news media coverage of biotechnology in the United States, at least in some community newspapers.154

Crawley questions how the flow of local news to national news occurs, wondering why some important biotechnology events are covered locally but do not get any national coverage.

Thomas Listerman,155 in a 2010 examination of media coverage in the US, the UK and Germany focusing on two high circulation papers in each country, focused on cycles in which media attention to biotechnology issues was high. He found that

the general tendency of the coverage was more often positive than negative in all countries. The positive share of news items measured 53 percent in Germany and Britain, and 67 percent in the United States. Although not significant at this general level, increasing media attention led to a slightly more negative tendency in German (−.071) and British (−.286) news, whereas the US coverage tendency (.311) changed to the positive.156

Additionally this research found an emphasis on risk framing in the British discourse, and economic-utility framing in the US.157 Listerman uses existing public opinion data to try to explain the discrepancies between the countries and the corresponding discrepancies in public opinion, but acknowledges the inability of the research to test causality. Instead Listerman concludes more broadly, “it is likely that the national differences discussed here are embedded in national culture and reflected in public opinion as well as in opinion-leading press coverage. For example, comparable discrepancies exist between the national regulatory systems.”158

Nisbet and Huge159 also focused on the connection between cycles of media attention to biotechnology and shifts in how the issue is framed. These authors highlight the Starlink corn contamination episode that occurred in 2000. At this time a genetically modified corn, Starlink, which was only approved for animal feed and not for human
consumption, was found by an independent environmental coalition to have contaminated the food supply, including Kraft taco shells as well as those used by Taco Bell and other corporations. The revelation, broken in the Washington Post, spurred massive recalls, and increased media attention. It was also revealed that the EPA and Starlink knew about this contamination as early at 1997 but didn’t act on it. Nisbet and Huge point out that,

one possible interpretation by journalists was that of a major political cover-up, complete with the drama of possible congressional hearings. What did Aventis and the EPA know, and when did they know it? And why did it take a coalition of environmental groups to draw attention to the public health risk rather than industry or regulators? As we will review, however, major news organizations did not react to the issue as a revelation worthy of the scandal label, assigning coverage to the politics desk and the front page. Instead, the press characterized the controversy predominantly from an industry and regulatory angle, with coverage delegated predominantly to business and science reporters, an editorial decision consistent with several decades of news coverage of the technology.\textsuperscript{160}

The authors note that technical reporting by business and science writers is less likely to lead to issue expansion while political and front page reporting is much more likely to generate controversy and public outcry. They note

the shift in news beats and media definition has important implications for the amount of attention an issue receives. Any topic can become ‘politically relevant’ and rise into the coverage domain of the political reporter with dramatic politically oriented frames replacing technically oriented frames.\textsuperscript{161}

This analysis consists of a quantitative content analysis of \textit{New York Times} and Washington Post coverage of biotechnology issues from 1978-2004, focusing on framing and attention cycles in general but also attempting to identify reasons for the comparatively lower attention to and controversy around biotechnology in the US compared to the rest of the world. The authors identify several periods of what they term “non-decision making,” in which biotechnology decisions were insulated within
government agencies and in which the media reported very little on biotech related
issues. Additionally, even in peak years of reporting on these issues (2000 and 2001 with
7 and 8 front page news stories respectively) biotechnology issues never became a major
agenda issue in either of the papers examined. The authors conclude,

Despite attempts to shift debate toward more dramatic frames by various
opposition groups, media discourse in the United States around plant
biotechnology has remained predominantly technical. Because the issue has
remained within administrative arenas, and because the issue has remained defined
in technical and scientific terms, it is likely that journalists have been unable to
place plant biotechnology into a larger narrative structure, giving greater meaning
to passing events, thereby facilitating an increase in coverage of the issue.¹⁶²

The authors propose that a reason for the framing of the issue remaining technical is
possibly attributable to competition with what they term “celebrity” issues such as
presidential debates, terrorism and war. The authors highlight two trends that they predict
will change the character of debate, the first of those being that critics have started
building narrative fidelity through connecting biotechnology issues with other related
issues such as childhood obesity, animal welfare, the survival of traditional farmers, and
other food system issues. Second, the US is becoming more and more isolated in its
regulation of GMOs in comparison to the rest of the world, and international trade issues
may affect US regulation of GMOs.¹⁶³

The research reviewed above regarding coverage of biotechnology creates a solid
foundation on which to base further inquiry. There is a preponderance of quantitative
analyses that show the big picture of trends in framing of the issue over time. The data
provided by these studies will be indispensable to the analysis proposed here, but the
present study will not contribute to this body of statistical data. What is lacking in the
body of research on media coverage of biotechnology is closer analysis of the most recent developments and how they have been represented by the media and other groups. This analysis must be contextualized within the larger body of data, through a critical analysis of framing, language use, sourcing of information etc., and with attention to the larger societal forces and power structures that these elements serve. The combination of content analysis of news articles with that of other available information sources from both sides of the debate, will allow for an examination of how mainstream media sources are treating new developments in light of the rhetoric coming from organizations with an acute interest in shaping this coverage. This research aims to synthesize the relevant findings of previous research with some closer textual analyses to create a more in depth understanding of the current GMO debate in two different, globally significant and powerful, national media environments.
Chapter 4: Research Questions

Multinational corporations are undeniably some of the most powerful actors on the global stage. Although often represented as negative societal forces by many environmental and social justice promoting interest groups, their presence and dominance is well established and irreversible due to the way the global market is currently arranged. Multinational corporations can play a positive role in society, and can also negatively affect society in significant ways, but it appears that they are here to stay for the foreseeable future. For this reason, it is practical to study the manner in which society and media interact with multinationals, and how activists and industry work to align media messages with vision of how the world should look.

To this end, the biotechnology industry is an interesting case study in that the stated goals of corporations such as Monsanto claim lofty humanitarian aspirations, while the reality of the effects of the actions of the corporation are much more contested. Additionally, the biotechnology industry is represented by a handful of large multinational corporations that use lobbying and political connections to a large degree to achieve certain goals that diverge significantly from the popular opinion, as well as public health, organizational and environmental goals of a large portion of the population. This raises questions about the power of corporations to dominate public dialogue and artificially construct what is seen to be objective scientific fact with regard to their products.
The biotechnology industry as well as those groups that oppose it claim to have science on their side, and a positivistic scientific battle is one of the defining characteristics of the discussion of how food production should proceed. Technical and scientific language dominates this disagreement, and huge amounts of capital and technology are at stake, a state of affairs that tends to position the argument in the realm of elite intellectual discourse. The basic issue of food production and distribution, though, affects every human being on the planet. In this way, the issues of power and science that are brought up by an analysis of the biotechnology industry are of universal concern.

Since genetically modified food was introduced into US and UK markets in 1996, the discussion about how to feed the world has evolved. The biotechnology industry has developed communication tactics to cope with the various objections to its products, and activist groups have developed their own tactics in response to those of the industry. The US and the UK have had vastly differing public receptions of GMOs as well as different political and legislative outcomes on the issue. The UK has historically rejected GMOs, and with labeling, UK consumers are able to largely avoid them if they wish. The US in contrast saw little controversy in the early years as GMOs were allowed into the food supply with no real public debate. The way that such issues are covered in the mainstream media is expected to have a significant effect on how the public perceives these issues, thus this study will examine the press coverage of genetically modified food in the US and the UK over the last year. In order to efficiently analyze how coverage of the issue has evolved, the study will examine articles from each of four publications from Oct 1st, 2011 through September 30th, 2012. This interval represents the most up to date
developments, and the newspapers were chosen for their ideological leanings as well respected papers of record with high circulation.

Additionally, corporate power abuses and the effects of excessive corporate power have been thoroughly discussed in the literature, making it clear that the ability of corporations to impact politics in an unlimited manner with monetary contributions will lead to the subjugation of the larger public interest to the interests of a small group of elites.

Corporate social responsibility has been posited as the balancing power wielded by the public to offset the excessive power of corporations in today’s society. In the case of the biotechnology industry, invoking corporate social responsibility does not quite get to the crux of the issues that groups opposing the industry’s goals have at the heart of their arguments. The issue in this case rests on whether or not GMOs are fit for human consumption or fit for introduction into the biosphere. In this case the biotechnology industry and its detractors are at direct cross-purposes, and traditional efforts at achieving corporate social-responsibility goals will not address these fundamental disagreements.

For such a case it is particularly relevant to examine how the mainstream media cover the controversy and the different actors who try to control the discussion. The most powerful interest groups lobbying on food issues, in terms of spending, represent the interests of the biotechnology industry. Monsanto is the largest of the biotechnology corporations and spent $6,370,000 on lobbying efforts in 2011. Another industry-sponsored group, the Biotechnology Industry Organization, spent over $8,000,000 lobbying the federal government in 2011. The Organic Trade Association, an organization, whose “mission is to promote and protect organic trade to benefit the environment, farmers, the public, and
the economy," spent about $85,000 lobbying the federal government in 2011. In terms of spending and influence, then, the biotechnology industry is far more powerful in the US than other groups, and is expected to have a more powerful voice, not only in the US government, but in media coverage as well.

This is a timely subject in that issues surrounding GMOs continue to become more contentious and more publicly visible around the world. At the same time, GMOs have been available for human consumption in the UK and the US for about fifteen years with drastically different public reception. This gives the researcher the opportunity to study this movement in two distinctly different contexts. This direction of inquiry is particularly important at this time in the context of the growing economic disparity seen in the US, and the Occupy movement, which is directed towards a number of goals, the most central of which is a push-back against corporate power over government. For this reason the anti-GMO movement has joined forces with the Occupy protests as part and parcel with the general spirit of the movement. Research that examines the communication tactics of activists, corporations and the mainstream media can contribute to a better understanding of how corporate-citizen interaction is evolving in the US and the UK.

Communication tactics are at the heart of efforts of corporations to pursue their objectives as well as the efforts of social movements whose objectives are in direct opposition to corporate agendas. Shifting power dynamics can be examined through analysis of media coverage of GMO related issues, allowing a deeper understanding of the manner in which a public dialogue surrounding GMOs is evolving, and what tactics are most effective in shaping that dialogue. This research, then, focuses on coverage of...
the biotechnology industry and activist groups who oppose the industry as well as those that are backed by the industry, therefore the following questions will guide the research:

How does mainstream press coverage of genetically modified organisms, the biotechnology industry, and groups actively promoting and discouraging the consumption of GMOs compare between the US and the UK?

How does mainstream US coverage of biotechnology issues compare with presentation and content of biotechnology issues by the Organic Consumers Association, AgBioWorld and the Biotechnology Industry Organization?

How does mainstream UK coverage of biotechnology issues compare with presentation and content of biotechnology issues by GM Watch, CropGen and the Agricultural Biotechnology Council?

How does the language used in news coverage of GMOs, GMO activist groups and the biotechnology industry in the US compare to that in the UK?
Chapter 5: Methods

Sampling

The sample spanned the time period from Oct 1\textsuperscript{st}, 2011 through September 30th, 2012 in order to look at the most recent developments on the issue. Previous studies with broader foci and more comprehensive time periods provide context and serve as references as to long-term trends. This time period was chosen to represent the most recent coverage of the issue at the time of the study was proposed. The length of time was chosen in order to get one full year of news coverage, so as to include all possible seasonal variation in coverage. As coverage of GMO issues in the US and UK differ based on the partially localized nature of reports on the topic, the time period was not chosen with a particular event or issue as its target, but instead as a long enough period to get a good understanding of the range of recent coverage, while allowing for close textual analysis.

The content of the sample consists of:

(1) All of the articles addressing issues surrounding GMO in food in the NYT, the Wall Street Journal, The Guardian and the Times from Oct 1\textsuperscript{st}, 2011 through September 30th, 2012. The reason for choosing the NYT (Cir. 1,150,589) and the Wall Street Journal (Cir. 2,096,169)\textsuperscript{174} to represent mainstream media in the US, and the Guardian (Cir. 230,108) and the Times (Cir. 405,113)\textsuperscript{175} in the UK, is that these pairings represent two
relatively different politically positioned examples of high-circulation mainstream daily newspapers. The NYT and the Guardian represent what many would see as more liberal or left leaning newspapers\(^{176}\) (although both are owned by large national corporations), and the Wall Street Journal and the Times representing a more conservative point of view,\(^{177,178}\) with the added parallel that the latter are both owned by News Corp, a massive vertically integrated multinational corporation. For these reasons the newspapers are papers of record in their respective countries, represent as balanced a range of perspectives as you might find among mainstream media, and approximate a similar sample group in both countries.

The papers were searched by online databases using keywords “genetically modified,” “genetically altered” “genetically engineered,” “genetic engineering,” “GMO,” “Frankenfish,” “Frankenswine,” “Frankenfood” “Enviropig,” “Transgenic,” “bacillus thuringiensis,” “bt corn,” “bt cotton,” “bt soy,” “Roundup ready,” “Flavr Savr,” “superweed” “colony collapse disorder,” “Monarch butterfly,” “agrichemicals,” “2,4-D” and “glyphosate.” Articles that were retrieved with these search terms that did not directly relate to genetically modified food, chemicals used in the cultivation of gm food, or more generally discussing the corporations who are active in producing GMOs were excluded for analysis.

(2) Articles/blog posts/news updates posted by the Organic Consumers Association (US) and GM Watch (UK) on their websites from Oct 1\(^{st}\), 2011 through September 30th, 2012.
These organizations were chosen as prominent examples of anti-GMO activist groups in each country. Both organizations are active in promoting petitions, publishing blogs and articles, and publicly speaking out against the biotechnology industry. Both of these organizations publish far more material than any of the others, though, so a sample was taken to represent the output of these groups. The articles were sampled through a process of stratified random sampling by time period. Two articles posted during each calendar week over the course of the year were randomly sampled using an online random number generator from the website random.org. The number of articles posted during each week were entered into the random number generator to produce two numbers. The researcher then counted from the top of the list of articles for that week to the article that corresponded to each randomly generated number and used those two articles as representative of that week. Articles that did not directly relate to genetically modified food, chemicals used in the cultivation of GM food, or more generally discussing the corporations who are active in producing GMOs were excluded for analysis and replaced by the same method. This method was chosen in order to get as representative sample as possible, since the articles are closely clustered by topic, and in a given week there are often numerous articles addressing one particular issue. For this reason it was important to sample each week individually, as taking a random sample by month or over the entire course of the year would be less representative of the subject matter covered by the articles. Both sites have approximately 600-675 relevant articles, thus 104 articles represents just over 15% of the total population of relevant articles on the sites. Data is unavailable for Organic Consumers Association from Sept. 17th-31st, so total article count is 100 for OCA. This has a negligible effect on results.
The Organic Consumers Organization (OCA), based in the US, deals with crucial issues of food safety, industrial agriculture, genetic engineering, children's health, corporate accountability, Fair Trade, environmental sustainability and other key topics. [They] are the only organization in the US focused exclusively on promoting the views and interests of the nation's estimated 50 million organic and socially responsible consumers.179

GMWatch, based in the UK, is an independent organisation that seeks to counter the enormous corporate political power and propaganda of the biotech industry and its supporters. [They] do this through [their] website, [their] lists, [their] Powerbase portal, LobbyWatch, the BanGMFood campaign, social media, and other outreach and campaigning activities.180

(3) Articles/blog posts/news updates posted AgBioWorld (US) and CropGen (UK) on their websites from Oct 1st, 2011 through September 30th, 2012. These organizations are both industry-funded nonprofits that seek to educate the public about the benefits of biotechnology. Both organizations claim autonomy and distance themselves from the biotechnology industry and associated organizations, while documented incidents and evidence available elsewhere suggests that these organizations are more closely linked with the industry than they claim. AgBioWorld is also a publication that puts out significantly more material than others in the study, thus a sample of these articles was taken as well. There were a total of twelve newsletters published during the time period under examination, containing an average of twelve articles each and published at odd intervals, so two articles were randomly sampled from each newsletter using the same method described above for GM Watch and OCA. Articles that did not directly relate to genetically modified food, chemicals used in the
cultivation of GM food, or more generally discussing the corporations who are active in producing GMOs were excluded for analysis and replaced by the same method.

The AgBioWorld Foundation is described on the website “About” page as

The AgBioWorld Foundation is a 501(c)(3) non-profit organization headquartered in Auburn, Alabama, and is run by Professor C.S. Prakash of Tuskegee University. The AgBioWorld community was established in January 2000 by Professor Prakash and Gregory Conko of the Competitive Enterprise Institute, and the foundation and AgBioView e-mail service rely upon the volunteer efforts of many friends and colleagues. . . . As an organization that has emerged from academic roots and values, we have chosen to go well beyond IRS charitable fundraising limitations by restricting our sources of income so as to not create any perceptions of bias or conflicts of interest. For that reason, the AgBioWorld Foundation does not accept contributions from corporations that have direct commercial interests involving agricultural biotechnology. Additionally, we do not accept program- or research-specific contributions from agricultural or biotechnology related trade associations or their philanthropic arms; contributions from such sources are limited to support for general operating and administrative purposes only. At all times, the AgBioWorld Foundation will rigorously adhere to both the requirements and principles behind fundraising and disclosure for charitable organizations. 181

While AgBioWorld’s site states in no uncertain terms that it is not industry funded, the affiliation of its two founding members with the Competitive Enterprise Group. The Competetive Enterprise Group is described by the Center for Media and Democracy’s Source Watch as an advocacy group based in Washington DC with long ties to tobacco disinformation campaigns. . . . It postures as an advocate of ‘sound science’ in the development of public policy. However, CEI projects dispute the overwhelming scientific evidence that human induced greenhouse gas emissions are driving climate change. They have a program for ‘challenging government regulations’, push property rights as a solution to environment problems, opposed US vehicle fuel efficiency standards, and spin for the drug industry. 182

According to Source Watch, the Competetive Enterprise Institute is one of the most heavily corporate funded think tanks around, and GM Watch labels it as a “libertarian
think tank, that co-founded AgBioWorld. While AgBioWorld may not be directly corporate funded, the fact that the co-founding organization and the two founding members are heavily backed by corporate funding brings claims of neutrality by the organization into question.

Additionally, a 2002 article in the *Guardian* reported that a PR firm that is employed by Monsanto, The Bivings Group, which specializes in viral marketing, was responsible for posts on the AgBioWorld message board slandering a couple of articles published in Nature magazine, instigating an uproar directed toward Nature, and ultimately resulting in Nature retracting the articles and publicly stating that they never should have been published. The articles revealed contamination of Mexican corn by GM varieties, which would greatly complicate the industry goal of achieving legal status of GM crops in Mexico and neighboring countries. The posts were authored by two people that do not appear to actually exist, and ultimately traced back to the originating from the Bivings Group server. The *Guardian* article goes on to reveal that even the website on which the campaign against the paper in Nature was launched has attracted suspicion. Its moderator, the biotech enthusiast Professor CS Prakash, claims to have no connection to the Bivings Group. But when Jonathan Matthews was searching the site's archives he received the following error message: ‘can't connect to MySQL server on apollo.bivings.com’. Apollo.bivings.com is the main server of the Bivings Group. ‘Sometimes,’ Bivings boasts, ‘we win awards. Sometimes only the client knows the precise role we played.’

This evidence suggests that the website of the supposedly independent organization, AgBioWorld, is hosted by the PR company employed by Monsanto. The above evidence, joined with the vigorous and unwavering pro-biotech stance taken by
AgBioWorld leaves little doubt that the organization operates as a front group promoting the agenda of the biotechnology industry.

A parallel organization in the UK, CropGen, has a similarly opaque identity. The CropGen website homepage states:

CropGen's views are entirely our own. None of the associates or experts is employed by or receives research funding either from the biotechnology industry or from any organisation campaigning against the use of biotechnology in agriculture and the food industry. Most CropGen contributors offer their services in the public interest.\(^{185}\)

A CropGen mission statement, included a 2001 publication available elsewhere on the CropGen website, though, describes the organization as a consumer and media information initiative, CropGen's mission is to make the case for GM crops by helping to achieve a greater measure of realism and better balance in the UK public debate about crop biotechnology. At the heart of CropGen is a panel of scientists and others who recognise that crop biotechnology offers many potential benefits — benefits which have been largely absent from the public debates to date. While ultimately funded by industry, CropGen's panel members are free to express such views as they consider appropriate. The funding companies cannot veto the panel's position on any issue.\(^{186}\)

In 2000, when the organization was founded, The BBC reported, “UK biotechnology companies are providing nearly £500,000 to a scientific panel ‘to help achieve a more balanced debate about genetically-modified (GM) crops.’” The article goes on to elaborate on the PR company employed to manage the group as well as the honorarium each scientist on the council will be paid,\(^{187}\) contradicting the claim on the website of the organization that the scientists volunteer their time for the cause. Additionally the Center for Media and Democracy’s website, PRWatch.org, describes CropGen as “a front group for corporate biotech interests, often coordinating its activities with EuropaBio, which plays a similar role on a Europe-wide basis.”\(^{188}\)
The significance of these supposedly independent groups in the debate over biotech should not be overlooked. These groups are largely able to position themselves as unbiased and independent, when in truth they are anything but. This puts them in the potential position of being reported on by the media as concerned citizens and scientists that agree with industry positions rather than industry groups, and it will be interesting to see if this is in fact the case. As Monbiot argues, in a later *Guardian* column,

What is fascinating about these websites, fake groups and phantom citizens is that they have either smelted or honed all the key weapons currently used by the world's biotech enthusiasts: the conflation of activists with terrorists, the attempts to undermine hostile research, the ever more nuanced claims that those who resist GM crops are anti-science and opposed to the interests of the poor. The hatred directed at activists over the past few years is, in other words, nothing of the kind. In truth, we have been confronted by the crafted response of an industry without emotional attachment.\(^{189}\)

Monbiot, in this article, makes the argument that the Prime Minister of the UK’s latest speech lauding biotechnology was filled with arguments formed and disseminated by these very groups that hide behind neutral fronts but ultimately represent the biotech industry, showing how policy makers and national rhetoric has been shaped by PR efforts such as these.

(4) *Articles/blog posts/news updates/PR releases posted by the Biotechnology Industry Organization (US) on its blog website “biotech-now.com,” and the Agricultural Biotechnology Council (UK) on its website, from Oct 1st, 2011 through September 30th, 2012.* These organizations are both official biotechnology industry organizations, whose websites publish original articles and press releases representing the public relations agenda of the biotechnology industry. Articles that did not directly relate to genetically
modified food, chemicals used in the cultivation of gm food, or more generally
discussing the corporations who are active in producing GMOs were excluded for
analysis.

Data Analysis

This is a qualitative content analysis, conducted using thematic analysis. Thematic
analysis is a research technique in which the researcher searches for themes that emerge
from the data, which then become the categories for analysis. The researcher examined
the news coverage and used patterns and trends found in this body of data to then analyze
the data with regard to similarities and differences between coverage in the US and the
UK as well as similarities in language and content across news articles, activist news and
industry and industry front group articles and blogs.

Since thematic analysis is regarded as a rather loose heading that doesn’t indicate
a specific methodology and is interpreted widely by different scholars, this analysis
followed one example that has been developed by the amalgamation of techniques
developed by scholars over time. In order to maintain a desired level of structure and
clarity of methods, the steps outlined by Fereday and Cochraine were followed. These
steps are outlined in their chart, reproduced below:
Stage 1: Developing the code manual

Stage 2: Testing the reliability of codes

Stage 3: Summarizing data and identifying initial themes

Stage 4: Applying template of codes and additional coding

Stage 5: Connecting the codes and identifying themes

Stage 6: Corroborating and legitimating coded themes

Figure 1: Coding Method

The code manual was developed based on research questions and theoretical concepts from framing, agenda building and agenda setting, as well as Herman and Chomsky’s propaganda model, especially their ideas concerning co-opting experts, flak, worthy and unworthy actors and sourcing of news. In this study thematic analysis has allowed for a necessary level of flexibility in analyzing the data, while this particular methodology brought structure to the process.
Chapter 6: Results & Analysis

The themes that emerged through the coding process are documented in the table below. These themes are discussed in detail throughout the following analysis.

<table>
<thead>
<tr>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are more pro-biotech mainstream news articles than anti-biotech news articles (pg. 71-72).</td>
</tr>
<tr>
<td>Anti-biotech articles tend to be negative in tone whereas pro-biotech articles are a combination of negative and positive. (pg. 75-76)</td>
</tr>
<tr>
<td>News Corp. papers tend to overtly promote industry frames and arguments while the more “liberal” papers do so more subtly. (pg. 85-105)</td>
</tr>
<tr>
<td>Use of some frames (such as environment frame, legitimacy of science, economic) to the advantage of anti- and pro-biotech arguments, dominance of other frames by one side or the other (human health, effectiveness of technology, humanitarian, UT/P). (pg. 83)</td>
</tr>
<tr>
<td>Depiction, in biotech and mainstream sources, of activists and anti-biotech actors as uneducated, against science, technology, progress and the welfare of the poor. (pg. 136-162)</td>
</tr>
<tr>
<td>Different levels of significance and credibility afforded to different scientific studies by the mainstream media. (pg. 115-131)</td>
</tr>
<tr>
<td>Patriarchal attitudes toward the developing world and the poor who live there in biotechnology industry sources and the mainstream press. (pg. 104-114)</td>
</tr>
<tr>
<td>Expert sources used by the mainstream press are predominantly pro-biotech and do not have full/truthful disclosure of their background. (pg. 97, 131-134, 152-162)</td>
</tr>
<tr>
<td>A reliance of 3-5 frames by each mainstream publications, lack of coverage of related events &amp; studies, especially internationally, repetition of the same narrow set of facts and perspectives. (pg. 166-167)</td>
</tr>
<tr>
<td>More volume of output, coverage of international news, topics and frames in anti-biotech sources. (pg. 83, 104-107)</td>
</tr>
</tbody>
</table>

Table 1: Themes
Orientation & Tone

The most basic elements examined were biotechnology orientation of the article (is it clearly oriented as pro-biotechnology or anti-biotechnology), tone of the article, and the geographic focus of the article.

![Biotech Orientation Diagram]

Figure 2: Biotech Orientation

As Figure 1 above illustrates, and as one would expect, the anti-biotech activist organizations publish articles that are largely anti-biotech, and a good portion that are neutral. These article are sourced from many different places, but the neutral articles are largely explained by articles from the mainstream press that the organizations view as
relevant to their discussion of the issue. Out of the 36 neutral linked articles (linked articles are those that are not authored by the source directly—in this case OCA—but instead published on the site in whole or in part, and credited to another source. In the case of these articles analysis has always been applied to the entire article to which the site refers.) published by OCA, 28 were from the mainstream press, while the anti-biotech articles were largely from alternative news sources (44 out of 56 linked anti-biotech articles on the OCA website were from alternative news sources). Alternative news sources are defined here as those which are not based on a profit-driven model. GM watch follows similar patterns. The few articles published by OCA and GM watch that are pro-biotech are those that the organizations reproduce as examples of the other side’s arguments and how they infiltrate government and mainstream media. For example GM Watch published an entry from George Freeman MP's blog with the editor’s note:

    The Cameron Government are proving no less pro-GM than their New Labour predecessors. Not only do they have a former biotech lobbyist heading Defra and an agriculture minister keen to promote GM at every turn, but now this announcement from David Willetts, the universities and science minister, and George Freeman, the Government's ‘Life Science Adviser.'

    Notably, the official biotech industry organizations publish articles that are nearly entirely pro-biotech, while their non-profit industry-funded counterparts both largely publish pro-biotech articles, but also publish a small portion of neutral articles as well. These articles follow a similar pattern to those of the anti-biotech organizations, in that these neutral articles are largely linked from the mainstream press. All five of AgBioWorld’s neutral articles were linked from mainstream press sources, while of CropGen’s three neutral articles, two come from an EU government website and one is
an original CropGen article that is reporting in a strictly factual manner on the
deregulation of GM salmon in the US.

As a whole, the mainstream media sources analyzed here all published more pro-
bio-tech articles than anti-bio-tech articles, with a significant portion of neutral articles as well. The Wall Street Journal published the fewest total articles on the subject, and fulfilling its image as a pro-business publication, published no anti-bio-tech articles, five neutral articles and six pro-bio-tech articles. Two of the six pro-bio-tech articles were published in a “Life and Culture” section, one is an opinion piece, and one is a book review, leaving two pro-bio-tech news stories. Its UK Murdoch owned counterpart, the Times, published far more articles about food biotechnology, and from an initial glance at the chart, the coverage looks a little more balanced. The Times published seven anti-bio-tech articles, seventeen neutral and sixteen pro-bio-tech. All seven anti-bio-tech articles, though, are reader letters, not written by the Times staff, while only seven of the sixteen pro-bio-tech articles are reader letters, four are editorials and one a whimsical feature about aliens coming to earth and demanding the EU end its stalemate on GM regulation. This leaves four total news articles that are pro-bio-tech and none that are anti-bio-tech.

The more liberal media, the New York Times and the Guardian, are slightly different from the Murdoch papers in their bio-tech orientation. The most significant difference being that the New York Times published one anti-bio-tech article, two pro-bio-tech and fifteen neutral articles. This is the only paper with a significant majority of neutral articles. The one anti-bio-tech article is an editorial promoting GMO food labeling, one pro-bio-tech article is a letter to the editor while the other is an editorial. This means that none of the actual news articles are noticeably promoting or criticizing food
biotechnology. The *Guardian* published seven anti-biotech, nine pro-biotech and seven neutral articles. The pro-biotech articles consist of two letters to the editor, two editorials and five news articles. Of the seven anti-biotech articles, four are letters to the editor, one is an editorial, and one is a short Features section article musing on the relative merits of shiny potentially GM apples and the lumpy, tasty kind. This leaves one anti-biotech news article and five pro-biotech news articles. The *Guardian*, in this respect, looks more like the Murdoch owned pro-business papers in this sense than the ostensibly more liberal *New York Times*.

Tone also plays a role in revealing the nature of the coverage, and the chart below categorizes the tone of all the articles in the broadest possible sense: positive, negative or neutral.
Figure 3: Tone

Immediately evident is the fact that this chart resembles the Biotech Orientation chart quite closely. While orientation and tone have clear connections in the patterns of the literature, they are not, by definition, the same idea. While a positive or negative tone is defined by the patterns of language and the fundamental positive or negative spin on the content, orientation is strictly whether the article is noticeably embracing or rejecting biotechnology, or maintaining a neutral stance. For example an article with a positive tone that is anti-biotech, might be an article reporting on new biotechnology labeling law that has been introduced, and the positive effects this will have on society etc., while an article with a positive tone that is pro-biotech might be reporting on the increasing
amount of land on which GM crops are grown and the spread of the technology throughout the developing world. If they traded content, likely they would be the opposite: the pro-biotech article would have a negative tone while discussing the new labeling law while the anti-biotech article would have a negative tone when discussing the spread of GM crops throughout the developing world. In this way tone is tied to the framing and topic of articles as well as the positive or negative orientation of the article towards biotechnology, but it is a distinction that allows a finer level of understanding of the complexity of the literature.

A relationship is evident between articles that are neither pro- nor anti-biotech and articles that are neutral in tone (81% of all articles with a neutral biotech orientation had a neutral tone as well). This relationship makes sense in the context of how these concepts relate to one another in that, if an article is neither embracing GM technology nor rejecting it there is less at stake for the author who is reporting factual information while trying to avoid revealing a point of view of any kind on the issue, thus a neutral tone is taken. While this is common, it is not always the case, a notable example being when the article is discussing draught or weed resistance to a agricultural chemical in the context of GM technology, without taking a stance for or against biotechnology, the article will often have a negative tone as a result of the dire circumstances for farmers and consumers that it addresses.

It also appears that there is a relationship between activist anti-biotech articles and a negative tone (79% of all anti-biotech articles published by OCA had a negative tone). The New York Times also had a pretty clear-cut relationship—both pro-biotech articles had a negative tone, while the only anti-biotech article had a positive tone, and all of the
neutrally oriented articles were neutral in tone. In the cases of the *Guardian* and the *Times*, all of the anti-biotech articles were negative in tone (and, as previously mentioned, the *Wall Street Journal* published no anti-biotech articles). The overwhelming negative tone of anti-biotech articles is unsurprising in that these articles are part of an argument pointing out negative aspects of the technology. The activists, especially in the US, are working against the status quo, a government that has a close relationship with the biotech industry, making the case for labeling. In the UK, the literature reveals that activists are fighting against a government that is pushing for deregulation of biotech by trying to influence public opinion on the issue, as well as a strong mainstream media bias in favor of the technology as figure 1 shows. Any anti-biotech opinion that appears in the mainstream media is a defensive response to the media publishing a pro-biotech slant of some kind, and thus has a negative tone.

There is a mix of positive and negative tones among the pro-biotech articles from the *Wall Street Journal*, the *Times* and the *Guardian*, as well as all of the industry publications. Eighteen of the twenty-two pro-biotech articles with a negative tone published by the US biotech industry are about labeling, regulation, and/or are criticizing the actions or statements (or scientific credibility) of those speaking out against biotech in various ways. Thirty-two of forty (80%) pro-biotech articles with a negative tone published by the UK biotech industry are about regulation and/or are criticizing government bodies or those speaking out against biotech in any way. Half of all pro-biotech articles with a negative tone in the *Times* are directly critical of government actions or anti-biotech activists, while 7 of 16 (44%) are about regulation of genetically modified crops (these do overlap, leaving 6 unaccounted for). Both of the articles in the
Guardian with a negative tone are about activism, and both criticize anti-biotech activists. All three of the pro-biotech articles with a negative tone in the Wall Street Journal criticize activists and address biotechnology regulation.

The pro-biotech articles with a positive tone tended to have a bit more varied range of topics, although many referred to the increasing world population and the environment. What nearly all of these articles had in common was a Utility of Technology/Progress frame. Eight of nine (89%) from US industry groups, fifteen of twenty (75%) from UK industry groups, both of the articles from the Wall Street Journal, both of the articles from the New York Times, all four of the articles from the Times and four of five from the Guardian were framed in this way.

The Utility of Technology/Progress Frame

The Utility of Technology/Progress is a frame that presents the central issue surrounding biotechnology as its potential to improve human life, solve problems and overcome current, potential or perceived obstacles to human happiness and survival.

Framing is significantly different than the topics of an article as they are referred to in the discussion above regarding regulation and activism. An article may touch on many different topics in different ways without framing the issue around every one of those topics. The frame is a more subtextual element of an article, and is defined in a previous section of this analysis in this way:

Framing involves organizing and structuring information so that it is socially shared and provides meaning to reality, i.e. issue or event. This involves deliberate identification of an aspect of a perceived reality, and giving interpretation and evaluation of that reality.¹⁹⁴
Framing is a significant focus of this analysis, and in order to discuss the results relevant frames must be defined for the reader. Frames were initially chosen based on previously published research on framing of biotechnology, and more were developed throughout the coding process. The central organizing ideas of an article define its frame or frames. How does the author present the issue in terms of what is salient about the issue? What kind of story does the author tell about the issue and what does the author indicate that readers should care about? More than one frame was identified for many of the articles.

<table>
<thead>
<tr>
<th>Economic</th>
<th>Characterized by discussing GMOs and biotechnology in terms of being a potential source of economic growth or risk for the various actors involved.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Choice</td>
<td>Characterized by focus on consumers’ ability to make decisions about what they choose to purchase or consume.</td>
</tr>
<tr>
<td>Public Opinion</td>
<td>Characterized by focus on the perception of the public or some more specific group regarding biotechnology or some related issue.</td>
</tr>
<tr>
<td>Public Relations</td>
<td>Characterized by a discussion of the methods of persuasion being used by a group or individual.</td>
</tr>
<tr>
<td>Government/Society Relation</td>
<td>Characterized by a focus on how government interacts with the public and private sector.</td>
</tr>
<tr>
<td>Legal</td>
<td>Characterized by a focus on whether or not something is legal.</td>
</tr>
<tr>
<td>Regulation</td>
<td>Characterized by a focus on how something is regulated.</td>
</tr>
<tr>
<td>Morality</td>
<td>Characterized by the author portraying biotechnology as an issue of moral significance of some kind, for example whether is it right to meddle with nature, or better to leave it alone.</td>
</tr>
<tr>
<td>Humanitarian</td>
<td>Characterized by a focus on needing to promote the welfare of others, such as, but not exclusively, needy populations in the developing world.</td>
</tr>
<tr>
<td>Human Health</td>
<td>Characterized by the author addressing biotechnology as a human health issue, highlighting health risks or nutritional benefits</td>
</tr>
<tr>
<td>Frame</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Food Security</td>
<td>Characterized by a focus on society’s ability to produce enough food and/or maintain access to food for various populations.</td>
</tr>
<tr>
<td>Utility of Technology/Progress</td>
<td>Characterized by presentation of the issue as a matter of technology with potential to improve human life, solve problems and overcome current, potential or perceived obstacles to human happiness and survival.</td>
</tr>
<tr>
<td>Legitimacy of Science</td>
<td>Characterized by discussion of which scientific statements or studies are legitimate and which are not, or by validation of arguments based on their purported scientific basis and disparaging ideas, arguments or spokespeople based on their lack of scientific basis or understanding.</td>
</tr>
<tr>
<td>Effectiveness of Technology</td>
<td>Characterized by discussion of whether or not the technology involved in GMO does or does not function in the manner that it presumably should.</td>
</tr>
<tr>
<td>Environment</td>
<td>Characterized by presentation of the issue as a matter of environmental consequence, such as biodiversity issues, global warming or pesticide use.</td>
</tr>
</tbody>
</table>

*Table 2: Frames & Definitions*
Figure 4: Frames - Total

The chart illustrates the distribution of frames across various sources. The x-axis represents the frames, with categories ranging from 'Other' to 'Utility of Technology/Progress'. The y-axis lists the sources, including GM Watch (UK), OCA (US), Guardian, NY Times, Times, WSJ, CropGen (UK), AgBioWorld (US), ABC (UK), and BIO (US).

Each frame category is color-coded, with specific meanings indicated in the legend. The bars for each source show the proportion of each frame type, allowing for a comparative analysis of how different sources frame the discussion of biotechnology.

Legend:
- Other
- Public Opinion
- Regulation
- Government/Society Relationship
- Legal
- Public Relations
- Consumer Choice
- Food Security
- Effectiveness of Technology
- Legitimacy of Science
- Utility of Technology/Progress
- Environment
- Economic
- Human Health
- Morality
- Humanitarian
While figure 4 is useful in helping the reader appreciate how many different frames are present in the sample of articles, it is too detailed to distinguish individual frames and patterns beyond the very obvious, so the chart below, figure 4, includes only those frames that are common in any of the sources, or that vary significantly from one source to the next.
Figure 5: Frames Significant
Figure 5 presents a slightly clearer picture of the major patterns. The Utility of Technology/Progress (UT/P) frame is easy to see as the most prevalent from the biotechnology industry groups through the mainstream media. The frame is close to non-existent in the anti-biotech groups’ articles, thus it is a frame shared almost solely by the biotech groups and the mainstream media, with the least prevalent example being the New York Times, where the frame is present, but not dominant.

The UT/P frame is often accompanied by the Food Security and the Humanitarian frames. Additionally, every single time the industry broaches the topic of the increasing world population it is in an article with a UT/P frame.
This relationship highlights one of the most dominant interrelated set of arguments made by the biotechnology industry about its products: that they will be needed to feed the increasing world population, that they will be necessary to respond to climate change, and that they are a fundamentally important tool in helping the developing world provide enough food for its starving population. This argument is characterized by strong, black and white language about biotech’s place in the global food system.
Figure 7: Geographic Focus

As is evident from the chart AgBioWorld and CropGen, both published many articles with a foreign focus, although foreign includes all articles focusing on the US and other developed countries in addition to the developing world. A January 2012 article on the BIO (US) website begins with “Bill Gates has a terse response to criticism that the high-tech solutions he advocates for world hunger are too expensive or bad for the environment: Countries can embrace modern seed technology or their citizens will starve.” Another BIO article states: “African nations must be open to new biotechnology tools that allow farmers to grow crops that have even higher yields and a higher nutritional content,” and another claims: “to provide for seven billion people, the world will need a lot more than three billion acres of biotech crops, but it’s a good
AgBioWorld, the US industry funded non-profit, published an article in its newsletter, linked from Pamela Ronald’s blog called “Tomorrow’s Table” that hopes that “we will soon wake up and applaud applications of biotechnology that have reduced the amount of insecticides in the environment or those that have the potential to save the lives of thousands of malnourished children.” Another article from the AgBioWorld newsletter claims “But with the world's population now at 7 billion and counting, the rejection of genetic modification of crops on such spurious scientific grounds now threatens the environment it claims to protect.” The UK biotechnology industry is using the same public relations strategy on this issue: “for these tools to meet the challenge of feeding the next billion people, all nations must ensure farmers have access to these sustainable, safe, science-based technologies.”

Claims a November 2011 CropLife press release published in a “news” section on the Agricultural Biotechnology Council’s (ABC) website. An August 2012 ABC Press release quotes the organization’s Chair, Dr. Julian Little: “Today’s figures highlight the challenges of maintaining global food security . . . GM technology is one of a number of agricultural innovations which offer farmers significant gains and increased yields.” CropGen, the UK industry’s non-profit mouthpiece adds:

More and more Africans are becoming fed up with European attitudes to agricultural biotechnology and the deleterious effect it is having on their own economies. Some African countries have important exports of fruit, flowers and vegetables to Europe and have long been warned that they risk losing those markets if they so much as dare to cultivate GM-crops anywhere in their countries. Europe's opposition to genetically modified crops is robbing the developing world of a chance to feed itself and could threaten food security [emphasis added], warned Dr Felix M'mboyi of the Kenya-based African Biotechnology Stakeholders Forum.
Another article published on the CropGen website, but linked from an article by Henry I. Miller that was originally published by the Cato Institute, argues “unscientific, excessive, stultifying regulation, nationally and internationally, is a major reason for the failure of biotechnology to achieve its potential to bring greater food security to the poor.”

The examples of quotes about the role of genetically modified food in saving the world in various ways are vastly abundant in this sample since this is a major talking point of the biotechnology industry, these are just a few examples. Beyond the message that the industry is trying to get across about feeding the poor, in many of these quotes there is also criticism, either explicit or implicit, of regulation on biotechnology. This tactic aims to directly link regulation of biotechnology to the suffering of malnourished populations all over the world.

These articles are consistently conjuring images of the poor and starving masses in the developing world, while rarely, if ever letting these populations speak for themselves or discussing their plight in a concrete, specific way. The African spokesman quoted above, Dr Felix M’mboyi, is a US educated academic, Kenyan government advisor, an international economic consultant, and is the director of the Center for Strategic and International Studies in Washington. M’mboyi, while clearly very accomplished, is not representative of Africa’s needy population. The quote from CropGen about M’mboyi begins “more and more Africans are becoming fed up,” but the article only goes on to quote M’mboyi extensively, these other masses of Africans who are fed up remain silent. Of 77 articles that the UK industry sources publish, 33 of them (43%) are linked from other publications. All of these publications are based in Europe, the US or Australia. Not one of them is published in the developing world (in
comparison, from the GM Watch sample of 104 articles, 102 (98%) of which were
linked and 17 (17% of linked articles) were published by media or other organizations in
Africa and India). The US biotech industry published 45 articles, 30 of which (67%)
were linked from other sources and 2 (7% of linked articles) of which were developing
world publications: one from the Times of India and one from Reuters Africa. The
industry uses the suffering of the developing world as a talking point, but does not
actively engage in these issues or talk specifically about local issues, small farmers or
their experiences with GM technology.

The article from the Times of India republished on the AgBioWorld website is
one called “Meet Farmer Chengal Reddy: He wants us to give up fear of GM crops.”

The article begins,

On behalf of the farmers of India, let me say that this report totally fails to reflect
farmers' aspirations, and distorts the scientific significance of biotechnology -
including genetic engineering - for the national economy. Instead, it echoes
persistent canards by some environmental NGOs.

The criticism for NGOs and the arguments that follow regarding an increasing population
and the need for GM crops to increase yields and the global spread of GM crops sound
like industry talking points, and indeed, Chengal Reddy is not an Indian farmer, as the
article claims, he works closely with Monsanto, has appeared on their brochures and on
their website and given interviews and speeches at industry orchestrated protests.

Jonathan Matthews writes in a 2002 article,

Reddy is not a poor farmer, nor even the representative of poor farmers. Indeed,
there is precious little to suggest he is even well-disposed towards the poor. The
'Indian Farmers Federation' that he leads is a lobby of big commercial farmers in
Andhra Pradesh. On occasion Reddy has admitted to knowing very little about farming, having never farmed in his life. He is, in reality, a politician and businessman whose family is a prominent right-wing political force in Andhra Pradesh ~ his father having coined the saying, 'There is only one thing Dalits (members of the untouchable caste) are good for, and that is being kicked.'

These two spokespersons, Chengal Reddy and Dr M’mboyi are the voices from the developing world that the industry chooses to nurture and amplify, neither of them are poor and neither are farmers, although they claim to speak on behalf of poor farmers in India and Africa. The voices of actual farmers in the developing world are conspicuously absent from biotechnology publications. Sumpter and Tankard, in their analysis of spin-doctors, argue, “the largest threat to the objectivity of journalism may come not from the subjectivity of the individual journalist, which has often been the focus of concern, but from professional spin doctors attempting to influence the newsmaking process at its very core.” The selection of Reddy and M’mboyi as spokespeople, the manufactured ambiguity about their identities, and the exclusion of certain other relevant spokespeople are all distinctly recognizable as the efforts of spin-doctors, who try to influence the selection of topics and the frames applied to those topics for the news media.

The mandate of Monsanto, Syngenta, Dow and other biotech corporations, of course, is not to save the world, but to produce profits for its shareholders. Susanne Soederberg argues, “the corporation is a vehicle for capital accumulation, and this sets defining parameters for its operations regardless of its ownership patterns.” Any messaging the corporation uses is in the interest of serving the goals of capital accumulation and market expansion first and foremost. Marc Williams, in his analysis,
“Feeding the World: Transnational Corporations and the Promotion of Genetically Modified Food,” explains,

investment in GMOs is predicated on reaping profits, which is dependent on increasing market share in order to meet the high costs associated with GMO research and development. . . . It is . . . resistance to GM foods that creates the necessity for the development of corporate strategies designed to promote GM food.210

This seems to be something that is forgotten by the press and various government spokespersons when amiably amplifying PR messages about the need for biotechnology in feeding the expanding world population. These publications are framing this issue in ways that serve as PR mouthpieces for the industry rather than their supposed societal role of informing the population about issues of critical interest. If they were simply informing the public about the issue, the selection of biased sources, the exclusion of important information about those sources, and the elaboration and emphasis on information that is pro-GMO would not occur.

The chart below illustrates the frames of the mainstream news outlets examined here.
The Utility of Technology/Progress frame is clearly dominant in coverage of biotechnology, while it is the primary frame for the *Times* (42% of articles) and the *Wall Street Journal* (64%) it is only second (22%) to the economic frame (61%) in the *New York Times* and second (39%) to the Legitimacy of Science frame (48%) in the *Guardian*. 
The *Wall Street Journal*, for which the UT/P frame is by far the most dominant, uses industry talking points commonly when discussing biotechnology. One editorial reports on the coming release of a GM crop called DroughtGuard, and quotes a statement from the Union of Concerned Scientists noting that millions of dollars in R&D have produced a crop that doesn’t actually respond to drought any better than non-GM varieties. The author of the editorial argues in response:

> The claim is contentious on many levels but most significantly it misses an important point. DroughtGuard is the first step in a new technology that has the potential to benefit the environment and enhance food security. . . . to object to a technology from the beginning because it’s expensive and its benefits are marginal over existing technologies.  

This argument attempts to invalidate any arguments regarding the effectiveness of the technology by suggesting that although the technology does not currently work, it surely will in the future, and by connecting this idea of progress with the imperative to produce more food, it invokes food security as a reason to embrace an ineffective technology.

This line of reason is in line with industry talking points regarding how GM-technology is the only hope in feeding the growing world population.

Another opinion piece in the *Wall Street Journal* states:

> Despite opponents’ fears that the technology would poison people, spread superweeds and entrench corporate monopolies, its now clear that the new crops have reduced not only hunger but pesticide use, carbon emissions, collateral damage to biodiversity and rain-forest destruction.

This statement implies that it has been undisputedly concluded that there are no negative health effects of GMO technology, an argument discussed in detail later in this analysis.

The article implies that “superweeds”—weeds resistant to the agricultural chemicals that GM crops are engineered to tolerate—don’t exist, while farmers, the USDA and the
biotechnology industry have all recognized that they do.\textsuperscript{213, 214} The quote also breezes over the idea that entrenched corporate monopolies exist in the industry, it is also a nearly uncontested truth that they do.\textsuperscript{215} The second part of this quote reproduces industry claims of reduced hunger and pesticide use, a highly disputed claim, in addition to the concept, also pushed hard by the industry that GM-crops have a positive effect on the environment. None of these claims is as clear-cut and fact-based as the author presents them, and citing no evidence, the author leaves no room for debate, disguising industry PR as undisputed fact. The article also includes a quote by Calestous Juma declaring that he “holds ‘the regulation of genetic engineering responsible for the death and blindness of thousands of young children and young mothers.’”\textsuperscript{216} This tactic of blaming death and blindness in the developing world on GM regulation not only acts to simplify the issue vastly, but to precisely reproduce the arguments and humanitarian framing of the issue of the biotech industry.

Articles in the \textit{Wall Street Journal} that are not presented as opinion, but as unbiased news also unquestioningly reproduce industry PR as fact. In an article about stock value of Monsanto, titled “More Monsanto Magic Likely to be Reaped,” Spencer Jakab tells readers, “Magic seeds exist only in fairy tales. But Monsanto Co. profits handsomely by selling the closest thing that science can produce.”\textsuperscript{217} In another article, this one putting a positive spin on Monsanto’s acquisition of vegetable and fruit seed companies that “helped it become the world’s biggest producer of vegetable and crop seeds by revenue”, Monsanto is presented, in the author’s words as “focused on breeding seeds to help farmers [emphasis added] grow produce that tastes better or contain [sic]
more nutrients.” This language implies that Monsanto’s main focus is helping farmers rather than making profits, a claim that is straight out of the company’s PR. This phrase is featured on the home page of its website: “Monsanto is playing a key role in helping farmers address the challenges of water,” and “Our innovations help farmers produce more food with fewer natural resources”218 The use of this language suggests that the article was written with the help of a PR release from the company, but it is not presented as a quote from the company, but as the article author’s own characterization of the company’s actions.

The Times, with the highest use of the UT/P frame overall, has a similarly high use of industry PR as unchallenged fact throughout its coverage of biotechnology. Editorials include phrases such as: “It is delusional to hope that either of these goals – let alone the larger one of feeding the whole planet – can be met without the increased use of GM crops,”219 “It is time to drag EU policy on GM into the 21st century,”220 “But without increased use of genetically modified crop varieties it seems inconceivable that food production will ever be abundant enough to keep pace with population growth,”221

Shamefully, the EU remains mired in a stalemate on GM regulation that is an affront to the hungry world. . . . Now new technologies can help by creating more sustainable ways to produce more food. This is hardly the moment to stifle that ingenuity by spurning the promise of GM science,”222

GM Food science is moving at an astonishing rate. And it needs to because it is, potentially, the engine of the revolution in food production that the world desperately needs if it is to cope with the lethal mix of global warming, the energy crisis, water shortages and exploding population.223

These editorials repeatedly send the same message that growing population, environmental changes and world hunger have no other answer than GM crops.
These *Times* editorials are joined by letters to the editor with essentially the same message and framing: a coalition of scientists from The Sainsbury Lab, the John Innes Centre and the Institute of Biological, Environmental and Rural Sciences write in

Sir, At the end of this month the world's population will reach seven billion (report, Oct 8). One billion are hungry, and one billion more are malnourished. In the next decades, there will be more humans. Limited land and water, costly energy for fertiliser, and climate change will ensure that more of them are hungry. Politics, economics and lack of good governance exacerbate the problem, but science and technology can contribute greatly to the solution. Why then is Europe regulating one part of the solution - GM crops - as if they are a hazard?224

Two emeritus professors, one of plant science and one of microbiology, write in: “But the prospects and need for biotechnology in agriculture, in a world with more than one billion starving, perhaps outweigh all the others combined.”225 A letter from Martin Livermore of The Scientific Alliance Cambridge226 reads “Rather than think how our farmers can become more productive and make their contribution to food security in a world of 9 billion people, our (largely scientifically illiterate) political elites are swayed by the green lobby's emotional arguments.”227 Yet another letter from the John Innes Centre argues, “we are seeing a revolution in biology - we have a choice whether we use new technologies to create a more sustainable future in food production, or whether we allow a fear of innovation to dictate a future using out-dated approaches that hurt our environment.”228

Examples of pro-GMO framing of the issue as humanitarian, environmental and rooted in food security with an emphasis on population growth are many. What is notable about these letters to the editor is that they do not represent a varied cross section of the population. All of these concerned advocates of biotechnology are direct stakeholders in
the success of convincing the UK population of the greatness of GM technology. For some reason these biologists and plant scientists offer themselves, and are positioned by the platform offered them by the newspaper, as experts to speak about topics such as global environmental issues, population growth and world hunger. The seemingly uniform message from biologists and plant scientists presented by this coverage gives the impression, as the biotechnology industry tries to argue, that there is scientific consensus on the issue. These letters, though, are part of a coordinated PR campaign by the biotechnology industry and their front groups, as discussed below in the section on the Rothamsted Debate. While the biotechnology industry constructs the illusion of scientific consensus on the topic, there are many notable scientists who disagree with the biotechnology messaging and who have spoken out against it. Many of these scientists, while held in high regard by the scientific community have become the target of ad hominem attacks as a result of their objections. Some examples of these scientists are Arpad Pusztai who was dismissed after 36 years at the Rowett Research Institute in Scotland,229 Doug Gurian Sherman, plant pathologist of the Union of Concerned Scientists,230 Don Huber, professor emeritus at Purdue University,231 Dr. Mae Wan Ho,232 Ignacio Chapela233 and others.

The *New York Times* uses the UT/P frame a bit more sparingly, and arguments matching industry PR and language primarily appear in the opinion pieces. An editorial by Roger Cohen that harshly criticizes what he sees as organic “ideology” based on his irritation with constantly hearing “the O word” (organic). In the course of this diatribe against organic food, Cohen criticizes the middle class, “oblivious, in their affluent
narcissism, to the challenge of feeling a planet whose population will surge to 9 billion before the middle of the century.” Cohen declare, “To feed a planet of 9 billion people, we are going to need high yields not low yields; we are going to need genetically modified crops.”

Another instance of the alignment of arguments in line with industry PR published in the *New York Times* is a letter to the editor from William Y. Brown, a senior fellow at the Brookings Institute, a Washington think tank that receives funding from the Cato Institute, Dow, Pfizer and a long list of other large corporations. The letter is a response to an editorial by Mark Bittman promoting GMO labeling, in it Brown argues:

> We need genetically modified organisms. They keep insects and weeds from corn and soybeans. New crops can resist droughts, floods and heat coming with climate change and provide vitamins and nutrients. Nothing erodes life and peace more than poverty and hunger is its expression.

This argument links coming environmental changes with a list of traits that have been proposed by the industry—drought resistance, flood resistance and increased nutrient content—none of which have been actualized on any scale, in a way that makes them sound like current characteristics of genetically modified crops. The author also makes sure to link the use of GM crops to poverty alleviation to give it a humanitarian frame. This is a perfect instance of industry arguments presented within the parameters of industry framing.

Beyond editorials and letters to the editor the *New York Times* largely does not push these industry arguments. Articles with a UT/P frame tend to give a more nuanced picture, and attribute any such arguments to industry and government spokespersons.
New York Times articles that are framed in this way include an article describing funding and approval problems of a GM salmon under consideration by the FDA\textsuperscript{237} as well as a GM apple developed in Canada that is seeking FDA approval.\textsuperscript{238} Both articles quote the developers of these products extensively and discuss their economic benefits, but neither frames these issues as humanitarian, food security or environmental issues. Instead the UT/P frame is joined by economic and public opinion frames in these articles.

The Guardian, while using a UT/P frame relatively often as well when discussing the technology, does so in a much more nuanced way, similar to the New York Times. A characteristic way for this publication to construct this frame is illustrated here:

with the global population rising quickly towards an expected 9bn in 2050, food demand is rising fast. Poppy said: ‘The research demonstrates that, when managed properly, GM crops can enable you to intensify agriculture sustainably.’ But he noted: ‘GM crops are neither all good nor all bad and GM is not going to feed the world overnight. But it is a very powerful tool.’\textsuperscript{239}

A more pointed promotion of GM crops, more in line with industry arguments, was published in a pro-biotech editorial by Johnjoe McFadden, Professor of Molecular Genetics at the University of Surrey, that argues:

Feeding nearly 10 billion people by 2050 while fuelling their cars and clearing up their waste threatens to exhaust the planet's handling capacity. Synthetic biology may provide some answers. Scientists have already developed genetically modified crops that can provide higher yields.\textsuperscript{240}

Beyond these examples The Guardian articles tend to combine the progress frame with the effectiveness of technology frame as well as the food security, these articles are by and large about the Rothamsted Wheat Trial debate, and although they incorporate Industry PR in certain ways, discussed below, they are not focused on the starving third
world with the strong humanitarian frames and industry language that the *Times* and *Wall Street Journal* implement.

One notable example of the *Guardian* amplifying industry PR in a similar way to the *Times* and the *Wall Street Journal* is its unproblematic coverage of the statements of industry “ambassador” Mark Lynas. On October 21, 2011 the *Guardian* ran a story revealing leaked PR documents revealing,

> Europe's most influential biotech industry group, whose members include Monsanto, Bayer and other GM companies, is recruiting high-profile "ambassadors" to lobby European leaders on GM policy.

Leaked documents from a PR company working for Brussels-based EuropaBio claim to have "had interest" from Sir Bob Geldof; the chancellor of Oxford University and BBC Trust chairman, Lord Patten; former Irish EU commissioner and attorney general David Byrne; and "potentially" the involvement of former UN secretary general Kofi Annan and pro-GM science writer Mark Lynas [emphasis added].

These PR documents cite a plan to gain credibility through these spokespersons who already hold respected positions in society without revealing their connection with the industry or their “ambassador” status.

The lobbyists have offered to write, research and place articles in their names, arrange interviews and speaking engagements with the *Financial Times* and other international media, and secure for them what could be lucrative speaking slots at major conferences. In addition, EuropaBio says it will introduce them to the highest-level European bureaucrats and MEPs in order for them to make the case for GM.

After breaking this story in October, a March 9 article, reporting a national poll on attitudes toward GM food and claiming that the UK is coming around on the issue ends with a quote by Mark Lynas saying “Mark Lynas, an environmentalist and author who ripped up GM crops in the 1990s but became a supporter of the technology, said:
‘Opposition to GM was perhaps understandable a decade ago, but today it is a mistake.’ In the article breaking the news about the PR release Mark Lynas is referred to as a “pro-GM science writer,” suddenly five and a half months later he is “an environmentalist and a writer who ripped up GM crops in the 1990s.” There is no recognition of the article, published by the same news outlet, revealing the industry’s plan to recruit him as a pro-industry spokesperson. Suddenly he’s just the logical person conveniently available to comment in favor of biotechnology.

Another Guardian article, this one from May 23, 2012, also about changing attitudes about biotechnology in the UK and Europe, quotes a range of different people, and includes a long quote from Mark Lynas as well:

Mark Lynas, an anti-GM protester in the late 1990s who now admits to a Damascene conversion to the merits of the technology, believes the protesters have misjudged the public attitude to GM. "I think there are several reasons why GM is making a comeback. First, the blanket opposition to GM per se as a technology is obviously untenable in any scientific sense - there is no reason why it should present any new dangers in food, and, indeed, may well be safer than conventional breeding in crops." The experience of seeing GM crops grown and sold in other parts of the world goes a long way to prove this, he says: "With the passage of more than a decade since the widespread commercialisation of GM crops in North America, Brazil and elsewhere, hundreds of millions of people have eaten GM-originated food without a single substantiated case of any harm done."

But the world's priorities and needs are also fast changing, says Lynas. Issues such as climate change and population rise mean we just don't have the luxury any more as a species to ignore or decry this technology: "It is increasingly obvious that unnecessarily ruling out crop-improvement technologies harms the interests of humanity when our challenge is to feed over nine billion much richer people by mid-century on a similar cultivated area to today and without enormous increases in fertiliser and pesticide use."

Lynas believes that the opposition to GM is now more driven by ideological than scientific objections: "Most of the remaining opposition to GM is really a displaced fear about big corporations dominating the food chain, which is why every argument about GM seems to be reduced down to one word: Monsanto. In which
case we should be encouraging publicly-funded, open-source GM such as that conducted at Rothamsted and the John Innes Centre, not threatening to rip out their crops.”

This rhetoric matches the biotechnology industry PR perfectly, and Lynas, a writer, fashions himself an expert on the issue, while Guardian journalists deem him a relevant person to consult, again without acknowledging the article revealing EuropaBio’s plan to use him as a mouthpiece.

Additionally, there is also no evidence that Mark Lynas ever ripped up GM crops in the 1990’s or had much to do with the anti-GM movement. Zach Kaldveer, in his critique of the excess of media coverage of Lynas’ “conversion” writes,

More disturbing is the fact that NOBODY in the movement's early years has much of a recollection of Lynas at all. . . . In fact, there is little evidence to suggest Lynas was anything more than a peripheral, bit player in what was rapidly transforming into a vibrant international movement. Of Lynas's 50 published articles on "green issues" for the UK's Guardian only one mentioned GM crops and of the roughly 90 articles he wrote for the New Statesman , the topic of GMOs is nowhere to be found -- until that is, he wrote a pro- GMO one in January of 2010. Further undermining Lynas's claims of helping co-found the movement was his admission last year that the single anti-gmo article he did write for the Guardian in 2008, he 'dashed off in 20 minutes without doing any research.'

Even without this extra information about the Guardian coverage of biotechnology issues in which Lynas is quoted without any recognition of the October 2011, the article is sloppy journalism at best, or it is indicative of an intentional effort by the Guardian to put a positive spin on the issue of GM food. According to Tankard et.al. news is framed through selection, emphasis, elaboration, and exclusion. This selection of spokespersons, and the exclusion of available information about these spokespersons is an important part of how the Guardian frames this issue, and it echoes of the
biotechnology industry’s careful choice, and cultivation of the images of, certain spokespersons. The willingness of these journalists to accept Lynas’ account of his history as an anti-GMO activist without corroborating this claim, and their willingness to overlook evidence of his association with the biotechnology industry, are important aspects of how this story is framed by the Guardian. Herman and Chomsky explain the attraction for the mass media in quoting opinions of sources such as Lynas:

Another class of experts whole prominence is largely a function of serviceability to power is former radicals who have come to “see the light.” . . . for the establishment media the reason for the change is simply that the ex-radicals have finally seen the error of their ways. . . . it is interesting to observe how the former sinners, whose previous work was of little interest or an object of ridicule to the mass media, are suddenly elevated to prominence and become authentic experts. 247

This attraction to the repentance narrative is evident in mainstream media coverage of Lynas, and explains the media’s portrayal of Lynas as an expert despite his lack of any other kind of credential to suggest him as a source of information on the issue.

Framing Biotechnology in India

Referencing the need for biotechnology in the developing world is an important part of the biotechnology industry’s sales pitch for its products, and India is a country where GM food is a topic of much controversy. The manner in which all of these groups, then, discuss events surrounding biotechnology in India, is an apt case study to examine the treatment of the developing world in biotechnology news. The debate surrounding bt-cotton and GM crops more generally in India is an issue that further illustrates the
tendency of the mainstream media to reproduce frames and PR messages of the biotechnology industry. India comes up relatively often in both the pro-biotech and anti-biotech arguments. Articles from the Organic Consumers Association sample that mention India include an article linked from the Huffington Post reporting:

India announced last month it is pursuing charges against Monsanto for "stealing" an indigenous crop -- eggplant -- and using it to create a modified version without permission, a violation of India’s decade-old Biological Diversity Act. It’s the first prosecution of a company for the act of "biopiracy" in the country, and possibly the world.248

The next mention of India in the OCA sample, from the Ecologist, is about a Permanent People’s Tribunal accusing biotech companies of human rights abuses:

The world’s major agrochemical companies, Monsanto, Dow, Bayer, Syngenta, DuPont and BASF, will face a public tribunal in early December accused of systematic human rights violations. They are accused of violating more than 20 instruments of international human rights law through promoting reliance on the sale and use of dangerous and unsafe pesticides including endosulfan, paraquat and neonicotinoids.249

Another article presented by OCA, this one from the Hindustan Times, leads with the lament:

India’s Bt cotton dream is going terribly wrong. For the first time, farmer suicides, including those in 2011-12, have been linked to the declining performance of the much hyped genetically modified (GM) variety adopted by 90% of the country’s cotton-growers since being allowed a decade ago.250

This article references an internal advisory from the Indian government agricultural ministry to cotton growing states that cites decreasing cotton yields, increasing cost of input and a link between farmer suicides and bt-cotton.
Another article from the Institute of Science in Society, reports a lawsuit against Syngenta for withholding evidence in a previous German trial regarding the death of livestock after eating bt-corn. Subsequently, in 2009, the farmer learned of a feeding study allegedly commissioned by Syngenta in 1996 that resulted in four cows dying in two days. The trial was abruptly terminated. Now Gloeckner, along with a German group called Bündnis Aktion Gen-Klage and another farmer turned activist Urs Hans, have brought Syngenta to the criminal court to face charges of withholding knowledge of the US trial, which makes the company liable for the destruction of the farmer’s 65 cows.  

The article references another report from Science in Society that at least 1,820 sheep were reported dead after grazing on post-harvest Bt cotton crops; the symptoms and post-mortem findings strongly suggest they died from severe toxicity. This was uncovered in a preliminary investigation conducted by civil society organisations in just four villages in the Warangal district of Andhra Pradesh in India. The actual problem is likely to be much greater.

Another article from the *Times of India*, published on the GM Watch website reports:

MUMBAI: The Maharashtra government has banned the sale and distribution of the genetically modified Bt cotton seeds of Maharashtra Hybrid Seeds Company (Mahyco), a partner of US multinational Monsanto, in the state with immediate effect for supplying inferior quality seeds. . . . Certain Bt cotton variants are suspected of toxicity, damaging public health and environment, and agriculture activists have been demanding a complete ban on Bt technology in India. Protests have marked the 10th anniversary of the introduction of Bt cotton in the country this year with angry farmers and social activists asking policy makers for a comprehensive review of the technology that was meant for irrigated areas but was pushed in all cotton-growing states.

In still another article from another Indian news source, Tehelka, reports on a national conference in New Delhi, hosted by a coalition of prominent environmental and agricultural groups and including seed providers, government officials, farmers etc. Today, approximately 90 percent of the total cotton cultivation in the country of 11.14 million hectares is covered by Bt cotton. This seems to be the basis on which
our policymakers have come to the conclusion that Bt cotton is a success story. But that’s only half the picture, the other half which comprises of dirty tricks used by the companies to first lure desperate farmers using advertisements promising high yields and reduced use of synthetic chemicals along with systematic removal of non Bt seeds from the market is hardly seen by the policymaker. . . . The macro-economic studies showed another interesting factor. If we take the 10 years of Bt cotton in India, the rate of growth of cotton yields was highest in the period 2002-07 when Bt cotton area grew from zero to 41 percent of the total cotton area. In the next five-year period, when the area under Bt cotton increased to almost 90 percent. The growth in yield has stagnated and even slumped. So it proves that Bt cotton adoption alone is not the reason for increase in growth.254

The object of this long list of quotes is not to make the case against GMOs, but to illustrate the range of stories presented by OCA and GM Watch about India (as well as the variety of their sources), that report on the experiences of Indian farmers with bt-cotton.

Biotechnology Industry sources present the issue very differently. A search for India in articles from the US industry organization, Biotechnology Industry Organization (BIO), pulls up a story written by Ab Basu, Executive Vice President (Acting), Food and Agriculture, BIO. Basu writes about growing up in India:

I saw first-hand the fear and chaos that comes from food insecurity. India – at that time – had the world’s largest food deficit. Now, India is a leading food exporter. That’s a great story to tell, and it’s because India adapted to technology and began using crop varieties that produced better yields. It is critical we provide farmers around the world with the same scientific tools and knowledge available that American farmers have. And let’s keep the food debate focused on basic human needs.255

This quote does a number of different things. The reference to his childhood in India gives the author credibility—he must know about India, he has first-hand knowledge, and he must care about Indian people. Without having to cite sources he has also credited the increase in cotton production in India to the biotechnology industry without discussing
sordid matters of Indian farmer suicides or statistics that illustrate the point specifically. With his last sentence, he has placed focus of the debate on a very limited scope of analysis, basic human needs, while framing his argument in a humanitarian way, and implicitly criticizing activists who argue about all kinds of different factors surrounding GMOs. What he has not done is discussed the actual conditions and experiences of Indian farmers. The only other mention of India in the ABC literature during the period of this analysis is a few times India is mentioned as part of a larger picture regarding increases in the adoption of GM crops worldwide.

The UK’s Agricultural Biotechnology Council (ABC) mentions India twice over the course of the year to say “India planted 10.6 million hectares of biotech cotton during 2011” and later, “GM is used extensively in North and South America but is also popular in India, China, Australia and several African countries.”

CropGen also only mentions India by way of passing and mentioning how many acres of GM crops they grow. The most in depth discussion of India:

India celebrated the 10th anniversary of Bt cotton, with plantings exceeding 10 million hectares for the first time, reaching 10.6 million hectares, and occupying 88% of the record 12.1 million hectare cotton crop. The principal beneficiaries were 7 million small farmers growing, on average, 1.5 hectares of cotton. India enhanced farm income from Bt cotton by US$9.4 billion in the period 2002 to 2010 and US$2.5 billion in 2010 alone.

BiotechNow articles touch on the topic more often. They include passing mentions of increasing yields in India, one quote from the head of an African think tank saying vaguely Africa must learn from the mistakes of India, another article claims that India’s lack of confidence in biotechnology comes from the UK and the US: “Much of the same lack of confidence of biotech foods exists in India and throughout the world.
because of the European Union spreading its unfounded concerns about biotech foods and a fringe U.S. scientific community spreading negative quasi science.® This argument calls into question the ability of Indian citizens to think for themselves as well as calling into question science that goes against the biotechnology industry’s arguments about its products and grouping any scientist whose findings aren’t in line with industry findings into the category of a “fringe scientific community.” This is a pattern that is discussed in more detail below.

The AgBioWorld sample also includes the previously discussed article by Chengal Reddy. In a search in all of the articles published by AgBioWorld (not just those sampled to limit the number of articles to a manageable number) during the time period under consideration, there are 3 additional scientific analyses, all three arguing that Bt-cotton has brought increases in profits and yields for Indian farmers.®

Another brief article from the Times of India appear in AgBioWorld’s coverage, reporting solely on the opinion of a Russian Biotechnology researcher visiting India who argues that Bt-eggplant resistance in India comes from pesticide companies who know they will be obsolete if it is approved (clearly a fallacy since the purveyors of the pesticide also sell the seed). “Professor Gaponenko, who is in the city to attend the ongoing Science Conclave at IIIT-A, told TOI that genetically engineered crop is the only viable alternative to feed the ever increasing population of the world, which traditional seeds cannot cater.”® This scientist offers up the industry argument of needing biotechnology to feed the growing world population.

The last AgBioWorld article addressing India is from US group International Service for the Acquisition of Agri-Biotech Applications (ISAAA), and presents this argument from Prof. G. Padmanaban:
‘The debate for and against GM technology has raged all over the world and people have taken extreme positions one way or the other and it appears to me that this is not an issue that can be settled through arguments,’ he said. ‘Ultimately it has to be a political decision, based on a clear perception of its utility and a careful risk-benefit analysis and not be guided by populistic (sic) movements.’

This argument calls for ignoring what the population at large thinks and asking politicians to make decisions “based on science.”

All of the instances of the biotech industry broaching the topic of India above involve arguments about increasing yields and profits of Indian farmers from Bt-cotton, no other issues are discussed by industry sources. The industry sources do not discuss the protests mentioned above against GM crops, the ban on GM-cotton, also mentioned above, or the lawsuit brought against Monsanto for biopiracy, it maintains the limited scope of looking at quantitative data from industry friendly sources regarding yields and farmer income. Promoting this macro-economic frame as the most legitimate frame within which to understand these issues limits the scope of conversation about the issue to a circumscribed set of arguments that the biotechnology industry is prepared to engage with. Biopiracy is not a concept the biotechnology industry has any interest in people thinking about as it brings up many complicated questions about intellectual property and rights of indigenous populations to their own history and knowledge. This is another example of Tankard’s framing through selection in that the selection of certain frames over others has a significant impact on the ways that readers are encouraged to think about a particular issue.
An article published by GM Watch reveals that the biotechnology industry is attempting to spread this PR message in India as well. In an op-ed from *The Hindu*, P. Sainath recounts:

Three and a half years ago, at a time when the controversy over the use of genetically modified seeds was raging across India, a newspaper story painted a heartening picture of the technology's success. ‘There are no suicides here and people are prospering on agriculture. The switchover from the conventional cotton to Bollgard or Bt Cotton here has led to a social and economic transformation in the villages [of Bhambraja and Antargaon] in the past three-four years.’ (*Times of India*, October 31, 2008).

So heartening was this account that nine months ago, the same story was run again in the same newspaper, word for word. (*Times of India*, August 28, 2011). Never mind that the villagers themselves had a different story to tell.

The article goes on to recount residents of Bhambraja testifying in a government hearing that, in fact 14 farmers had committed suicide in the village since the introduction of bt-cotton, and that farmers were giving up farming or switching to soy. Detailed interviews with the farmers featured in the news story reveal that even the first time it was printed in 2008, it was deceptive about increases of farmer profits and other details. The author also references a study of the 365 farm households in Bhambraja and the nearly 150 in Antargaon by the Vidarbha Jan Andolan Samiti (VJAS) [that] shows otherwise. ‘Almost all farmers with bank accounts are in critical default and 60 per cent of farmers are also in debt to private moneylenders,’ says VJAS chief Kishor Tiwari.

This account, published by the Hindu, highlights the (perhaps intentional) blindness of the biotech industry to the actual conditions of Indian farmers, and implies willingness of biotech corporations to fabricate stories and evidence in the interest of selling their products.
Press coverage of India regarding biotechnology from the US mainstream sources examined in this analysis is rather limited. The *New York Times* mentions India once, to note that the country has GMO labeling laws in place. The *Wall Street Journal* mentions India four times, twice to note that corn yields in India are significantly lower than in the US, once to mention the rising affluence in reference to the need to produce more food, and once to praise Norman Borlaug’s introduction of hybrid wheat: “whose yield was so enormous that struggling countries such as Mexico and India became self-sufficient by raising the crop.” As far as these sources are concerned, events in India are irrelevant to biotechnology news and discussion. Without knowing why that is the case, the outcome is clearly that events in India are not framed as important or central to the issue of GMO.

An article in the *Guardian* reports:

Genetic engineering has failed to increase the yield of any food crop but has vastly increased the use of chemicals and the growth of "superweeds," according to a report by 20 Indian, south-east Asian, African and Latin American food and conservation groups representing millions of people. The article reports the main points of the report, citing the arguments that biotechnology companies own most of the available seed, that use of biotech crops increases use of pesticides, that superweeds are popping up that are resistant to Roundup and other agro-chemicals. Potential health risks are brought up as well, as well as the claim, from the report, that “scientists are loth to question the safety aspects for fear of being attacked by establishment bodies, which often receive large grants from the companies who control the technology.” The account is followed by a quote from Monsanto arguing that because of the amount of GM food consumed already it must not be a health risk. The article ends
with a few other quotes from the report about the biofuels taking food that is needed to feed the developing world, and finally that “GM companies have put a noose round the neck of farmers. They are destroying alternatives in the pursuit of profit.” While the article covers a number of topics and claims of anti-biotech activists, it is strictly an account of what is in the report, making neither the author of the article nor the newspaper in any way accountable for the content. There is no corroboration of the claims or context given, just the content of the report and Monsanto’s quote countering one of the points.

India is also mentioned in an editorial by Robert Newman. In a larger article questioning the issues of democracy and agency of citizens of the developing world surrounding philanthropy, Newman comments:

The biotech agriculture that Lord Sainsbury was unable to push through democratically he can now implement unilaterally, through his Gatsby Foundation. We are told that Gatsby's biotech project aims to provide food security for the global south. But if you listen to southern groups such as the Karnataka State Farmers of India, food security is precisely the reason they campaign against GM, because biotech crops are monocrops which are more vulnerable to disease and so need lashings of petrochemical pesticides, insecticides and fungicides – none of them cheap – and whose ruinous costs will rise with the price of oil, bankrupting small family farms first. Crop diseases mutate, meanwhile, and all the chemical inputs in the world can't stop disease wiping out whole harvests of genetically engineered single strands.²⁷³

General arguments made by Indian groups against GM technology is the limit to which he discusses this topic.

The last article that mentions India is in the Society pages, and it is an article by Aruna Roy, detailing recent legislation in India, its Right to Information Act, and
comparing it to similar, but according to Roy, inferior legislation in the UK, the Freedom of Information Act. Roy recounts:

There is greater provision in Indian law for access to information from private companies, including those running outsourced agencies. One example of information obtainable in India that would not have been possible to obtain in the UK or the rest of Europe was when a subsidiary of Monsanto was forced to reveal information related to trials of genetically modified crops, which the company had claimed was protected by commercial interest.²⁷⁴

There is no further mention of India in the Guardian coverage of biotechnology.

The Times mentions India in several articles that address biotechnology. One is just in passing, in an editorial in which Matt Ridley fantasizes about a time in the future where population growth has decreased even in India to the point where the younger generation doesn’t know how to support the much larger older generation. One in a letter to the editor in which the author laments: “Look at the GM research and related industries in China and India. In maybe 20 years there will be a wringing of hands: GM, a technology invented in the UK by the elucidation of the structure of DNA - but developed by others.”²⁷⁵

Another mention of India in the Times is an article in the Business section reporting on the ban of GM in India’s largest state, citing the lack of economic benefit reported and the possible connection to farmer suicide according to “campaigners.”²⁷⁶ A second article about Indian suicides also appears in the Times relating the story of two farmers in India who committed suicide and their families. The article reports:

Kishore Tiwari, a campaigner monitoring the crisis in Vidarbha, blames the changes in farming practices pushed by India's Government and by Monsanto, the US agribusiness giant that produces drought-resistant GM cotton seeds that farmers in the area use. ‘This is a manmade crisis,’ he said, pointing out that 20 years ago farmers grew food as well as cash crops, making them less reliant on
market prices, and did not need to take out debts to buy seed and fertiliser every year.

While the US mainstream media sources analyzed here do not acknowledge any claimed connection between farmer suicides and bt crops during the period of analysis, or report on the ban of these crops in India’s largest state, the UK media has reported on these issues a fair amount. One possible reason for this imbalance is Britain’s long and complicated history as a colonial occupier of India, and the subsequent economic and political ties. News of India would be culturally and politically more important in the UK than the US for this reason. What news outlets in neither country report on, though, is the biopiracy charge from India’s government, or the German farmer suing Syngenta for withholding evidence of consumption of bt-crops poisoned livestock in their own feeding trials. Nor is the Permanent People’s Tribunal accusing Monsanto, Dow, Bayer, Syngenta, DuPont and BASF of Human rights abuses. There is no mention of the preponderance of lawsuits internationally against Monsanto or other biotechnology companies.

Gaps in Coverage & the Human Health Frame

The New York Times reports one in this period on the suit brought by US farmers against Monsanto attempting to escape their eventual litigation against them when their crops become inadvertently contaminated with the company’s patented seeds. Readers who depend on these newspapers for their knowledge of this subject would not be aware that in addition to this case there are many other lawsuits against these companies.
regarding the legitimacy of their patents and safety of their products all over the world.

No mention was made in any of the four mainstream news sources of the supreme court of Brazil ordering Monsanto to pay a multi-billion dollar settlement to Brazilian farmers:

In April 2012 a Rio Grande Do Sul judge ruled that Monsanto's fees were illegal and noted that the Roundup Ready seed patent had already expired in the country. The company was not only ordered to stop collecting the royalty fees but to also return all such fees collected since 2004. Such collected royalties amount to $2 billion. Monsanto appealed the ruling but was dealt another blow on June 12 when the Brazil Supreme Court decided unanimously that whatever the Rio Grande Do Sul courts rule on this matter should apply to the whole of Brazil. This caused the number of plaintiffs to balloon to five million and the total royalty owed to rise to $7.5 billion.278

These news outlets do not report lawsuit of the French farmer who sued Monsanto over adverse health effects from contact with the weed killer Lasso, and won, as reported by Reuters and on the OCA web site in February 2012.279280

Many of these lawsuits that are not reported by the four mainstream news sources examined here have something in common: they are claiming negative health effects of agricultural pesticides or genetically modified crops. One of the more significant frames identified in the material from the anti-biotechnology organizations was the Human Health frame. Below is an enlarged chart of the anti-biotech group frames:
As the chart illustrates, the human health frame is by far the most significant of the OCA articles and one of the four most significant frames from the GM Watch sample. The human health frame is inconsequentially small or non-existent in all of these mainstream press articles, as evident from figure 9, above.

It is important to note that frames used frequently by both pro-biotech and anti-biotech groups are used in different ways by the two groups. While an environment frame
used by the biotechnology industry is promoting the benefits of biotechnology for the environment, the anti-biotech groups use this frame to emphasize the environmental risks and observable negative effects of GM crops on the environment, one side says GM crops increase use of pesticides the other says they decrease the use of pesticides, both of these arguments fall under the environment frame. The biotechnology industry uses the legitimacy of science frame almost constantly, repeating endlessly that there is a scientific consensus regarding the safety of genetically modified food. As Herman and Chomsky postulate:

> a propaganda model suggests that the ‘societal purpose’ of the media is to inculcate and defend the economic, social, and political agenda of privileged groups that dominate the domestic society and the state. The media serve this purpose in many ways: through selection of topics, distribution of concerns, framing of issues, filtering of information, emphasis and tone, and by keeping the debate within the bounds of acceptable premises.  

Keeping the debate within the bounds of acceptable premises is the key operating factor here, the biotechnology industry as well as various other establishment bodies have declared a scientific consensus that there are no health risks from GM crops, so to report on those would be outside of the bounds of acceptable discussion, and could potentially result in flak towards the mainstream press. This results in an uncontested message of the safety of GM crops and their principle inputs across the mainstream media.

For example, in reporting about the issue of GM labeling the *Wall Street Journal* explains,

> The U.S. Food and Drug Administration says genetically modified foods aren’t any less safe than conventional foods, and it doesn’t require labeling. Some scientists argue the foods require further study but say that there are no known health risks associated with them.
In this explanation the author has communicated that there is no scientific work that has warned of possible health risks of GM food, just a few suggestions that more work might be done on the issue, he has also dispensed with the issue of possible health effects in order to go on to frame the labeling debate as a political matter and one revolving around public opinion first and foremost.

In addition to the lawsuits against the biotechnology industry, anti-biotech organizations publish articles on a significant number of scientific studies that question the safety of roundup and genetically modified crops, and most of these studies do not make it into the mainstream media. When these studies are covered by the mainstream media the biotechnology industry undermines the legitimacy of the authors and the validity of the studies to such a degree that the result is to further reinforce the biotechnology industry’s message of scientific consensus on health effects.

*The Times* reports on studies linking neonicitinoids to bees’ colony collapse disorder, the Rothamsted wheat trials and finally a grant given by the Gates Foundation to the John Innes Centre in Norwich to study crops that could take nitrogen out of the air. According to the article, it is hoped that the study “will benefit struggling maize farmers in sub-Saharan Africa.” Beyond that no scientific studies are reported on and the references to human health are few: one editorial refers to the issue briefly, “the argument [against cultivation of GM crops in Europe] would carry more weight if there were substantial evidence of GM crops harming human health or suppressing biodiversity, but there is very little of either.” In two instances articles actually vaguely refer to human health benefits of GM crops, on in a letter to the editor in which the author claims,
without providing any further clues as to what he is referring, “well evidenced health and output benefits achieved through changing to GM cotton, rice and bananas or the potential for other crops.”

The other mention of health effects of GM food occurs in a letter from Dr. Giles Oldroyd, a plant biologist at the John Innes Centre, in which he claims, “GM also allows improvements to our food, such as increased levels of health-promoting components.”

The Times, as this evidence shows, barely recognizes that controversy exists over potential negative health effects of GM crops, while suggesting in a general way that they may actually improve human health.

On June 21, 2012 the Guardian reports on a Chinese study that reports environmental benefits of Bt-crops. The article introduces Bt-crops as “Plants engineered to produce a bacterial toxin lethal to some insects but harmless to people.”

By stating that Bt-toxin is not harmful to people without attributing a source of this information or identifying it as an industry claim, it is represented as an undisputed fact. This, presumes information provided by the biotechnology industry is true and ignores a study reported repeatedly in OCA and GM Watch materials, and published in reproductive toxicology in May 2011, that finds:

Cry1Ab toxin was detected in 93% and 80% of maternal and fetal blood samples, respectively and in 69% of tested blood samples from nonpregnant women. There are no other studies for comparison with our results. However, trace amounts of the Cry1Ab toxin were detected in the gastrointestinal contents of livestock fed on GM corn. . . . To our knowledge, this is the first study to highlight the presence of pesticides-associated genetically modified foods in maternal, fetal and nonpregnant women's blood. 3-MPPA and Cry1Ab toxin [b-t proteins] are clearly detectable and appear to cross the placenta to the fetus.

The authors of the study express concern about the effect of this toxin in reproductive disorders and conclude:
Given the potential toxicity of these environmental pollutants and the fragility of the fetus, more studies are needed. . . . Today, obstetric-gynecological disorders that are associated with environmental chemicals are not known. This may involve perinatal complications (i.e. abortion, prematurity, intrauterine growth restriction and preeclampsia) and reproductive disorders (i.e. infertility, endometriosis and gynecological cancer). 290

The article reports findings of a Chinese study that reports spillover benefits of the use of bt-crops to nearby non-GM crops. The article quotes the research team leader:

‘Insecticide use usually kills the natural enemies of pests and weakens the biocontrol services that they provide,’ said Professor Kongming Wu at the Chinese Academy of Agricultural Sciences in Beijing, who led the research team. ‘Transgenic crops reduce insecticide use and promote the population increase of natural enemies. Therefore, we think that this is a general principle.’ 291

The article reports the study unproblematically, in an upbeat tone, framing the issue as a positive environmental story, promoting the usefulness of GM-crops, failing to cite anyone who may disagree with the findings and failing to cite repeated reports, noted by GM Watch and others, of the increasing failure of the bt-technology to resist the pests it is designed to resist. 292 293 294

A subsequent letter to the editor from Emma Hockridge, Head of Policy of the Soil Association, addresses the article and reveals that these findings are, of course, contested:

Your article (GM crops deliver green benefits, study suggests, 14 June) reports on a study that finds Bt cotton is a better habitat for such predators than cotton that has been sprayed with pesticides. What it doesn't cover is other recent research in China that has discovered increased insect resistance and increased numbers of pests developing in and around these GM cotton crops. Studies show problems occurring with secondary pests in Bt cotton, which are not only affecting the cotton but also damaging surrounding crops. This suggests "spillover" problems rather than "spillover" benefits. 295 The study that Hockridge refers to is one published in February 2011 in Environmental Monitoring and Assessment. 296
While it is notable that this letter is published, it doesn’t change the message of the original article that GM crops provide environmental benefits through the reduction in pesticide use. This message is one that the biotechnology industry focuses on in materials published by the four pro-biotech organizations examined. It is also part of a strategy that is laid out in a previously cited internal Monsanto memo regarding a new public relations campaign that the company launched in 2002 called “Good To Grow”: “Monsanto’s future is inextricably linked to global acceptance of biotechnology . . . pesticide reduction has shown it is a powerful message.”

Another study reported on by the Guardian, already discussed above, is the report by “20 Indian, south-east Asian, African and Latin American food and conservation groups representing millions of people.” The report criticizes many aspects of GM technology, but when it comes to suggestion of health risks, a quote from Monsanto is provided stating:

Monsanto disputes the report: ‘In our view the safety and benefits of GM are well established. Hundreds of millions of meals containing food from GM crops have been consumed and there has not been a single substantiated instance of illness or harm associated with GM crops.’

The piece goes on to quote Monsanto’s argue that GM crops provide “substantial economic and environmental benefits,” but no response is given to the main arguments of the study regarding control of global food supply, indebtedness among developing world farmers, attacks on scientists who speak out about possible negative effects of GMOs, or appearance of superweeds. These aren’t points with which the industry is willing to engage with. These two are the only relevant studies the Guardian reports on beyond
public opinion surveys, studies on a connection between neonicitinoids and bees’ colony collapse disorder and the Rothamsted wheat trials, discussed in detail below.

Other mentions of health effects of GM crops in the *Guardian* are few, but the instances include an editorial in which Leo Hickman notes:

Monday, Europe's food safety agency ruled against a temporary French ban on a strain of GM maize made by the US company Monsanto, saying there was ‘no specific scientific evidence, in terms of risk to human and animal health or the environment’ to justify it. But the protesters feel the public is still on their side.”

This quote puts the argument in terms of science vs. popular opinion, a stark contrast that doesn’t acknowledge existing scientific studies that question the health effects of consuming GM crops as contributing to public opinion. This has the effect of positioning public opinion as based on irrational objections to GM crops that fly in the face of science.

In another quote referencing human health, the same article quotes Colin Ruscoe, Chairman of the British Crop Production Council, arguing “GM offers the promise of a number of beneficial traits: ‘Some crops could be climate change resistant. They could be both salt and drought resistant. Or they could be enhanced with extra health-giving properties such as omega-3 oils.’” This quote references possibilities of future GM crops but none of these functions have yet been realized in practice, and thus are based on speculation rather than scientific evidence.

Another article from the *Guardian* comment section by James Randerson claims: “Scary health effects that were always the most potent fears for average consumers (though perhaps also the least credible) have failed to materialise.” Still another
comments, “and while there is little evidence that the consequences of GM will match the prophesies (particularly the potential health risks to consumers)” These quotes, as a whole, imply that there is no scientific debate around possible health risks associated with consuming GM food, while there could very well be some benefits down the line. This is exactly the message the biotechnology industry would like to convey about its products.

*The Wall Street Journal* reports on one scientific study relevant to this analysis. The article, titled “Beijing Suspends Researcher Over Modified-Rice Study,” reports,

China's national health watchdog suspended one of its researchers after announcing it hadn't approved or participated in a 2008 Sino-U.S. study that examined the effect of genetically modified vitamin-enriched rice on 24 children.

There is no indication that the children have been harmed, but the agency's response is likely to further entrench widely held public skepticism in China over genetically modified grains amid broader food-safety concerns.

This passage frames the issue not as one of research ethics or of the health of the subjects, but of importance of public opinion regarding genetically modified grains and food safety. The article goes on to compare Chinese law prohibiting human consumption of GM foods with the commonness of GM grain in the US, presumably to demonstrate the unreasonable nature of Chinese regulation, and then discusses the potential market for genetically modified crops that China represents. The article proceeds to report that the study found that the genetically modified rice provided vitamin A just as well as spinach to the children in the study. The details of the researcher’s suspension are given, followed by the conclusion of the article in which the author seemingly gives as much evidence to absolve the researcher of any wrongdoing that can be scraped together:
Ms. Tang had earlier said the tests had been preapproved, the state-run Xinhua news agency reported. She wasn't available to comment.

The project involved feeding the children modified rice, spinach and carotene capsules over a 35-day period. The center said it has asked Tufts to investigate the case.

public-relations deputy director Jennifer Kritz said on Tuesday that the university is conducting a review of the protocols in the research and declined to comment further until after it is completed. She said made "every effort to abide by Chinese law" as well as to ensure the safety of human research subjects.  

This article frames the story in such a way as to imply that Chinese law regarding GMOs is unreasonable as well as hard to comply with and that Chinese officials are potentially lying about having approved the study in the first place. The major issue presented as being at stake here is the image of GM foods and the fact that the study proved the health benefits of so called “Golden Rice.”

No other studies regarding the safety or health effects of GM foods are addressed in the Wall Street Journal coverage. Mentions of health risks in the coverage are limited to those such as the example cited above, that convey the image of a scientific consensus surrounding the issue. The Wall Street Journal tends to frame any mention of possible health effects of GM food in terms of public opinion on GM crops, much like the article reporting the Chinese Golden Rice study above. For example, one article about the GMO labeling debate reports, “opponents of the initiative say the labels would mislead consumers into thinking there are health risks associated with the products.” Another article notes,

Monsanto frequently has been criticized by some consumer and environmental groups that argue its biotech corn and soybean seeds are detrimental because they encourage farmers to apply more of certain herbicides, breed insect resistance and have unknown human health effects.
This quote is in the context of discussing Monsanto’s newest foray into the vegetable market and the company’s economic prospects and stock value, in an overall economic frame. Thus the mention of consumer and environmental group criticism is a suggestion of a potential economic pitfall for the company due to public opinion, rather than any real engagement with these health and environmental concerns.

The New York Times also reports on studies connecting neonicitinoids to bee die off. Additionally, in an article reporting the rejection of a request by the Natural Resources Defense Council for the EPA to ban agrochemical 2,4-D, the evidence presented on scientific studies of the issue is as follows:

The group cited various studies suggesting that exposure to 2,4-D could cause cancer, hormone disruption, genetic mutations and neurotoxicity. It also said the E.P.A., in previous assessments, had underestimated how much people, especially children, might be exposed to the chemical through dust, breast milk and skin contact.

In its ruling, the E.P.A. said that while some studies cited suggested that high doses of the chemical could be harmful, they did not establish lack of safety, and in some cases they were contradicted by other studies.

The agency in particular cited a study, financed by the 2,4-D manufacturers and conducted by Dow, in which the chemical was put into the feed of rats. The study did not show reproductive problems in the rats or problems in their offspring that might be expected if 2,4-D were disrupting hormone activity, the E.P.A. said. This account of the scientific controversy downplays the studies regarding the health effects of 2,4-D cited by the group, not detailing the evidence in a way that would allow readers understanding of the methods or results, nor providing a way to access these particular studies, while giving significantly more detail on the industry funded study from which the agency concludes that the chemical is not unsafe.
Roger Cohen’s anti-organic editorial also mentions a study, this one the widely reported Stanford study that, according to Cohen,

concluded, after examining four decades of research, that fruits and vegetables labeled organic are, on average, no more nutritious than their cheaper conventional counterparts. The study also found that organic meats offered no obvious health advantages. And it found that organic food was not less likely to be contaminated by dangerous bacteria like E.coli. The takeaway from the study could be summed up in two words: Organic, schmorganic. That’s been my feeling for a while.

Cohen added another claim about the Stanford study, stating that he trusts “the monitoring agencies that ensure pesticides are used at safe levels -- a trust the Stanford study found to be justified.” These findings, reported here as if representative of the final say on organic vs. conventionally grown food, was also reported on by the Organic Consumers Association in an article by Jim Riddle of the University of Minnesota Southwest Research and Outreach Center on September 11, 2012. The author notes,

The Stanford study was striking in several regards: 1) No new research was conducted - the Stanford team simply reviewed existing studies; 2) The review included research conducted under different sets of organic standards; 3) The review included research conducted prior to 2002, when USDA National Organic Program Regulations took effect; and 4) The review concluded that organic foods consistently contain fewer pesticide residues and antibiotic-resistant bacteria, and significantly higher levels of beneficial nutrients in organic milk. The New York Times editorial presents the study in a way that suits the author’s outlook on the issue, which is irritation at what he sees as the excessive amount of references to organic food in his every day life. This is perhaps pardonable given the tone and personal nature of the article, but it nonetheless simplifies the issue and unproblematically presents a very limited view of the results of a study that has received a significant amount of criticism in its methods and the way in which its results have been presented by the media. The controversy over this study is widely reported on by anti-biotech groups and
pro-biotech groups, but since the focus of the story is not on genetic modification, most articles in the mainstream press addressing the study, including one by the *New York Times*, were not included in this sample, thus this controversy, while interesting, will not be a focus of this analysis. The editorial in question here was selected because the author goes on to argue that the world needs GM crops and pesticides over organic farming in order to feed the increasing world population, thus, based on the relevance of this material, the article made it into the sample.

Another study to receive a significant amount of press attention is reported on by the *New York Times* in a September 20, 2012 article by Andrew Pollack, titled “Foes of Modified Corn Find Support in a Study.” The title of the article politicizes the study immediately, rendering it not important science news to inform the public about but a controversial tool for “foes” of the technology. The article leads with,

> Rats fed either genetically engineered corn or the herbicide Roundup had an increased risk of developing tumors, suffering organ damage and dying prematurely, according to a new study that was immediately swept up into the furor surrounding crop biotechnology when it was released Wednesday.

The study, conducted by a prominent opponent of genetically engineered crops, was immediately criticized by some other scientists, who said the methods were flawed and that other research had not found similar problems. The article goes on to detail the notably longer time period of the study than others as well as some of the basic methods of the study, which, according to the article, was published “the peer-reviewed journal Food and Chemical Toxicology.” The author then quotes Brude M. Chassy, Emeritus Professor of food science at the University of Illinois arguing “‘This is not an innocent scientific publication. . . . It is a well-planned and
cleverly orchestrated media event.” Chassy has in the past been quoted on the Biotechnology Industry Organization publication, BIOtechNOW, saying of GM crops, the science and results are clear: products of biotechnology are probably safer than any others. There is no scientific controversy or doubt about the real-world outcomes. They are all positive, good for consumers, farmers and the environment. . . . There is a well-financed and organized global opposition to GM crops that spreads misinformation and fear. . . . Make no mistake about it, this isn’t a grassroots opposition. It is a small handful of people that profit from higher prices for organic and GM-free foods. They are paid to block GM crops that can benefit certain countries and companies.\textsuperscript{315}

Not only do these comments sound paranoid, his accusations of a global conspiracy coordinated by a few powerful actors are unsupported by any evidence provided here or discernably elsewhere. Additionally, to state that all outcomes are positive for consumers, farmers and the environment is a lie in the face of evidence of even one farmer committing suicide after growing failed Bt-crops in India, or the appearance of weeds and pests resistant to Roundup and Bt-crops. Whether or not GM crops are benefitting the food system overall, to state that there are no negative outcomes is arrogant at best. As a spokesperson Chassy is an interesting choice, then, for the New York Times to cite as a supposedly neutral and credible scientist in the position to criticize the motives and methods of another. The New York Times article goes on to provide any further evidence it can find of the fallibility of the study:

Some critics pointed out that the new findings contradicted other studies. One review of long-term studies, published earlier this year, concluded that those studies did not present evidence of health hazards.

Dr. Chassy said that people and livestock had been eating genetically modified grains for years without evidence of the high death rates and tumors in the study. "Curious that no increase in tumor incidence has been reported in animals eating large amounts of such grains," he said.
David Spiegelhalter, a professor at the University of Cambridge specializing in the public perception of risk, said the numbers of animals in each group was too low to draw firm conclusions.

Another red flag for some scientists was that higher doses of the crop or the herbicide did not cause more harm than lower doses, which would have been expected if the crop or the chemical were truly harmful.

Dr. Séralini's work has been questioned before. A review of one of his studies by European authorities concluded that his statistical methods "led to misleading results" and that his study had not raised new issues about the safety of the crop.

Such a long and detailed exploration of the possible flaws of a study published in a respected peer reviewed journal, as this study is, is an unusual undertaking for a mainstream newspaper such as the New York Times to take on. Taken one at a time, also, the claims are not unusual for scientific studies as a whole: for instance the point that there are other studies that contradict the conclusions of this study—well there usually are conflicting findings in bodies of scientific literature. If the author of the article is interested in informing readers about various findings on the issue and the scientific uncertainty surrounding it, then the findings, methods and reputation of the groups conducting this opposing study would be discussed here as well. Instead the existence of possible conflicting evidence is offered up solely to provide evidence to undermine the credibility of the Seralini study. As far as the use of unscientific, casual observation of Chassy having never heard of incidence of tumors in livestock eating GM grain—casual observation is not usually presented as a legitimate contradiction of scientific evidence. Also cited as evidence of the lack of credibility of the study is the point that Dr. Seralini’s work has been questioned before—in a field so embroiled in controversy is it evidence of bad science that a scientist’s work has been questioned in the past? Seralini is quoted once in the article, saying “the results are really alarming,” in a quote given to another
group in a telephone news conference. He is not consulted to respond to critics of his methods or findings, nor is anyone else consulted who might support them. The only other quotes are from Chassy, one other critic of the study, with an additional reference to “another red flag for some scientists” implying a general dismissal of Seralini’s work with no clue given as who these other scientists might be. The scientific legitimacy frame implemented by the author of this article appears to be geared entirely towards undermining the credibility of the study rather than providing information about it in any real sense.

This analysis is not intended to settle the question of whether Seralini’s study is conclusive in proving health risks of GM food, but solely to point out the unusual nature of the New York Times article going so far in attempting to undermining a scientific article published in a peer reviewed journal. In contrast, in the 2,4-D article analyzed above, the New York Times reported on an industry funded study taken by the EPA at face value in proving that 2,4-D is not dangerous to human health. Although the article gave some detail as to the methods, no conflicting reports on the legitimacy of the science was provided, while studies cited by the group asking the EPA to ban the chemical were breezed over without any detail.

The release of the Seralini study was quite close to the end of the time period of this analysis, so the entire controversy (which lasted months) will not be included in this analysis. The available evidence within the parameters of this analysis time frame gives enough of a snapshot of the subsequent arguments to illustrate the controversy. Of the four pro-biotech organizations the Agricultural Biotechnology Council (ABC) is the only
one to have published material on this topic within the time frame of this analysis. The press release argues that many studies have found GMOs safe, they are “rigorously tested for safety, and that farm animals and humans around the world have eaten many GMO meals without incidence of harm.” Nature reveals, though, that only about a dozen other long term studies have been done that have not found such results, and these studies on different GM crops than those in question in the Seralini study: “the rats were monitored for two years (almost their whole lifespan), making this the first long-term study of maize containing these specific genes.”315 This reveals that this study has never been done by the industry or anyone else, so reassurance that such studies have been done before with different results is simply not true. The New York Times, though, in its article cited above claims “Some critics pointed out that the new findings contradicted other studies. One review of long-term studies, published earlier this year, concluded that those studies did not present evidence of health hazards.” This claim, that the research contradicts other studies, then, is used in the loosest possible way. The research perhaps “contradicts” other studies done on other GMO foods and/or possibly over a significantly shorter time period, since most studies on GMO toxicity for government approval are done for 90 days, not two years. This further reveals a bias in the New York Times article towards undermining the importance of the findings, in line with biotechnology industry PR, over transparently reporting on the results.

The ABC press release also states that although the organization has not yet studied the research closely,
Media reporting this story should be aware that some of the researchers behind the study are closely associated with anti-GM campaigning groups. . . . The funding of the research should be carefully considered, as should the commercial motivations of parties involved and the motivations of political figures associated with the study.  

This is an attempt to undermine the credibility of the research even without the organization having examined the study, and saying nothing about the methods or results, but preemptively the research should be dismissed because of the researchers ties with groups and funding. Following that logic we would have to reject any research funded by the biotechnology industry or those associated with the industry, which would be the greater body of scientific research on the topic since the industry limits the research that can be done on its products based on its patent rights. An article from Yale Environment 360, details this industry obstructionism. The article reports on an anonymous letter to the EPA from 24 scientists warning that the industry exercises so much influence over research that scientists could not do their jobs properly.

In a paper co-authored (non anonymously) by nine of the 24 researchers and published last month in GM Crops, the scientists elaborated upon their grievances. Research restrictions, they wrote, preclude public scientists ‘from meeting their obligations to the American crop producer and ultimately the consumer.’ The system, as it now stands, ‘sets up an uneven relationship where industry partners may unduly influence the way research is designed and disseminated.’ Even once an agreement has been successfully negotiated, they wrote, there’s no guarantee the company won’t withdraw its participation if the results appear to be unfavorable to its product.  

Given the level of control that the industry wields over research on its products, it is patently absurd for its spokespersons to argue that research should not be trusted based on a bias against the industry that another researcher holds, or the funding of that outside
research. Nonetheless these challenges to the legitimacy of the researcher, despite peer review approval and publication, made it into mainstream media coverage of the study.

The industry is, in fact, correct in pointing out that funding and association of researchers affects the outcomes of research in this area. A study, published in Food Policy, examined 94 objectively chosen articles written on studies that involved or considered consumption of the GMO product by animals or humans with the intention of measuring a biological response or involved data collection on participants or from an uncontrolled or natural environment without the intervention of the investigator. The study concludes, through statistical analysis of a selected population of studies in the described area, it could be shown that a combined analysis of COIs [conflicts of interest] through professional affiliations or direct research funding are likely to influence the final outcome of such studies in the commercial interest of the involved industry.

Indeed this is precisely the reason it is important to consider studies conducted by scientists not affiliated with the biotechnology industry.

GM Watch published many retorts to media coverage of the Seralini study, one of which, titled “Study Backlash a Barrel of Red Herrings” and originally published by the Organic Council of Ontario, responding to criticisms of the actual research, some of which were included in the New York Times article, above: “What Dr. Clark found was that many of the criticisms about the study design could equally be said of studies used in the biotech sector to request GM food approvals.” The article goes on to detail criticisms of the study that were used to undermine its credibility—the type of rats used, the number of rats used, and the unlimited food they were allowed—and points out that
they match the methods of the industry. The main thing that didn’t match was the two
year trial period rather than the 90 days used by the industry.

Dr. Clark also notes in her paper the use of ‘third party authorities’ in response to
the new study. A third party authority is a respected person, such as a leading
member of the community, whose views on a controversial subject are accepted
simply because of their position. ‘Most of the academic and institutional
commentators participating in the attack on Seralini’s work have never conducted
original research into the health effects of GM crops,’ writes Dr. Clark.
‘Nonetheless, the authority of their titles accords the aura of impartial purveyors of
sound, scientific reason.’

It is beyond the scope of this analysis to attempt to determine the veracity of the scientific
claims on either side of the argument, but what is apparent is that the New York Times, in
its coverage of the study, disregarded arguments in defense of the study that link the
methods to those that the industry itself uses, and instead chose to amplify only those
voices that challenged the legitimacy and integrity of the study.

The way that newspapers choose to report some science stories and not others,
and the choices, when reporting these science stories to either present the conclusions in
an entirely unchallenged way, or presenting the conclusions with a collection of
handpicked evidence and quotes contradicting those conclusions, goes a long way in
leading readers to certain conclusions about the “truth” of the matter at hand.
This technique allows newspapers to present some scientific studies as if they are
uncontested truth, picking which of these studies to print and which of these studies not
to print spins a powerful narrative of truth that excludes a lot of uncertainty and scientific
debate around these issues that would disturb the industry message of scientific
consensus. When a newspaper does, then, choose to contest the conclusions in a study, it
sends a strong message to the reader downplaying the findings of the study and ultimately damaging the reputation of scientists conducting the study. This damage, whether based in reality or not, can then be used by powerful interests to discredit subsequent studies by the same scientist, as seen in the case of Seralini.

This treatment of science stories is consistent with Tankard’s conception of framing, as referenced above, as “a central organizing idea for the issue that supplies a context and suggests what the issue is through the use of selection, emphasis, elaboration and exclusion.” These science stories are framed to emphasize a particular point of view, that of the biotechnology industry through the systematic decisions that are made about which stories will be reported and which won’t—an example of framing through selection and exclusion—as well as when and how to elaborate on the details of scientific studies for example and who supports or contests their findings—an example of framing through elaboration and emphasis.

Insight into why reporters make the choices they do in framing of stories like the Seralini study can be found in Herman and Chomsky’s analysis of “Flak and the Enforcers.” Herman and Chomsky explain, “flak refers to negative responses to a media statement or program. It may take the form of letters . . . phone calls, petitions, lawsuits, speeches and bills before Congress and other modes of complaint threat and punitive action.” If the flak is produced by groups with substantial resources, the authors go on to explain, it can be costly or uncomfortable to the mainstream media. If initial reactions by powerful groups such as biotechnology industry organizations and their spokespersons are demonstrably negative, as was the case with the Seralini study, it is not unlikely that the New York Times would heavily qualify their reports on the study with the input from
these voices in order to avoid potential flak produced by coverage of the study. Indeed, the Propaganda Model elaborates, “if certain kinds of fact, position, or program are thought likely to elicit flak, this prospect can be a deterrent.” The *New York Times* might have received flak in researching the article about the study, or have perceived that flak from the biotechnology industry was inevitable, and thus framed the story in the way they did in order to minimize flak towards the publication itself by portraying the research as not necessarily legitimate.

**The Scientific Legitimacy Frame**

The article about the Seralini study in the *New York Times* is an example of the Legitimacy of Science frame. In this context the frame was used to challenge the legitimacy of a scientific study that contradicted industry science. Another use of the frame is to emphasize the superior legitimacy of science overall as a framework for evaluating the value of the technology over other types of arguments, as illustrated in this quote from AgBioWorld coverage:

> The Bt eggplant decision was not science-based, even though there are scientists like Dr. Swaminathan who supported the moratorium. In general, one can say that the objections of these scientists to the deregulation of Bt eggplant were based on ethical positions, not on science.

The biotechnology industry uses the scientific legitimacy frame extensively throughout its literature as illustrated by figure 6. The frame is particularly prominent in the materials from the industry-funded non-profits, representing the most important frame (46% of articles) in the AgBioWorld coverage and second only to the UT/P frame (43%) in the CropGen coverage (35%).
The industry uses the scientific legitimacy frame for a number of different purposes, one of which is to discredit those who speak out against or contradict the industry in any way. Challenging the credibility of scientific studies, as illustrated above, is one part of this tactic, another is to characterize those who disagree with industry messaging as anti-science or as holding these views as a result of their lack of scientific education. Examples of this from AgBioWorld coverage are plentiful: “Luddite objections to technological progress can really threaten mankind's survival particularly when there is no valid reason for objection to the science involved,”326 and with every potential scientific advance, especially one that involves genetic modification - or ‘messing with nature’ as the environmental zealot would have it - there is often a small group of underemployed, stunt-loving and trust-funded activists all too keen to don a naff costume and put a stop to it,327 and occasionally you just have to stop and ask yourself what the public has against scientific progress.”328 CropGen articles mimic this tactic: “Germany, to its shame in view of its earlier scientific reputation and standing as well as to its ultimate disadvantage, wants to bury its head in the sand,329 and One wonders how long this pantomime can go on as the European Union fails once more to develop anything close to a sensible attitude to agricultural biotechnology in the face of entrenched economic and political positions and, it seems, a woeful lack of scientific understanding,”330 and “Responding to the bleating of activists, policymakers have subjected the testing and commercialization of genetically engineered crops to unscientific and draconian regulations, with dire consequences.”331 Examples of this tactic in the literature are far too numerous to provide an exhaustive list here.

The literature published by the anti-biotechnology activist groups, though, does not support this anti-science characterization of their arguments. The dominance of the
Human Health, Economic, Environment and Effectiveness of Technology frames in these groups’ literature, as illustrated by figure 9, indicate a reliance on science to make arguments within these frames. In fact, less scientific frames such as the moral (OCA 2%, GM Watch 6%) and humanitarian (OCA 4%, GM Watch 3%) frames are less frequent in this literature than in biotechnology industry literature with Humanitarian frame occurrence of UK 13% and US 20% and Morality UK 8% and US 9%. The frames themselves are not conclusive evidence of this, but examination of the literature confirms this theory. Examples that support this are numerous, from OCA: “The new industry approaches to controlling weeds in soya, maize and cotton mean that dependence on glyphosate looks set to continue despite mounting scientific evidence about its safety for farmers, people, wildlife, the soil and water supplies,”332 and “Even as increasing scientific evidence concludes that biotechnology and its arsenal of genetically modified crops may be doing more harm than good, companies like Monsanto are still pushing them hard and they are getting help from the U.S.”333

Monsanto strong-armed the EPA into accepting a 20 percent refuge requirement, even after an independent scientific panel convened by the agency had recommended a 50 percent buffer. In a Nature article from the time, available here, scientists involved in the panel express rage at the EPA's cave-in.334

GM Watch articles follow a similarly scientifically driven set of arguments:

The judge also noted in his ruling . . . ‘The defendant [Monsanto] created improper and misleading advertising because they hyped a product, the sale of which was banned in Brazil, and did not clarify that its alleged benefits are much disputed in scientific circles, including serious studies with findings opposite to those advocated by Monsanto,’ he concluded,335

and

Independent studies have shown that basing health assessments on flawed scientific assumptions is not only arrogant, but foolish. Scientific studies dating
from the 1990s have identified Bt toxins as potent immunogens, with Cry1Ac inducing immune responses in mice similar to the cholera toxin,\textsuperscript{336} and

The reason we cannot get a reality-based conversation started on GMOs is because we have precious little independent science on their effectiveness or safety. We know so little about GMOs' safety or efficacy because global ag biotech firms like Monsanto, Dow and DuPont actively suppress science under the heading of protecting ‘confidential business information.’ Companies routinely deny scientists' research requests and suppress publication of research by threatening legal action, a practice one scientist describes as ‘chilling.’\textsuperscript{337}

These examples are also too numerous to fully catalog here, since references to science and litigation are the largest portion of this literature as the framing chart for anti-GM groups shows.

The mainstream press, though, tend to perpetuate the anti-science, uneducated image of anti-GMO campaigners that the biotechnology companies promote. This phenomenon is highlighted by the separate debates going on in the UK and the US over genetically modified food. Figure 10, below, illustrates the different frames in all of the UK and US coverage combined:
Figure 10 illustrates the major differences between the information produced by the US organizations and the UK organizations. One notable difference is the presence of 18 articles (10%) with a consumer choice frame in the US, vs. four in the UK. The human health frame is also more important in the US, at 43 (24%) articles vs. 28 in the UK (11%). In the UK The UT/P frame was the strongest with 67 articles (30%), and legitimacy of science was second at 63 articles (26%) (vs. 22 articles (13%) in the US. The most important current event going on during the study time frame involving GMOs in the US was the GMO labeling debate that was building towards the November 2012
election in which GMO labeling initiative, Proposition 37, was on the California state ballot. The anti-biotech activist groups framed this debate as an issue of consumer choice and human health (explaining the higher incidence of these frames in the US than in the UK), and by the industry as an economic and public opinion issue. The most important GMO related event going on in the UK was the GM wheat trial being conducted by Rothamsted Research. This debate was framed by the biotechnology industry as a public opinion issue as well as UT/P and legitimacy of science (explaining the higher incidence of these frames in the UK than in the US). Beyond subject matter, these two debates are very representative of current attitudes and state of the public debate on GMOs in each respective country. Both debates are marked by the characterization of anti-biotech activists by the biotechnology industry as representing an anti-science faction, as discussed above, thus these debates will also serve to illustrate the adoption of these attitudes by the mainstream media.
The US Labeling Debate

Figure 11, below, shows the number of articles from each source (in orange) that discusses labeling in any way.

![Articles w/labeling topic](chart)

**Figure 11**: shows number of articles with a labeling topic in orange with the grey representing the rest of the articles that do not discuss labeling

This chart illustrates the comparatively higher focus on GMO labeling in the US sources. Some of the UK sources have a slightly higher level of labeling discussion, for CropGen this is a result of three articles about labeling in the US and three about labeling elsewhere (France, Japan, Codex Alimentarius GMO labeling parameters). The GM Watch articles, though, largely take up the US labeling debate while also mentioning labeling elsewhere (South Africa, UK labeling rules on GM in animal feed etc.)
The Organic Consumers Association has more articles, in quantity (35) and by percentage (35%) than any of the other sources. This is because the OCA was a strong supporter of GMO labeling, publishing many petitions, opinion pieces, any mainstream coverage of the issue etc. During this time California Prop. 37 was an issue the OCA was pushing hard. For the OCA the top 3 frames were Consumer Choice (14, 40%), Economic (10, 29%), and Human Health (10, 29%). Consumer Choice was the main frame the group was promoting, while the Economic frame was a frame that the group adopted primarily in order to refute the arguments made by the industry, that the law would make consumers grocery bills rise.

The US biotechnology industry, with less overall focus on labeling, used the economic frame (8, 67%) and the legitimacy of science frame (5, 42%) when discussing the issue, with very little adoption of the consumer choice frame, (1, 8%), and a little more use of the slightly different, public opinion frame (2, 17%).

The Wall Street Journal includes one article on GMO labeling in its food biotechnology coverage. The article is titled “Corporate News: Foes of Genetically Modified Foods Seek Vote on Labeling in California.” This title immediately positions those pushing for GMO labeling as foes of the industry, othering them and giving them a negative connotation. The article goes on to use a neutral tone and a public opinion frame. The article introduces the measure by saying that it would require labeling of products with GM ingredients, says the backers of the initiative say that have double the votes to get it on the ballot, talks about other states who have proposed labeling in the past, none of which passed, discusses the lack of fuss Americans have made thus far about GMOs comparing them to Europeans and others.
who remain “skeptical” and require labels. The FDA is cited as saying they are no less safe than conventional foods. The article then informs readers who the opponents of the measure are, and explains their argument,

Opponents of the initiative say the labels would mislead consumers into thinking there are health risks associated with the products. ‘Food manufacturers who believe their customers want such information can label their products if they choose to do so,’ Monsanto spokeswoman Sara Miller said.

The article ends with another reference to the critics of GE food, telling of their confidence they could win, the favorable venue California provides and the opinion polls that show an overwhelming majority of Americans support labeling. While the reasons not to have labels from the opponents of the measure are mentioned, nowhere in the article does it explain what the supporters’ arguments for labeling are.

The *New York Times* covers the labeling debate in more depth than the *Wall Street Journal*, with five articles mentioning the labeling proposition. The first article begins with a description of farmers in a courtroom who are hoping to get a court ruling that would prevent Monsanto from suing them if GMOs contaminate their crops. This image is followed with similar content to the *Wall Street Journal* article, with explanations of the proposal, information about GMOs, public opinion, other countries’ labeling laws etc. The article includes a similar quote to the *Wall Street Journal* example on health effects: “no known health risks are associated with eating transgenic foods (though many scientists say it is too soon to assess the effects), and the Food and Drug Administration classifies them as safe. But consumer resistance to transgenic food remains high.” This ordering of information makes it sound as if all evidence shows GMOs pose no risks but illogical consumers want labeling anyway for some reason. This implies a lack of
scientific understanding of these consumers. A quote responding to this idea is given, “‘You don't have to be a technophobe or think corporations are evil to not want G.M.O.'s in your food,’ said Ashley Russell, a college student who attended a rally sponsored by Food Democracy Now after the Manhattan court hearing,” but no arguments as to why labeling is desirable for consumers or for those promoting Prop. 37 appear in this article either. Readers are then told, “for the most part, the spread of transgenic seeds into the American food supply has been purposeful, carried out by farmers and scientists who see enormous advantages in hardier plants.” This downplays the instrumental role of the seed and chemical companies in spreading the use of the technology, making it sound as if farmers and scientists, the experts in agriculture, all made the conscious decision to transfer the majority of US staple crops to GMO.

Bill Gates devoted most of his annual letter on agriculture from the Gates Foundation to the need for advanced technology. He later said that most people who object to transgenic agriculture live in rich nations, responsible for climate change that he believes has caused malnutrition for the poor.

This implicit criticism towards activists and those that oppose GMOs is included without question as to the legitimacy of making those groups responsible for the suffering of the underprivileged. The article then addresses the problem of organic crops being contaminated with GMOs and again back to the farmers who are seeking recourse to avoid Monsanto suing them for GMO contamination, although the article assures us that “But the real issue here is not patent law; it's contamination. The point made by the suit is that, according to the regulations that govern American agriculture, it's these unwilling farmers who must prevent Monsanto's products from trespassing onto their land.” While this article goes over a lot of information and topics, it is careful not to criticize
patent law, to explain the benefits of GMOs and to avoid discussing the role
biotechnology industry players had in marketing intimidating and litigating to compel
farmers to adopt the technology. The article also glosses over why consumers might want
GMOs labeled and any problems about the technology other than contamination. Overall
the article gives the impression that this whole drama is because rich spoiled Americans
don’t want GMOs in their organic food, causing huge logistical difficulties for farmers
and starvation in the developing world.

A subsequent article, focusing more closely on the labeling debate begins with the
image of a woman sneaking through the grocery aisle labeling foods with homemade
stickers that say “Warning: May contain GMO’s.” The article explains that Americans
have been eating GMO’s for years and

Regulators and many scientists say these pose no danger. But as Americans ask
more pointed questions about what they are eating, popular suspicions about the
health and environmental effects of biotechnology are fueling a movement to
require that food from genetically modified crops be labeled, if not eliminated.

Again the language here sets up the juxtaposition of the views of scientists and regulators
vs. the flimsy “popular suspicions” of consumers. The article then repeats the usual
background info about GMOs, other states that have proposed labeling etc., discussing
the amount of money likely to be spent on political ads for and against the proposition
and who the supporters and opponents are. The first instance of an argument for the
labeling is provided halfway through the article, “Supporters of labeling argue that
consumers have a right to know when food has been modified with genes from another
species, which they say is fundamentally different from the selective breeding process
used in nearly all crops,” although this doesn’t elaborate on the reasons that supporters
suggest consumers might want to know. “‘It just makes me nervous when you take
genetic matter from something else that wouldn't have been done in nature and put it into
food,’ said Ms. LaPier, 44, a mental health counselor whose guerrilla labeling was
inspired by the group Label It Yourself.” This quote furthers the non-fact based, non-
scientific nature of quotes from those in favor of labeling. This vague nervousness
inspired by GM crops as the driving force behind the opposition is exactly the image the
biotechnology industry perpetrates. This quote is followed by the information that “The
F.D.A. has said that labeling is generally not necessary because the genetic modification
does not materially change the food,” and further,

Farmers, food and biotech companies and scientists say that labels might lead
consumers to reject genetically modified food -- and the technology that created it
-- without understanding its environmental and economic benefits. A national
science advisory organization in 2010 termed those benefits ‘substantial,’ noting
that existing biotech crops have for years let farmers spray fewer or less harmful
chemicals, though the emergence of resistant weeds and insects threatens to blunt
that effect.\textsuperscript{340}

This argument for these “benefits of GMOs” that consumers supposedly are ignorant of,
without any mention of the various publicly acknowledged problems such as weed and
pest resistance that make these functions considerably less effective, combined with a
litany of repetitively vacuous quotes from those promoting labeling creates the
impression, that the industry promotes, of silly activists and ignorant consumers all
emotionally responding to scary new technology without any real reasons for their ideas.

The subsequent labeling article is centered on the amounts of money donated for
and against the labeling laws and the reactions of consumers to those donations.\textsuperscript{341} While
this article doesn’t discuss the financial motives that the biotechnology industry has for
trying to avoid labels, it does point out, with reference to organic brands and why they

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might donate to the labeling campaign, “what is left unsaid is that it may also be a marketing advantage for organic companies, distinguishing them from conventional food producers.” Another quote warns of financial consequences for consumers:

last week, the organization released a study it had commissioned that estimated the initiative would add $1.2 billion in costs for California farmers and food producers. Ms. Fairbanks said that the higher costs could add as much as $350 to $400 to an average family's grocery bill. In addition, she said, the opponents believe the labeling would heighten what they call unfounded concerns about the safety of genetically engineered crops.

These arguments, as well as the usual information about how Americans have been eating GMOs for more than a decade and the reassurance that “regulators and many scientists say they pose no danger,” juxtaposed again against vague arguments about consumers deserving to know, but not elaborating on why they would want to know, again frames the issue as largely based on popular opinion vs. scientific fact, with the possibility of paying more money for something for which the value is unclear.

The next article on the subject is an editorial by Mark Bittman called “G.M.O.’s: Let’s Label ‘Em.” Bittman makes several detailed arguments including that most people want labeling, that it would create more competition and perhaps promote research on GMOs that the industry currently controls, and finally that it is a right to know law:

genetically engineered food is so terrific, persuade us; if it's not, well, fine. . . . I want to know - quite technically, in all the detail available - how my food is produced, and I'm far from alone. We'd be able to make saner choices, and those choices would greatly affect Big Food's ability to freely use genetically manipulated materials, an almost unlimited assortment of drugs and inhumane and environmentally destructive animal-production methods.342

Bittman largely stays within the bounds of arguments that would appeal to most anyone and makes a pretty good case for labeling without really getting into any details about why people object to GMOs. While this is a convincing and measured argument, it likely
appeals more to people that agree with Bittman already and not to those who are unfamiliar with arguments against GMOs that are largely not covered in the mainstream media.

Bittman’s editorial is followed by a letter to the editor, ostensibly responding to his arguments, but instead of addressing Bittman’s idea about the effects of labeling—essentially that they would certainly not ban GMO’s, and that if they are needed to feed the world as proponents argue it wouldn’t stop them. Instead his critic makes all of the common claims about GMOs, omitting any of the possible down sides:

We need genetically modified organisms. They keep insects and weeds from corn and soybeans. New crops can resist droughts, floods and heat coming with climate change and provide vitamins and nutrients. Nothing erodes life and peace more than poverty, and hunger is its expression.343

The lack of details regarding the debatable nature of these claims and the research that contradicts them in Bittman’s editorial, the previous 3 articles about labeling or this letter, leaves these claims unchallenged in this coverage despite the activist focus on the questionable efficacy of the technology in doing what it claims, the observed increase in the use of agrochemicals with the adoption of GM crops by some scientists, the human health effects of the pesticides involved in this kind of farming and the level to which they contaminate drinking water and out bodies, are all left unmentioned. To a reader without any other background knowledge about the issue, it would seem driven by a bunch of paranoid, wealthy, organic eating yuppies who are demanding extra labels at the cost of higher food prices for everyone and the continued suffering of those starving in the developing world.
The labeling arguments made in the Organic Consumers Association also focus on the consumer choice frame, with a much richer context than appears in mainstream media coverage. OCA publishes many different articles about a variety of topics, largely news about negative effects of GMOs internationally, failures in the fields, scientific studies challenging their effectiveness, questioning the veracity of industry claims regarding their economic value to farmers, and refuting the claim that alternatives will not be able to feed the increasing world population. This context is important for understanding why labeling would be desirable. Additionally, the body of OCA articles that mention the labeling measure also have a strong human health frame, which does not appear in mainstream media coverage, as demonstrated above. For instance,

‘Californians have a right to know what's in the food we eat and feed our children,’ says Robyn O'Brien, author and founder of the Allergy Kids Foundation. ‘I support labeling genetically engineered foods because allergy-sensitive people can exercise caution with essential information to make informed decisions about what they eat,’ and

‘Genetic engineering adds completely new elements into our food. Because the FDA has failed to require labeling of GMO food, this initiative closes a critical loophole in food labeling law. It will allow Californians to choose what they buy and eat and will allow health professionals to track any potential adverse health impacts of these foods.’ says Andy Kimbrell, Director of the Center for Food Safety. ‘Genetically engineering food can cause unintended consequences and because there have been no long term studies, we are unsure of how GMOs may affect our health.’

OCA coverage includes logical arguments such as these that frame the scientific uncertainty about health effects and allergies in a way that is reasonable and cautious about potential risks, not based on vague anxiety as the mainstream media and the biotechnology industry imply.
The mainstream media dispenses with any human health issues implied by the labeling controversy with the repeated statements of safety from the FDA and most scientists, not delving any more deeply into these arguments than that. Stripping the argument for labels of all of this context, as the mainstream coverage largely does, and just offering the argument of consumer choice, undermines the logic behind the labeling argument for those readers who do not have at least some knowledge of the issue beyond the explanation given by the labeling articles analyzed above, weakening the labeling argument for a mainstream audience.

The mainstream media in the UK did not pick up on the US labeling debate at all during the time period under analysis. The only mention of the US labeling debate is in a letter to the editor published in the *Times*, contradicting the popular claim found repeatedly in the *Times* coverage that in the US and the rest of the world there is no controversy about GMOs. The letter in question cites US protests in favor of labeling as evidence of growing worldwide concerns about the environmental and health effects of GMOs. The lack of mainstream mention of the US GMO labeling debate in UK news coverage has the effect of downplaying controversy about GMOs elsewhere in the world and largely allows claims that the EU is the only place left in the world where GMOs aren’t embraced to go unchallenged in this coverage.

**The UK Wheat Trial**

While GM Watch published a sizeable number of articles on the US labeling debate, the Organic Consumers Association is more oriented towards the domestic biotechnology debate, and thus there are no mentions of the Rothamsted wheat trial.
controversy in the OCA sample. The *New York Times* mentions it in passing once in one of the GMO labeling articles, in order to illustrate Europeans’ attitudes on GMOs in contrast to those of US Citizens, and *Wall Street Journal* does not mention it once. This controversy is a very national one, in tone, tactics and language, and nearly consumes the UK mainstream coverage of GM food entirely.

The role of GM Watch in the debate is almost solely to respond to coverage of the controversy in the UK media, in contrast to the role of antagonist that OCA played in the labeling debate at the same time. On March 1st, 2012 GM Watch published an announcement of a new campaign “called ‘GM Wheat? No Thanks!’ – to protest the Government’s approval of an open-air field trial of GM wheat at Rothamsted Research in Hertfordshire,” calling on “individuals, farmers and food businesses to pledge not to use or buy GM wheat, and demands that research money to be directed to more sustainable food production methods.” The campaign description makes no mention of the planned protests, which were not orchestrated by GM Watch. Each subsequent article in the GM Watch sample is in response to media coverage of a protest of the wheat trials.

The *Times* first mention of Rothamsted is an October 13 letter to the editor called “GM Science Plea” from a group of scientists at the Rothamsted Research Centre and the John Innes Centre. Both of these groups are mentioned in unrelated articles as having received a grant to study GM crops. The letter goes through the usual arguments about the growing population and the need to feed it, and then goes on to criticize EU GM regulation: “Irrational and unwarranted obstacles that obstruct the deployment of this useful technology retard innovations that will increase yields and reduce the environmental impact of agriculture,” and further to criticize environmental and activist
groups who opposed GMOs: “Irresponsible and perhaps well-meaning pressure groups are preventing delivery of agrichemical-free solutions to crop pests and diseases.”

Shortly after, on October 20th, a letter from Professor Anthony Trewavas is published defending GM crops. The letter is a rebuttal to another reader letter claiming that GMOs promote monocultures from Patrick Holden at the Sustainable Food Trust. The letter ends with another jab at anti-GM activists: “I found it impracticable to get GM opponents who lack any scientific training to understand the importance of acting on established, evidence-based knowledge.”

This letter was followed by a November 1st editorial by Matt Ridley, in which he assures readers that population growth will slow and we will be able to feed the world population, unless the worst happens: “The greens may win the argument for renewable energy and demand vast acreages for their expensive toys - Renewistan, as the inventor Saul Griffith calls it. The Luddites may prevent innovation from raising food yields and drive us back to land-hungry organic farming.” This letter follows the formula of claiming a need for GM crops, warning about dangerous green activists and calls those who oppose GMOs Luddites, in other words anti-science.

These are followed, on November 7 by an article co-written by professor Chris Leaver and professor Vivian Moses, objecting to what they see as a neglect in government and a Times article, to the benefits of agricultural biotechnology: “but the prospects and need for biotechnology in agriculture, in a world with more than one billion starving, perhaps outweigh all the others combined and there the Government is totally silent, as indeed are you in your leading article.” The article generates flak

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against the journalist and the government for not properly championing agricultural biotechnology.

On March 12 a letter is published written by a Martin Livermore from the Scientific Alliance Cambridge. The letter mentions food security in a world of 9 billion, and then gives the inevitable anti-science speech:

political elites are swayed by the green lobby's emotional arguments. Such entrenched attitudes make Europe increasingly out of step with its competitors. We try to stop the clock on the continuing trend towards more efficient farming while farmers in Asia and the Americas avidly take the best technology on offer. We set unachievable targets for renewable energy while China forges ahead with building new power stations to run factories in sectors we can no longer compete in.352

The accusation that anti-GM and environmental activists base their arguments on their emotions appears yet again here.

The next Pro-GM letter is written by Dr. Giles Oldroyd, identified as a plant biologist at the John Innes Centre, and makes a similar argument:

We are seeing a revolution in biology - we have a choice whether we use new technologies to create a more sustainable future in food production, or whether we allow a fear of innovation to dictate a future using out-dated approaches that hurt our environment.353

Finally, a May 23 opinion column by Colin Blakemore, regarding the Rothamsted wheat trials, argues for tightening laws against activism in the name of feeding the growing world population,

GM food science is moving at an astonishing rate. And it needs to because it is, potentially, the engine of the revolution in food production that the world desperately needs if it is to cope with the lethal mix of global warming, the energy crisis, water shortages and exploding population. . . . The Government knows that our future recovery depends on discovery and innovation. It wants more of our children to study and make their careers in science. But unless it makes criminality in the name of anti-science unacceptable, how can it expect young people to devote their lives to a career that can be ruined by those with no mandate other than hatred of science?354
Here we see the same formula: we need GM crops to feed the world, activists are ruining it, and activists are against science. Here the author goes the extra step in suggesting that the government make activism illegal.

These letters appear to be the work of a diverse group of scientists all interested in promoting the public good. They all use the same arguments and agree with one another because that must be the scientific consensus on the issue and it must be the truth. What the bylines on these letters and editorials don’t reveal is that the majority of these letters are written by members of a group called Sense About Science. Anthony Trewavas, Matt Ridley, Chris Leaver, Vivian Moses, and Colin Blakemore are all associated with the group. Chris Leaver is on the board of trustees and the rest serve on its advisory board.\footnote{5556} Martin Livermore, a PR consultant, and Vivian Moses are also part of the Scientific Alliance, a corporate front lobby group started by a PR agency. The two organizations have a history of working closely with one another.\footnote{57} The two letters that were not directly connected through their authors to Sense About Science were the Science Plea from the group of scientists from the John Innes Centre and Rothamsted Research and the letter by Giles Oldroyd of the John Innes Centre, also a signatory on the first letter. Jonathan Jones, the first signatory on the letter shows up all over the sense about science website, doing interviews, serving on panels etc. Jones has also been accused of hiding his business ties to Monsanto and other biotechnology companies.\footnote{58} The John Innes Centre and Rothamsted Research were both recipients of grants to study GM crops during the period under analysis. There is also evidence that Rothamsted
Research is working with Sense About Science on a PR campaign to win public sympathy in the UK for the wheat trial. As GM Watch points out:

the head of Rothamsted's GM wheat team, Prof. John Pickett, appeared in a Newsnight debate, he was flanked by Tracey Brown, the media-savvy head of the lobby group Sense About Science which has been at the heart of the PR campaign. It is Sense About Science who kicked off the high profile 'Don't Destroy Research' campaign with a highly emotional appeal from the Rothamsted researchers on YouTube linked to an online petition calling on the protesters not to damage the trial.359

George Monbiot wrote a column in 2003 about a group, subsequently referred to as the Revolutionary Communist Party (RCP), who moved “from the most distant fringes of the left to the extremities of the pro-corporate libertarian right. While its politics have swung around 180 degrees, its tactics - entering organisations and taking them over - appear unchanged,” Monbiot explains, citing their 1988 launch of a publication called Living Marxism (LM). Monbiot catalogs the group’s activities:

LM described its mission as promoting a ‘confident individualism’ without social constraint. It campaigned against gun control, against banning tobacco advertising and child pornography, and in favour of global warming, human cloning and freedom for corporations. It defended the Tory MP Neil Hamilton and the Bosnian Serb ethnic cleansers.

Monbiot then presents a complicated web of associations linking Living Marxism to Sense About Science:

Let us begin with the Association for Sense About Science (SAS), the lobby group chaired by the Liberal Democrat peer Lord Taverne, and whose board contains such prominent scientists as Professor Sir Brian Heap, Professor Dame Bridget Ogilvie and Sir John Maddox. In October it organised a letter to the Times by 114 scientists, complaining that the government had failed to make the case for genetic engineering. In response, Tony Blair told the Commons that he had not ruled out the commercialisation of GM crops in Britain. The phone number for Sense About Science is shared by the "publishing house" Global Futures. One of its two trustees is Phil Mullan, a former RCP activist and LM contributor who is listed as the registrant of Spiked magazine’s website. The only publication on the Global Futures site is a paper by Frank Furedi, the godfather of the cult. The assistant
director of Sense About Science, Ellen Raphael, is the contact person for Global Futures. The director of SAS, Tracey Brown, has written for both LM and Spiked and has published a book with the Institute of Ideas: all of them RCP spin-offs. Both Brown and Raphael studied under Frank Furedi at the University of Kent, before working for the PR firm Regester Larkin, which defends companies such as the biotech giants Aventis CropScience, Bayer and Pfizer against consumer and environmental campaigners. Brown's address is shared by Adam Burgess, also a contributor to LM. LM's health writer, Dr Michael Fitzpatrick, is a trustee of both Global Futures and Sense About Science.  

This characterization of Sense About Science as an industry funded lobby group run by ideologues with some decidedly non-mainstream ideas about global warming, ethnic cleansing, gun control, child pornography etc. puts an interesting slant of the arguments published in the *Times* as the opinions of an unaffiliated group of concerned scientists. It also creates the impression that the “scientific consensus” the industry claims to have on GMOs is something that a lot of effort has been put into fabricating.

The *Times*, for its part, not only supports the PR efforts of Sense About Science in publishing these pieces, but prints several editorials, presumably reflecting the opinions of the editorial board of the paper, based on their lack of bylines, echoing the views expressed by Sense About Science representatives.

A leading opinion article from the *Times*, April 5, 2012 titled “Grain of Sense; The world is capable of feeding a growing population with the help of science,” argues

Mouths are born hungry. The world's success in feeding itself for 10,000 years is a testament to man's ingenuity. Now new technologies can help by creating more sustainable ways to produce more food. This is hardly the moment to stifle that ingenuity by spurning the promise of GM science. Another lead editorial, titled “Against the Grain; Threats to destroy GM crops amount to vandalism in the service of superstition,” addresses the Rothamsted wheat trials and
paints those opposed to the trial as operating on superstition, the enemy of science. The editorial states, in an authoritative tone,

GM crops are no more hostile to nature than are horticulture or the domestication of animals. The scientists at Rothamsted are conducting a wholly responsible experiment with scrupulous concern for human and environmental benefits. Yet some campaigners against the Rothamsted experiment aim to ‘decontaminate’ the crop of GM wheat. That is a euphemism for destroying it. Fortunately, the police presence thwarted them from accomplishing what in any normal endeavour would be termed vandalism in the service of ignorance. The value of scientific research lies not only in practical benefits but in its ethos. Knowledge depends on inquiry. Scientists should be defended in pursuing it.\textsuperscript{362}

Vilifying protesters, calling them anti-science, ignorant and superstitious, the \textit{Times} editorial board seems to have taken up the PR points of Sense About Science with great gusto.

The \textit{Guardian} is no less enthusiastic about the Rothamsted wheat trials and condemnation of activists protesting against it. On March 9\textsuperscript{th}, 2012, the \textit{Guardian} published an article claiming a “swing on GM foods,” framing the results of a poll, in which the number of those concerned about GM foods decreased by only 5%, in this pro-GM light. The article reports:

The poll comes as European countries prepare to vote on a Danish-led proposal to allow states to ban the cultivation of GM crops on a country-by-country basis, with Britain expected to vote in favour. There is British political support for a new push on GM, with agriculture minister Jim Paice telling farmers in January that GM crops could greatly help food production, and the shadow environment minister, Mary Creagh, calling for more money for GM research.\textsuperscript{363}

A quote by Maurice Maloney, the chief executive of Rothamsted and one by Mark Lynas round out the article.

A retort, written by Bryan Wynne of the ESRC Centre for Economic and Social Aspects of Genomics at Lancaster University, points out the oddity of the spin put on the
article, and of the whole PR effort in which scientists seem to be lining up to make arguments about political and socioeconomic subjects that stretch the limits of their expertise:

The percentage of the public who say they agree that GM food "should be encouraged" actually drops by nearly a half over the last decade, from 46% in 2002 to 27% in 2012. In my book that would be a shift in the opposite direction from that spun by your headline. The CEO of the Rothamsted Research Institute's statement that "the large number of 'neither agree nor disagree' answers suggests scientists have much work to do in public engagement, if the UK public are to benefit to the same extent as the 29 other countries who currently grow GM crops commercially" raises a further question - why is a public scientist making presumptive political statements in favour of GM?364

The Guardian continues to insist that public opinion on the debate has shifted, though. A subsequent article by Leo Hickman, in the Features Pages informs readers,

In stark contrast to the widespread anti-GM mood a decade ago - an age when GM was being described in the popular press as a ‘Frankenfood’ and protesters dressed in bio-hazard suits routinely trampled on and pulled up test crops - it appears that the scientists have been far more successful this time at garnering sympathy and understanding of their work and motives. And there are signs from Europe, too, that attitudes are - albeit glacially - starting to shift.365

The article goes on to discuss the protests to the trial, quoting the protesters extensively, to the author’s credit, and then quoting arguments from Mark Lynas (the “anti-GM protester who saw the light,” discussed above) and other industry spokespersons at length.

Another news article on topic, on May 28, claims,

Much of the early opposition to GM crops was aimed at multinational companies, especially Monsanto, whose heavy-handed approach to public concern stoked resentment and mistrust. . . .The public sector scientists at Rothamsted Research, who are growing an experimental GM wheat crop with no commercial backing, are a different breed.366
This attempt to distinguish the researchers from Monsanto and other seemingly evil corporations is part of the PR campaign for the project, and as GM Watch points out, a deceptive stance:

It is also hard to square the claims of the GM wheat being free of patents and commercial interests with what Prof. Pickett told Farmers Weekly about how companies were 'very interested' and were 'keeping a watching brief' and that 'it could be that we generate very good intellectual property for commercial development in the interests of the UK and European agriculture and business.' During the Newsnight debate, Prof. Pickett claimed the wheat trial had a public mandate because of its approval by the public funding body for the biological sciences, the BBSRC, which has backed the trial to the tune of one million pounds. But the BBSRC has a long history of alignment with industry, with a director of the GM giant Syngenta sitting on their council along with a consultant for Dow Agro Science.

And this industry alignment is perfectly illustrated by Rothamsted itself, which partners up with corporations like Bayer, Syngenta and Dupont. It also has an Institute Director who not only drives a Porsche with a GMO number plate but has a c.v. to match. It is Maurice Moloney’s GM research that lies behind Monsanto’s GM oilseed rape. He is the inventor of more than 300 patents and prior to Rothamsted, he also successfully launched his own GM company in Canada - SemBioSys Genetics Inc., in which Dow Agro Science were investors. This was flagged up by the BBSRC when they appointed Moloney in a press release praising his 'effective translation of research into successful business activity.'

Nonetheless, the Guardian depicts Rothamsted as wholly different and apart from evil corporations like Monsanto. In the same article, the author claims: “The Rothamsted scientists have won public support. In stark contrast to the 1990s, the media overwhelmingly condemned the campaigners' threat of vandalism.” This is a strange argument that equates public support with media treatment of an issue. Perhaps the media is condemning the protesters, but does this mean that the Rothamsted scientists have public support? A subsequent editorial by a different environmental editor of the Guardian follows a similar line of logic:
more interesting than their failure to vandalise the plants is the important turning point in the GM debate that this trial has revealed. Media reporting and comment has been mostly neutral and positive about the experiments, or actively hostile to the protesters - a far cry from the days of ‘Frankenfood’ headlines. What has changed?

This article again contrasts the Rothamsted researchers positively against Monsanto and concludes:

Despite acres of coverage and glorious sunshine, the protest failed to really take off. There were an estimated 200 people at the event. But their seemingly fanatical opposition to the GM trial set against the reason and openness of the scientists has cast the whole GM debate in a new light.\textsuperscript{368}

The same theme is taken up again in the last article about Rothamsted, a leading editorial without a byline. The editorial tells us “It is beginning to feel as if the scientists are winning the GM argument.” The article goes on to praise the PR of Rothamsted, its ability to distance itself from Monsanto and it’s GM plea video that it released on YouTube in advance of the trial. This coverage, although less overtly taking up industry talking points as the \textit{Times} did, still paints a rosy picture of the UK and Europe “finally” “growing up” and coming around to what, supposedly, the rest of the world has been on board with for years. None of this coverage, as mentioned above, acknowledges the fight over GMO labeling going on in the US, international protests against Monsanto, as detailed by GM Watch, the lawsuit against Monsanto for biopiracy in India, or the struggles in the US with the appearance of GM resistant weeds and the associated move of seed companies and farmers towards the use of 2,4-D since Roundup is becoming ineffective. Similar to the labeling debate, the Rothamsted wheat trial debate remains insulated and framed in a very limited manner, minimizing the scope of conversation around these issues. The press latches on to the redemption story of the UK coming
around to GMOs and repeats it over and over again. Both the labeling and Rothamsted debates feature a lot of repetition of the same facts and arguments, making it appear to readers that they have already heard all the relevant information about the story. This creates a mythology around these stories as the same pieces of information and ways of describing situations are recycled so that everyone is speaking the same language. In many cases even if it is a point of view that is repeated enough times, it becomes a shared knowledge and “true” in a social sense through repetition. Similarly, if a frame is repeated enough it becomes an integral part of how an issue is approached in general. Reese discusses the repetition and routinization of frames, which “suggests that a frame has become second-nature, well entrenched and built into the way of doing things.”369 In this way a certain way of approaching an issue becomes the “natural” way of understanding it at the cost of other perspectives.
Chapter 7: Discussion & Conclusions

As Herman and Chomsky theorize, “the mass media are drawn into a symbiotic relationship with powerful sources of information by economic necessity and reciprocity of interest.”\(^{370}\) The biotechnology industry has vast resources at its disposal that it uses to create front groups to pose as independent bodies, stage fake protests in favor of biotechnology and produce flak against the mainstream media when it fails to properly amplify its PR messages. The mainstream press has pressing deadlines, limited monetary resources that have diminished even more dramatically in recent times and a strong motivation to avoid legal entanglements with powerful actors such as the biotechnology industry. All of these factors put the mainstream press into a position of adopting industry frames and viewpoints over those of less “dependable sources” like activists and scientists who speak out against industry science. Herman and Chomsky’s argument that, “partly to maintain the image of objectivity, but also to protect themselves from criticisms of bias and threat of libel suits, they need material that can be portrayed as presumptively accurate,” supports this.\(^{371}\) This creates a bias towards quoting biotechnology industry sources over those with opposing viewpoints and potentially deters journalists from exposing material such as that published by organizations like GM Watch and OCA, that questions the veracity of claims made by the industry.

This is partly a matter of cost: taking information from sources that may be presumed credible reduces investigative expense, whereas material from sources that are not prima facie credible, or that will elicit elite criticism and threats, requires careful checking and costly research.\(^{372}\)
If journalists use biotechnology industry information in reporting biotech related stories, fact-checking is not as important since they will not be sued for libel by those who disagree or know that these claims are false. If news outlets report claims made by groups such as the OCA or GM Watch, a significantly greater level of research and corroboration of these stories is necessary.

Cost is an important factor impacting how journalists source and report news, as Herman and Chomsky acknowledge, and even more so since the *propaganda model* was developed. Since that time media outlets have been losing financial stability, significantly more media consolidation has occurred and news outlets have had to pursue different models in finding ways to make their businesses profitable. This has resulted, among other consequences, in cost cutting measures including having fewer journalists reporting in person.\(^{373}\) International news coverage and correspondents have been cut and there is more pressure, with reporting via the Internet, to report news faster than ever.\(^{374}\) While larger papers, such as those examined here, do not suffer under as extreme financial pressure as some of the smaller ones that have closed and undergone mergers, they have been affected by these trends in notable ways including closure of environment desks\(^{375}\) and acceptance of funding from vested interests.\(^{376}\) Shortening of deadlines and loss of revenue have exacerbated the mass media sourcing issues theorized by Herman and Chomsky in 1988, making many of the authors’ arguments more relevant rather than obsolete with time.

Herman and Chomsky discuss twenty four companies who make up the top tier of media giants in the US in 1988,\(^{377}\) in 2013 there are now six corporations that own 90% of the US media between them.\(^{378}\) Of these corporations Herman and Chomsky write,
“they are closely interlocked, and have important common interests, with other major corporations, banks, and governments.” In light of the level of consolidation and the size of these corporations, then, it makes sense that mainstream media corporations protect the interests of the biotechnology industry, another industry dominated by a handful of massive, powerful corporations.

This analysis has demonstrated that the two papers owned by News Corp. tend to take up the biotechnology industry’s perspective and PR materials much more blatantly, while the adoption of industry frames and biases by the New York Times and, in many cases, the Guardian is more subtle and often balanced by a multiplicity of perspectives. The latter two papers were just as likely to omit important information as the News Corp papers, but their coverage of events tended to be more “balanced,” in the conventional news sense, than that of the Wall Street Journal and the Times. The New York Times and to some extent the Guardian seem to fit theories about how journalistic norms operate to inadvertently skew coverage a certain way, while the Murdoch papers’ intent to promote one perspective over another is more blatant and feels intentional at times. The Guardian demonstrably publishes messaging of the biotechnology industry more blatantly than the New York Times in many instances. Perhaps a contributing factor to this skew is the recent funding provided to the Guardian by the Gates Foundation, one of whose central efforts currently is to push biotechnology in the developing world in a humanitarian context. The foundation is noted, after all, for its unabashed efforts to steer media content in the service of its humanitarian projects. Whatever the explanation may be, the finding, demonstrated here, that the two papers with a reputation for embodying the very epitome of the “liberal media” have a significant bias toward adoption of biotechnology
industry PR, including frames, subject matter and perspective, is a much more surprising finding than the fact that the conservative, pro-business media serve this function to an even greater extent. This finding contributes to a body of research, including that by Herman and Chomsky, that seeks to dispel the myth of the “liberal media,” revealing a more accurate understanding of media as propaganda tools for legitimizing the status quo and representing the interests of elites. This renders the labeling schema of “liberal” vs. “conservative” a characterization of surface content, and largely a distraction from the much more fundamentally important ways that the supposedly liberal and conservative media promote the same underlying ideology.

Agenda building research focuses on the concept of public relations setting the agenda for “the news media because the source in source–reporter interactions is often either a public relations practitioner or a practitioner’s client. That is, news is shaped by the sources on which a newsroom relies.” This research largely supports agenda building theory in demonstrating the mainstream media’s dependence on the frames and language of the biotechnology industry, while marginalizing the frames used by those groups who work to oppose the biotech industry agenda. This research has found that the stories that are not reported are just as important as the stories that are reported in revealing this relationship.

The number of frames implemented by the mainstream media and how they are used is a key factor in illustrating the agenda building function of the biotechnology industry on the mainstream media. Framing scholars have found that mainstream media typically use no more than five frames in reporting on a particular issue, a trend
consistent with the findings of this research. In this sample the media primarily used the Economic, Utility of Technology/Progress, or the Legitimacy of Science frames for most articles. Other frames that are taken up by one or two but not all of the news outlets are Food Security, Environment, and Humanitarian frames. The Economic frame is one used frequently by all the sources examined here (except for, notably the Guardian), an unsurprising finding based on the commonness of economic framing in our daily lives and the manner in which western society is structured around money, as exemplified by our measures of success, for instance salary, or on a larger scale, GDP. Reese notes that “frames must be shared in order to be useful and noteworthy organizing devices,” and considering the extent to which they are shared “helps us determine whether they are personal and idiosyncratic, social and shared, or if broadly and deeply shared, cultural.” The economic frame falls into the latter category. For this reason, as well as its pervasiveness in the literature, in that it is so common and put to so many uses, its use in and of itself does not reveal a lot about a body of articles.

The UT/P frame is one primarily used in promoting biotechnology and is common among industry and mainstream news sources but not among anti-GMO industry groups. Legitimacy of science is also a frame used by both sides in challenging their opponent’s approach, data, and evidence for their arguments, but the frame appears more often in the mainstream media with the industry use of marginalizing those opposed to the biotechnology industry agenda as “anti-science,” rather than in contesting industry funded science or government decisions, as used by anti-GMO groups. The Humanitarian frame is one used more by the biotechnology industry as the reason for urgency in
adopting its products, and food security is largely implemented in the same way. The notably absent frame in mainstream media coverage and in biotechnology industry sources is the Human Health frame. This frame is used extensively by biotechnology opposition groups, but fails to be adopted by the mainstream media, in conjunction with a much wider range of frames generally implemented by these opposition groups that also do not get adopted by the mainstream media. The limited scope of frames within which the issue is discussed by the mainstream media results in the public reading the same frames repeated over and over, having the effect of obscuring the fact that other frames and perspectives exist. This is how readers are trained to think about the issues such as genetically modified food in certain ways deemed acceptable and beneficial by the powerful interests that shape the conversation.

Entman argues,

framing essentially involves selection and salience. To frame is 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 for the item described. Frames, according to Entman, then, define problems, diagnose causes, make moral judgments and suggest remedies.

Through this theoretical lens, biotechnology industry frames define the problem as insufficient progress in commercialization and slow adoption of GM technology, which is keeping the world from realizing its food production potential, and thus perpetuating the starvation and suffering of millions of people. The causes of which are identified as excessive government regulation and irrational public opposition. The moral
judgment is towards anti-science activists who are inhibiting progress while denying choice to consumers and necessary technology to the developing world. There is also a moral judgment of spoiled consumers in the developed world whose decadent desire for organic food leads to the starvation of the developing world. The remedy for this mess is to completely deregulate GMOs since they are no different in health and environment effect from GMOs and conventional food, thus regulation is just creating problems and no benefits. The further implication of the framing of this problem and its solution implies that consumers should have no say in this process since it is an entirely scientific issue, and thus not the right place for democratic debate.

The anti-biotechnology groups’ frames broadly identify the problem as the takeover of the food supply by GMOs. The cause of the problem is consolidation of the industry and companies’ resulting ability to control seed supply in addition to government policy. This is manifested by excessive power that seed and chemical companies have over resources and government decisions while the public lacks power to affect change. These frames present moral judgment on a system in which government decisions serve the interests of corporations rather than in the interest of consumers, which is powered by the translation of money into the ability to win favor with politicians. The root moral problem is the lack of democracy inherent in a system where money wins over public opinion. The solution proposed by this framework is, in one sense, depicted as a cluster of smaller measures—such as US labeling and inhibiting GMO R&D locally—that are seen as progress towards a better level of fairness and choice, but ultimately do little to solve the larger problem presented through the anti-
biotechnology framing. While larger solutions, implied by the nature and gravity of the problem as depicted by these frames, are rarely explicitly stated. Solving the underlying problems that are laid out by anti-GMO frames would involve a radical shift in societal power structures. Voicing these kinds of solutions immediately pigeonholes the spokesperson as a radical, or anti-capitalism, and certainly too fringe to be taken seriously by the mainstream. Thus these arguments are generally left unspoken by the politically active anti-GMO groups seeking to enter the mainstream debate.

Mainstream media tend to adopt the general framework of the biotechnology industry over that of the activists. The industry framework is built within the existing societal framework of capitalism and glorification of business in creating wealth and progress, while the oppositional framework challenges societal norms in a way that is dissonant with mainstream media news reporting norms. These opposing frameworks describe a debate larger than that over biotechnology, and are representative of a larger opposition between social justice groups and corporations. Thus media treatment of this debate has larger implications beyond the fate of the global food supply.

Mainstream media often focus on smaller problems such as community conflict resulting from a disagreement between those who want GMO labeling and those who don’t. The cause of this problem is a group of activists who are agitating for labels and corporations who don’t want those labels. The moral judgment rests with the perceived motives of these groups and the solution will come with the November election as far as mainstream media are concerned. This much narrower focus leaves little room for grander idealistic narratives but the subtext of this frame accepts the status quo of the
legitimacy of money as a vehicle to influence political decisions. The framing shies away from any discussion of the material consequences of the decision, focusing more on the political and economic fight than the meaning such a decision holds for consumers and humanity.

Notably, the coverage of the Rothamsted debate in the UK embraced the larger industry narrative recounted above to a degree beyond that of depicting a narrow conflict of two sides disagreeing. The *Times* coverage fully embraced industry PR over more conventional news framing, and thus acted overtly as a tool of propaganda for the biotechnology industry. Arguably, this deviation from norms in the service of business is an outcome of ideologically driven news ownership, and one that is likely to become more the norm and less the exception if news outlets continue to be acquired and funded by wealthy powerful ideologues such as Bill Gates, Rupert Murdoch and David and Charles Koch.
Chapter 8: Implications and Limitations

Taking the New York Times, the Wall Street Journal, the Times and the Guardian to represent the mainstream media limits the generalizability of this research, since these papers do not fully represent the mainstream coverage of this issue in the US and the UK. While these papers are probably largely representative of the coverage, arguments about what was missing from the coverage might be contradicted by coverage in other mainstream media sources, and thus the findings of this study do not represent the mainstream media of the US and the UK in total.

Additionally this research did not address the role that Internet news and social media has in affecting news consumers’ points of view and their full scope of news consumption. Most news consumers in the US do not rely solely on the New York Times and/or the Wall Street Journal, and the same applies to the Guardian and the Times in the UK. While these papers are still culturally significant, and thus worth examining, future research on the issue should analyze the public’s opinions, perceptions and level of knowledge about genetically modified food in conjunction with what sources they consult for their news on the topic.

Future research should also examine this issue from the point of view of journalists and scientists, interviewing these two populations about their roles in constructing news coverage such as that examined here. Interviewing scientists on their
role (or lack thereof) in this process would shed light on how certain experts get quoted while others are left voiceless. In this way research can model how the “mainstream scientific consensus” is constructed.

This research is significant in adding to a body of literature noting important differences in how the parent company of a news organization affects the quality and bias of coverage of different issues. In this case the News Corp owned papers were found to have much more biotech industry-biased coverage than the *New York Times* or the *Guardian*. Further research should be done to analyze an array of different news sources’ treatment of biotechnology, organized by owners of the six major news corporations, and those outside of that ownership. This would allow researchers to identify patterns of GMO criticism or support as a characteristic of particular publications, as it seems that publications tend to choose a side on the issue and do not portray a "balanced" view of the issue, whichever side they come down in favor of. This would provide insight into the idea of journalistic balance and the implications of news ownership consolidation. It is essential to understand the consequences of media ownership and consolidation as the media market continues to be deregulated and powerful, elite ideologues such as Rupert Murdoch, and now the Koch Brothers, are buying up media outlets with the express purpose of “making their voices heard.”

The manner in which the media cover a particular issue has a significant relationship with public opinion on that issue. Past research has shown that public opinion in the UK has historically been strongly against GMOs and this resulted in mandatory labeling of GMOs. Labeling, in conjunction with strict regulations on which
GM crops are grown in the UK and, more generally in the EU, has largely allowed UK consumers to be able to avoid GMOs if they want to, making the issue far less pressing for the general public than it is in the US. The US has never had mandatory GMO labeling, and as awareness of issues surrounding GMOs and their ubiquitous presence in the US food supply has grown, a consumer movement for labeling and against GMOs has been gaining momentum in the US. These contrasting trajectories have lead to significantly different political climates surrounding the issue in the two countries, as consumers are pushing most strongly against the status quo in the US and the biotechnology industry is pushing most strongly against the status quo in the UK. A significant difference was identifiable between the two countries’ media coverage, but further research would benefit from the inclusion of public opinion research on the topic that specifically addresses individual sources of news (as addressed above) and opinions on biotechnology in the two countries.

This analysis is also important for activists trying to affect the US, UK and international conversations surrounding biotechnology, since understanding the way that information is included and omitted in mainstream media coverage of the issue is an important tool in an effort to have a voice in mainstream news coverage. Another area where more research should be done is in comparing how biotechnology is covered in India, Latin America, Africa and elsewhere in the developing world in contrast to the patterns of media coverage in the US and UK as examined here. This research has indicated that coverage patterns are substantially different between the developing world and those countries with economic and political power and strong economic interests in
biotechnology, such as the US. The Indian media in particular were demonstrably less sympathetic to biotechnology corporations and more likely to cover controversial aspects of the issue. Including international patterns of media coverage in this kind of analysis would allow a much deeper understanding of the linkages of money, corporate power, public relations and the spread of biotechnology around the world.

This research also details the way in which scientific studies are treated differently by activists, industry groups and the mainstream media, emphasizing the increased level of politicization of science that has occurred as part of the growing power of industry to shape mainstream notions of scientific knowledge. The level of control over resources that the biotechnology industry wields allows it unprecedented levels of control over what studies are conducted and how, as well as how these studies are then interpreted and reported to the public. Additionally, when that mechanism of control breaks down, the industry has the power and resources to influence how, if at all, the media reports on scientific studies that contradict industry claims, undermining the legitimacy of scientists who dare to oppose the official narrative. The position of the biotechnology industry is unique in many ways, in that it has proprietary claims over its technology and is able to prevent unfavorable independent research on its products. This allows it more control over scientific claims surrounding its products than, say, the oil industry has over the climate science debate. Nonetheless the evidence presented here of manipulation of scientific knowledge by various interested parties is indicative of a larger trend towards the politicization of science. This is in stark contrast to the way in which science has been treated historically, as evidenced by the original intent behind the
creation of government agencies such as the FDA. The creation of the FDA was an attempt to rationalize American government by basing government decisions on objective fact obtained through scientific analysis rather than on politics. It appears the integration of government with science has had the opposite effect, having made science more political rather than making politics more objective. The politicization of science has far reaching implications for the role that science plays in affecting government decisions and the legitimacy of arguments that pit science against democracy.

Agenda building theory functions on a set of assumptions about journalistic practice that has become outdated since its inception. The agenda building strategies of large, well-financed industries have evolved, while the resources of the media have shrunk significantly. This leaves a news ecosystem that is aptly summed up by the statistic, provided by the Pew Research Center, that the ratio of PR practitioners to journalists is somewhere around 4-1.\textsuperscript{386} An indicator of how this imbalance between the number of reporters and PR professionals is playing out is revealed by this quote, from a 2011 *Gateway Journalism Review* article:

Now, journalists say, the experts find them. When a story breaks, public relations practitioners will conduct interviews with sources within their organizations and email the transcript of the interview to a large list of reporters. ‘What used to take me a half hour, can be done in 10 minutes. Everybody gets the same quotes. It's an instant news release,’ said Richard A. Serrano, a reporter in the Washington Bureau of the *Los Angeles Times*.”\textsuperscript{387}

This level of packaging of experts and news, and the willingness of many journalists to accept this kind of assistance, imply a model of agenda building that is different in many ways and more pronounced than that originally theorized by agenda building scholars. The role of PR professionals in the news creation process is becoming much larger and
much more accepted, even welcomed, than previously theorized. The findings of this research, as well as that of other scholars and casual observers, highlight the need for an updated theory of agenda building that takes into account this changing relationship between the reporter and the PR professional.

While framing was a useful device in characterizing the content of news coverage of GMOs, this analysis shows that there is significant variation in the ways that a frame is used differently in the interest of promoting a certain point of view. The examples, discussed above, in which each side used a particular frame to its own advantage and with its own particular set of rules, challenges the efficacy of simply counting rates of frame usage to reveal the nature of a particular debate. More context than a tally of which outlets use what frame is needed to understand the essential nature of the coverage of a particular issue, especially in the case of extremely common frames such as the Economic frame. This need for another level of analysis beyond framing is the rationale for the combination of frame categorization with the aggregation of information on tone, geographic focus, topic, and orientation toward the subject matter, as well as the implementation of close textual reading, that this research includes. Future framing studies should take this into account and combine different elements of interest with frame analysis in order to create a clearer interpretation of the implication of framing data.
End Notes


20 Ibid.


24 Lieberman, S., & Gray, T., op. cit.: 403.


31 Howard, op. cit., 1269.


33 Ibid,15.


35 Dros, op. cit.:14.

36 Dros, op. cit.: 14.

38 Shiva, op. cit.: 16.

39 Dros, op. cit.: 29.


42 Dros, op. cit.: 36.

43 Dros, op. cit.: 36.

44 Monsanto, “Sustainable Agriculture,” op. cit.


46 Howard, op. cit.: 1270.

47 Howard, op. cit.: 1268.


50 Ibid.

51 Ibid.


55 Richards, op. cit.: 567.

56 Dros, op. cit.: 18.


58 Ibid.

59 Shiva, 2011, op. cit.: 17.

60 Smith, Jeffrey M., Seeds of Deception (Fairfield Iowa: Yes! Books, 2003),148-149.


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70 Ibid, 18-25.

71 Ibid, 23.


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77 Ibid, 34.


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87 Ibid, 70.
88 Ibid, 71.


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101 Ibid, 120.

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113 Ibid.


115 Ibid, 108.


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