Frankenfoods: Conceptualizing the Anti-GMO Argument in the Anthropocene

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Seventy-five percent of processed food consumed in the United States contains one of the eight commercially available genetically modified organisms (GMOs); corn, soybeans, alfalfa, sugar beets, canola, cotton, papaya or squash. GMOs are organisms that have been developed by taking the DNA of a desired trait from a particular organism and inserting it into another.[i] This accepted reality of food production has gradually begun to be challenged as an anti-GMO movement has formed, the conceptualization of which can be understood through the word Frankenfood. This term emerged from a simple letter to the editor in the New York Times on June 6,1992. Paul Lewis, a professor of English from Boston College, wrote a three sentence response to an article that had been published about the newly created Flavr Savr Tomato, one of the first major GMO's to hit the market. He commented:

> Ever since Mary Shelley's baron rolled his improved human out of the lab, scientists have been bringing just such good things to life. If they want to sell us Frankenfood, perhaps it's time to gather the villagers, light some torches and head to the castle.[ii]

Since then, the term Frankenfood has emerged to shape the anti-GMO debate, evoking emotional responses rooted in the ideas of the romantic literature icon Frankenstein. The evolution of this metaphor emerges from the atmosphere of uncertainty that surrounds the GMO debate. The use of this metaphor outside of the scientific sphere reflects people's fear of science and technology overstepping human boundaries as the public works to conceptualize the problem of GMOs. Through the use of the Frankenfoods metaphor, the public is able to provide a framework to conceptualize an issue of the Anthropocene that falls outside the realm of current paradigms.

The Image of Frankenstein

To understand the framing of the anti-GMO movement created through the term Frankenfood, one must understand the romantic image from which the term comes. The image of Frankenstein has its roots in the early 19th century novel by Mary Shelley, *Frankenstein; or the Modern Prometheus*. The idea of Dr. Frankenstein and the monster express the major theme that when people overstep the boundaries of human kind by allowing science to play God, destruction ensues. Dr. Frankenstein's story is a tale of caution about the limit on the power that humans may have, as alluded to with the subtitle "the Modern Prometheus." The subtitle reiterates the main theme through the Greek tragedy of Prometheus in which the power given to humankind through fire was overstepping the roles appropriate for human nature. For Shelley's story, the limit for human nature is surpassed when humans become creators of life. It is science, the new modern invention of electricity to be exact, which brings Dr. Frankenstein's creation to life, asserting the idea that "the creator of life was for the first time recognized as a scientist."[iii] Dr. Frankenstein has overstepped the limits of human power and aligned himself with divine power. This occurrence frames science as the mode through which to create life, a role that is not meant for human kind to play.

The Romantic ideals imbedded in this theme come from the moment of scientific inquiry and revolution during which Mary Shelley wrote. During this time, science was taking on the role that it plays in modern society. The French Revolution was taking place, spurring the ideas of the Enlightenment and value for rational thinking. The Industrial Revolution also began, altering the landscape of Shelley's native London to one of factory smokestacks in the name of progress.[iv] The depiction of the doctor and monster in the book reflects the societal shift "away from alchemy and the past towards science and the future,"[v] symbolizing the change in the popular perception of the natural world as a mystical experience to the modern notion of the rational representation of nature. This shift came with uncertainty of what could come from this innovation that was happening at such a rapid rate. Romanticism itself was an intellectual revolt that encompassed this fear of innovation at the time of scientific discovery and rational thought, evoking emotion and passion as the movement's core values in stark contrast to the logic and reason of the scientific movement. This moment of stark change in the role of science in society that creates an atmosphere of uncertainty

parallels the current atmosphere of uncertainty surrounding the public perception of science.

The Frankenstein image has evolved since Mary Shelley's version of the doctor and the monster through recreations in different media, changing its meaning and connotation to a monster of the horror genre.[vi] The image itself is similar to a meme, having a distinct image attached and cultural perceptions that create a subconscious understanding of the term that cannot be avoided when the image is presented.[vii] The modern meme is largely shaped by the 1931 film version of the story and its many sequels produced by Universal Pictures, the key medium that took the image from an image of literary high culture to an image of pervasive popular culture. The film integrated the image into a mass medium that universalized key traits of the Frankenstein monster and its link to science. It is this version that gave the iconic image of Frankenstein as the monster, not the doctor, with the flattened face and bolted neck and made it synonymous with the horror genre of movies. The image of Frankenstein is integrally tied to the idea of the perfect monster—a freak of science—in a story that is meant to terrify people. The media links the idea of horror and fear to the original connotations of Frankenstein and science that are central to the novel. With this change of media, the image of Frankenstein has been linked to many scientific issues, especially those surrounding bioengineering, in-vitro fertilization and other ethical concerns about the human body.[viii] Frankenstein stands for the argument that there is danger in combining aspects of living creatures, like an individual organism's DNA, because it can threaten human life in overstepping the boundaries of the human species.

The History of GMOs

Aside from understanding the history of the Frankenstein image, it is important to understand the scientific principles of genetics and the history of how they came to be discovered to give context to the GMO debate. The basic molecule within genetic studies is Deoxyribose Nucleic Acid, or DNA. In eukaryotes, DNA gets copied each time a new cell is made through cell division. The DNA in a single cell is copied by unwinding the DNA from the double helix shape into what looks like a ladder. Each rung of the ladder is a base pair, base A pairing with base T and base G pairing with base C. During the copying process, mutations in the DNA structure can occur where base pairs can be paired up incorrectly or even deleted. In some circumstances, this mutation can effect the outcome of what the DNA codes for.[ix] Of all of the DNA material in the body, only about 3% of it codes for traits of an organism, which are called genes.[x] These genes get coded into RNA molecules, which are then translated into proteins. Mutations in the DNA of a gene can cause the protein coded by that gene to function incorrectly, leading to fundamental changes in an organism.[xi] These kinds of genetic mutations have provided the basis for the artificial selection of preferred traits in agricultural production for thousands of years even before the scientific community developed the ability to directly manipulate the genetic material of an organism.

Nina Feldorff gives an example of the manipulation of crop outcomes through the utilization of genetic mutations. She explains the history of domestication of the wheat plant, a process that happened over 10,000 years ago, in her book *Mendel in the Kitchen*.[xii] Feldorff discusses the three major changes that occurred in the wheat plant that allowed for its domestication: a mutation that altered how the seed was attached to the crop, a mutation that altered the timing of when the seed sprouted, and changes in farming practices that altered the size, shape and make-up of the grains.[xiii] Because of these changes, wheat transformed from a wild growing crop to a domesticated agricultural staple.[xiv] As Jared Diamond discussed in his book *Guns, Germs, and Steel*, "human farmers reversed the direction of natural selection by 180 degrees: the formerly successful gene suddenly became lethal and the lethal mutant became successful" as the circumstances around which the production of wheat changed.[xv] This single example is an illustration of the historical basis of genetic modification in agriculture; humans have been altering the genetic makeup of plants for centuries through the process of artificial selection practiced with the domestication of agriculture. However, before the 19th century, humans altered genes by perpetuating the existence of mutations and genetic traits that were most beneficial for human and allowed domestic agriculture to flourish instead of directly manipulating the actual DNA of the organism. At this point in the history of genetic manipulation, humans were not personally inserting new genetic material; they were simply choosing

plants that already had the preferred genes and selectively breeding for those genes.

The shift to using what is seen as modern science to alter crop outcomes started to take form in the 1840's when Justus von Liebig published *Organic Chemistry and Its Application in Agriculture.* In this book, Liebig discussed soil fertility and how the advances in plant science could affect farming, beginning the studies of agricultural science. In the same decade, the first application of this agricultural science was put into practice with the invention of fertilizer, marking the conception of using chemicals to alter the output of crops.[xvi] By the 1860's, scientists were attempting to grow plants in water instead of soil, leading to the claim by 1887 that scientists could "rear plants artificially," a moment that John Tourney, a Harvard biologist, labels as the beginning of plant biotechnology.[xvii] The field of genetics was also born at this time with Mendel recording his pea plant experiments in 1857, and the discovery of this work in 1886.[xviii] Meanwhile, in 1873, Luther Burbank created his own potato by grafting potato plants and using natural selection to alter the outcome of the crop, furthering the basic practices of genetic manipulation. With the Mendel contributions and the Burbank plant breeding work, the field of genetics emerged in 1900, establishing the scientific framework used to humanly manipulate crops so that food production could be done in the most efficient manner.[xix] By the 1930s, scientists were exposing plants to chemicals like colchicine to induce mutations in order to change the phenotypes and to allow hybridization of organisms that would not naturally breed.[xx] These scientific discoveries and early manipulations of genetic phenotypes set the foundation for the creation of GMOs. The discovery of DNA and its structure pushed the foundation set in the early 20th century into the next chapter of genetic manipulation that directly targets specific genes within the DNA.

Genetic material was discovered in 1944 and confirmed as DNA in 1952.[xxi] Building upon the work of Maurice Williams and Rosalind Franklin, Watson and Crick were able to model the structure of this newfound basis of genetics in 1953.[xxii] In 1955 DNA polymerase, the enzyme that synthesizes DNA was discovered, while ligase, the enzyme that glues the ends of the DNA molecule together, was discovered in 1966. The discovery that propelled the ability for the creation of GMOs forward was in 1970 when scientists discovered the restriction endonuclease, the enzyme that cuts DNA at a specific base pair.[xxiii] With this information about the DNA molecule, Lucien Ludoux, a scientist in Mol, Belguim, claimed that foreign DNA could be inserted and replicated in barley plants.[xxiv] This claim was widely refuted by scientists and brushed off as lacking a strong basis as negative evidence was collated against the claim.[xxv] However, in 1976 an agrobacterium tumefaciens naturally transferred a portion of its DNA to recipient plant cells, adding legitimacy back to Ludoux's argument.[xxvi] With this new evidence and the structural understanding of the DNA molecule, the field of genetics expanded its reach by directly manipulating the genetic material through cutting the DNA of one organism and inserting it into another. Instead of just selectively breeding the most beneficial traits as was done previously in agriculture, scientists were directly manipulating the makeup of an individual organism's DNA. By the1990's, Pam Dumshuir at the American DNA Plant Technology Corporation inserted fish genes into a tomato to make the tomato stay harder longer.[xxvii]

It is with this tomato that the Frankenstein image entered the GMO debate as a metaphor to conceptualize the arguments against GMOs. The image of Frankensfoods was created with Paul Lewis's letter to the editor in response to the opinion editorial "Tomatoes May be Dangerous to Your Health" about the Flavr Savr tomato.[xxviii] The Flavr Savr, Pam Dumshuir's tomato, was the first major GMO food to be developed and discussed in the media. The product was engineered by creating an anti-gene to shut down the process of softening in the tomatoes so that they would not be crushed in transit, mitigating the loss in product from shipping the produce across the country. The tomatoes were submitted to the FDA for testing in 1992 and went to the market in 1994, but the product failed in commercial sales due to a production price that was too high to be supported, an ironic thing compared to cheap pricing of GMOs today.[xxix] Most of the public accepted the GMO, but there was a vocal percentage of the community that questioned this genetic modification of the plant. They feared the implications of the new innovation, spurring the argument against GMO crops that became centered on Louis's term. Even with the failure of this first genetically modified crop in 1994, over 50 million hectares of land area across the globe were planted with genetically modified organisms by 2001,[xxx]

marking the use of GMOs as a normal reality of agricultural production.

The creation and implementation of genetic modification of crops can be seen as a breakthrough from a purely scientific point of view. It was a new and empowering discovery to realize that DNA is universal; it has a small amount of difference from organism to organism which allows it to be easily mixed. This universality means that it makes sense to insert DNA from one organism to another. Because this made sense in the scientific world, it created a prime opportunity for seed companies to emerge as dominant business entities, capitalizing on the promise of progress and a better future through technological development. The promises these seed companies offer are especially enticing within the current context of increased population growth in the Anthropocene. Seed companies, scientists, and the public see GMOs as providing a solution for the dominant problem of population growth because they offer an improvement on the solution of monocultures that came about from the Green Revolution. GMOs promise a more efficient system and a greater harvest, which seed companies utilize to propel their work forward.[xxxi]

Seed companies also argue that GMOs are more environmentally friendly because they reduce environmental impact by decreasing the amount of fertilizer that has to be used through the use of "Roundup Ready" or Bt resistant crops. These crops allow farmers to spray pesticides on all of their crops, killing the weeds that surround the harvest but not effecting the actual crops themselves.[xxxii] All these factors that arise from scientific institutions and corporate structures have allowed GMOs to take off as a dominant reality in American agricultural production. However, there is still a public disconnect from this scientific and corporate breakthrough. The public is not greatly informed about the science and fears the uncertainty that surrounds it. The technology is so new, what if there are unforeseen problems? Even with this history of scientific development, there is a divide and uneasiness within some public spheres. This uneasiness is not powerful enough to become dominant over the influence of the corporations and science. Because of this reality, the anti-GMO sentiments have not changed the emergence of GMOs as a prominent part of the food market, but they are dominant enough to create a coalition that has emerged around the issue. This anti-GMO movement needs a conceptual framework in order to mobilize the urgency of their side; this framework is found in the term Frankenfoods.

The Meme Within the GMO Debate

Since the original conception of the term Frankenfoods in 1992 around the Flavr Savr tomato, it has been increasingly used in popular discussion. Google Trends tracks the amount of times the term has been searched on the Internet, showing a steady increase from the start of the data in 2005 until today. This buzzword increasingly appears in the articles in this graph with peaks in each year, but the word Frankenfood shows up almost exclusively in the titles of articles and rarely in the bodies of the articles. If it is within the body, it serves mostly just to incorporate the title into the rest of the article. The appearance of the word in the title and nowhere else reflects the use of the term as a framing device; the term creates an image in the brain of the reader before he or she has begun to read the article. Before the reader sees the substance in the article the image of Frankenstein, the monster of the horror genre that is related to the negative aspects of scientific technology is in one's mind shaping the conceptions of genetically modified organisms and giving the reader a clear way of conceptualizing the topic before delving into it. In the United States, when the term is used to bolster the pro-GMO argument, the term Frankenfood shows up to be pushed off as an erratic emotional response to something that is logically sound. The term encompasses the emotional responses in order to become a clear signal for the issues surrounding human's relationship to food (see FIG. 1.).

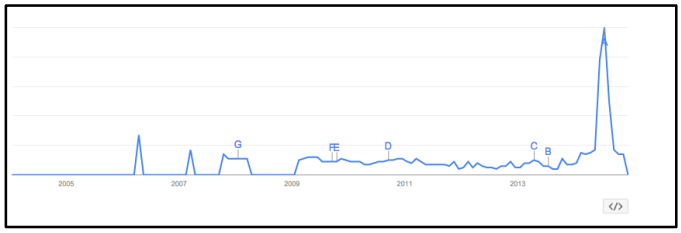

FIG. 1. The beginning spikes from 2006 through 2009 are mostly surrounding discussions in Europe about regulations on GMOs. Other articles at this time in the U.S. use the term Frankenfood to dispel fears around the issue of GMOs by dismissing the argument as an irrational and emotionally charged. Starting in around 2010, there are more discussions about Frankenfoods helping the food supply of underdeveloped countries during the peaks in conversation surrounding the topic. In 2013 the discussion shifts over to the debate on labeling Frankenfoods and concern over the uncertainty that surrounds the topic due to the lack of hard evidence that has been compiled against GMOs. The peaks in 2014 corresponding with debates about labeling in the

United States as individual states start to enter the discussion about whether or not food labels should be regulated to state if they contain GMOs.[1]

In the current human food relationship, it is not normal to give much thought as to where food comes from. The dominant cultural idea around food is that we get our food from the grocery store and do not necessarily know or mind that GMOs are a dominant part of the food supply. Living in urban centers, we no longer have a connection to where our food comes from because we are not farming it ourselves. The scientific community and agricultural seed companies that create GMOs support their implementation and use, and so the dominant public opinion supports them as well. Because of this, people do not necessarily see a reason to worry about where their food comes from or what is in it, whether that be its own genes or genes from other organisms. Though the Frankenfoods term has been increasingly used to fight against this idea, it is still not the dominant thought. Instead, it is the afterthought to the normalized idea that our food is safe and there is no issue with it. The minority that views GMOs as a bad thing employs the word Frankenfoods in order to give weight to something that they see as a large problem that many people just do not take the time to think about. By juxtaposing the issue of GMOs with the idea of a monster, the anti-GMO coalition is working to get the attention of those who never even considered this potential problem. The use of the term Frankenfoods is an attempt at engaging in the process of changing the preconceived notions about food that are built around the public disconnect from food production.

It is also necessary to note that though the term was born in the United States, the discussions in the beginning that use "Frankenfood" were originally most prevalent in Europe and did not infiltrate American media until later. Europe had started the debates about requiring labeling on all products that contain GMOs when the first laws were passed regulating GMO labels in 1997. These laws were expanded with a bill in 2003 to continue regulation that limits GMOs.[xxxiii] Recently, the Frankenfood term has been used in debates about labeling in the United States that have just become prevalent in the last two years. Though not an argument that the majority of the states are choosing to engage, the 2014 election did lead to a spike in the use of the Frankenfood term with discussions in Oregon and Colorado surrounding attempts to pass bills mandating the labeling of foods containing GMOs.[xxxiv] Regardless of their failed outcome, the recent political debate marks the shift toward a push for policy in the United States shaped around the Frankenfood term. The proponents of the bills put this word at the forefront of their arguments to evoke emotional response, as can be seen with the spike in conversations using the term around this past election cycle. There is an increasing outcry against GMOs in the political realm and policy changes (albeit failed) to address this social issue.

The difference in attitudes in relation to the political context of GMOs in Europe and the United States can be explained when looking at the context of perceptions about food. Fear over Mad Cow disease coincided with the time in which the anti-GMO movement started to emerge, becoming the catalyst for the Frankenfood discussion. Mad Cow disease first emerged in Europe in 1986 and the first human casualties were in 1992. However, the disease was not linked to meat products until 1996; this led to a public panic in Europe and many bans on cattle production.[xxxv] The overall public opinion shifted to putting concern over food safety at the forefront. However, this problem did not affect America at this time. Americans saw it as a problem for Europe, not for their own soil because the U.S. produces most of its own beef. The disease didn't appear in the U.S. until 2003 inciting public concern seven years after the European panic.[xxxvi] It is then that Americans had a major media story that created fear over food safety in the United States. This explains some of the lag in time that it took for the term Frankenfood to catch on in America as opposed to Europe. Food safety was not as big of a concern for the U.S. until later therefore giving Europe an earlier start in questioning the potential harmful effects of GMOs. This longer time to grow the movement is one element that shaped the difference in the European perception about Frankenfoods from the American perception.

There also is a stark difference in agricultural economics for Europe and the United States that explains the European adoption of the term far before the United States. The United States supplies most of its own food while Europe imports a larger portion of its food supply. Europe, however, has pushed for regulatory legislation in the twentieth century in order to protect the agricultural practices of agricultural producers within Europe. The EU spends over fifty billion

euros a year subsidizing their farmers in order to increase production within their own territory. They also have established import tariffs to protect the farmers from an influx of goods from other countries.[xxxvii] A large percentage of the food that is imported into Europe is from America; America is the major leader of GMO crop production and the major cash crops of American, soybeans and corn, are almost all genetically modified. By placing bans on GMOs, Europe is in essence decreasing competition for European farmers from other countries' exports by drastically decreasing the amount of food that can be imported from America.

The effects of this economic atmosphere can be seen today with a negative overall perception of GMOs in Europe while Americans are mostly just uncertain about how they feel about GMOs. Europe has created legislation against genetically modified organisms while the United States has normalized GMOs as a major part of both the agricultural economy and the corporate economy with the "big four" companies in the United States seed industry, Monsanto Company, DuPont Pioneer, Dow AgroSciences, and Syngenta.[xxxviii] These companies run an oligopoly on the seeds, with the Monsanto Company controlling the majority of the seed industry. Monsanto has been able to patent the technology they have created, leading to an increase in revenue from seed production. They receive royalties on all new technologies other seed companies create that use any Monsanto patents,[xxxix] allowing Monsanto to go from a company worth $6 billion in 2000 to a company worth $66 billion in 2014.[xl] On top of the revenue from patents, Monsanto has been able to increase revenue by vertically integrating their company through the production and sales of the Round Up that is applied to the genetically modified Round Up Ready Seeds that they also produce and sell.[xli] Through these means, Monsanto and the other dominant seed companies have become successful by capitalizing on positive ideas associated with science, technology and progress.

Even with the success of Monsanto and other seed companies, there are still many people who view them in a negative light. Monsanto was rated as the third lowest company on the Harris Poll reputation quotient of major companies in 2014 and is seen as a corporate bully that picks on innocent farmers through patent laws.[xlii] But even with this negative reputation, Monsanto and other seed companies have integrated themselves as a normalized force in American food production because of the success they were able to have in the free market system. People may still be uncertain or uneducated about the topic of GMOs, but they believe that GMOs are suitable on some level because they are such a dominant part of food culture in the US. They are the cheapest and most readily available food options at the grocery store because of these companies. These corporate entities control food interactions on a global scale. Because of this global scale, nations lose the ability to regulate the power of corporations or do not want to all together because it gives the countries a hand in global economic success. Europe worked to put up regulations on the GMOs that were entering the country to protect their own economic interests surrounding agriculture and to mitigate their loss of control in the global scale system. On the other hand, the United States normalized the seed companies' economic success in order to gain control within the globalized food economy. These differing attitudes of countries in reaction to the global distribution of agriculture are a major driving force behind the uncertainty that arises within the public around the GMO debate.

With the current globalized state, consumers do not know where the commodities they purchase come from, exacerbating the disconnect consumers have from the production of food and the reliance they put on government regulation of food products. Consumer studies have been done asking people about GMOs and Frankenfood, dividing people into different categories of knowledge and emotional perception of GMOs. In a particular study of a group of 858 people published by the *Journal of Health Communications,* the biggest group of respondents, 357 people, reported to be neutral in the amount of knowledge they had about GMOs and the emotional response they had toward them. The predominant response is that most people do not know much about genetically modified foods; they were still waiting to form their opinions about them because of the uncertainty that surrounds the topic.[xliii] Other respondents in this study believed that GMOs are bad because of the nature of the word but eat them on a regular basis. Some of the respondents did not even realize they were eating GMOs on a regular basis, a reality that the majority of the public embodies as many people have little knowledge about what GMOs actually entail.[xliv] Because of this uncertainty about food that arises from the disconnection from the production and

source of food, there is a reliance on the government and institutions like science and corporations to protect the public on issues surrounding this topic. However, the trust in these institutions is convoluted due to the transgression of paradigms and so the atmosphere of uncertainty arises as people question how they are supposed to feel and what they are to believe.

This public debate is not only taking place in political and scientific circles, but also in the larger popular culture. Jimmy Kimmel played with this idea of a lack of understanding of GMOs in his popular late night show. The camera crew went to a local farmers' market and asked people if they ate GMOs, to which almost all of them quickly responded with a prominent no. He then asked them what the letters "GMO" stand for and the majority of the participants could not answer correctly. They gave answers like "General modified ingredient," "some corn bad stuff," and many just replied with a short, "I don't know." [xlv] Though used as a comedy stunt, this video is an illustration of the feelings of uncertainty that exist in popular culture surrounding GMOs and science in general. Many people fervently believe that they should be against GMOs because of their perception of the concept but do not have a solid scientific reason why they believe this or even a general understanding of what GMOs are. This state of confusion is perpetuated by the lack of hard scientific evidence backing up the harm or safety of GMOs. However, many people believe that not enough time has passed to test the long-term repercussions of GMOs. Consequently, the scientific community is not a resource for the public to uncover the truth behind GMOs, if there even is one to be uncovered. This atmosphere of uncertainty is the prime place for a term such as Frankenstein to enter in order to conceptualize the problem.

Frankenfood Visual Representations

The Frankenfood term itself has few accompanying visuals. Most associated depictions are just visual conceptions in the minds of individual readers or those engaged in the conversation; these visuals have an idea tied to them while not actually having a physical image themselves. However, there is one major representation of the image of Frankenfoods that Greenpeace created in 1999. It was utilized on posters and protests that were directly targeting Kellogg's in their production of cereal with GMOs.[xlvi] The image is modeled off of the Frosted Flakes cereal box with the label "Frosted Fakes." Tony the Tiger is depicted with a Frankenstein face with the recognizable flat forehead, green flesh, and bolts on each side of his face. Corn is put in quotes, questioning the validity of food containing GMOs as real food. There is a beaker in "Frankentony's" hand, explicitly representing science and tying it to the horror genre. The cereal is shown on the box as dark green flakes, a very unnatural looking cereal compared to the normal Frosted Flakes. The box also says "Untested! Unlabeled!" suggesting that there have been no measures taken to insure the consumer that everything within the box is safe (see FIG. 2.)

FIG. 2. Poster created Greenpeace to attack Kellogg's use of foods containing GMOs.

The image uses the Frankenstein meme while also playing up public fear of uncertainty. Kellogg's is a trusted brand from childhood; the box itself and its advertising is meant for children. By using the Frankenfood representation in relation to products that are sold to children, Greenpeace

works to solidify the legitimacy in the fearful response over GMOs. They put Frankenfoods in a conceptual framework that shows the unknowing consumer making bad choices due to their being fooled by science and those they are supposed to trust. The consumers are so detached from food production that they must depend on producers and trustworthy brands, like Kellogg's. If the public cannot trust such a staple brand, then who is the public to trust? Who has the "right" information and how come they are not sharing it? The corporations that stand for the public good are brought into question if they are really considering what's best for the public. Therefore, the fear of not knowing what is going into the foods is exacerbated and adds to the strength of how the image resonates with fear and mistrust through the use of the Frankenstein representation.

Besides this depiction by Greenpeace, the word itself is utilized most often to create images in the mind. This is demonstrated in the marketing analysis put together in the *Journal of Food Products Marketing*. In the case study of thirty-two people of middle class background from the west coast of the United States, participants were asked to create their own food by mixing anything they wanted. The participants made emotional choices of what they thought was "cool" or "interesting" combinations of their favorite foods like a mango and an apple or creating pink strawberries. They were not told to create Frankenfoods, but rather to mix and match whatever they wanted after being asked about GMOs. Within the study, the examiners remark how the "functional" attributes of these imagined foods did not hold much value with the interviewees; "Making vegetables last longer in the refrigerator is claimed to be a desirable attribute but at the same time scary and abnormal." [xlvii] These emotionally produced creations give insight to how people conceptualize a picture of GMOs and Frankenfoods. They are afraid of them when it comes to scientific terms like gene splicing or functional attributes for the food industry, but when it comes to combing their favorite foods it is cool and fun. This shows the emotional backing to the conceptualization of the Frankenfoods image surrounding GMOs that adds to the air of uncertainty and confusion.

The same concept is illustrated by the Spike TV show *Frankenfoods*. This TV show is a competition setting where chefs from all over the country are brought in to create unique food dishes with unorthodox mixes of ingredients. The best tasting and most outlandish foods are judged as the winners by a panel of four judges. These winners are given 10,000 dollars for making it through the rounds.[xlviii] Again, Frankenfoods are not scary but rather cool or interesting, but are still thought of as weird or unfamiliar because of the title. Yet the connotation of this word through this colloquial use has nothing to do with GMO's as they never refer to GMOs in this show. Here the conceptualization of the image of Frankenfoods is done in a different context, further convoluting the actual use of the word, but still illustrating the emotional response of unfamiliarity and strangeness that the term envelops. Whether presented as an image for Greenpeace, in marketing and behavioral studies, or in popular TV show culture, the term Frankenfoods incites an emotional response that is utilized in order to conceptualize the problems surrounding the GMO debate.

What Does This Say?

Within the context of the scientific debate, the meme of Frankenfoods serves as a metaphor to discuss the issues of genetically modified foods. Max Black coined the interaction theory of metaphors as tools that "join together and bring into cognitive and emotional relation with each other two different things or systems of things that are not naturally joined," a definition that is easily applied to the role of metaphor in science.[xlix] Brendon Larson further explains the role of metaphor in science as a framework to "help us interpret the novel and the unknown by invoking our shared cultural context."[l] In the case of Frankenfoods, the use of the term brings together genetically modified organisms with a narrative from the Romantic Movement and conceptions of the modern horror genre. This metaphor allows people to think of "abstractions in terms of something more concrete and every day." These abstract ideas are those of GMOs that come from the institution of the scientific community.[li] The concrete and everyday things are the monster image; it already has a public conception and understanding so the juxtaposition of it with the unfamiliar science concept of GMOs gives a context of what GMOs must be about. In essence, this term allows for the public to take an issue from inside institutional science and outside of the dominant cultural framework and place it into a cultural system with already shared understandings and connections. Metaphor frequently plays this

role in science to conceptualize a wide range of issues just like GMOs.

The scientific community originally denied the importance of metaphor within the communication of science because it was associated with literature, emotion, and pseudoscience during the scientific revolution of the 17th century. However, it is now being increasingly acknowledged as a main way to circulate scientific information.[lii] Scientists impose metaphor upon their given subjects with examples ranging from words like food web to global warming. Scientists then promote the metaphor through research and the eventual integration into public conversation through textbooks, news releases, and the integration of these metaphors as normal words in the daily vocabulary used to discuss science.[liii] However, the metaphor within this particular example of Frankenfoods was not integrated in the GMO debate by the scientific community but was rather put there by the public. The metaphor serves the same purpose as when metaphor is applied by the scientific community, but reflects different implications about the way scientific issues are viewed in the Anthropocene because it is a term coming from the public sphere. The Frankenfood term reflects a moment where the conversation of the scientific community spills over into the public, reflecting three major issues that society deals with when understanding environmental issues of the Anthropocene; the public fear of science overstepping human boundaries, the fear of uncertainty in science due to the public perception of what role science is supposed to play, and the inability for current societal systems to conceptualize slow violence issues or issues that manifest themselves on longer time and space scales. Each of these issues is integrally tied to the others as they are all problems stemming from the inability to navigate between the scientific and public realms of discussion.

The first reality manifested in this application of the Frankenfoods metaphor is the fear of science overstepping human boundaries by playing a higher power. While the most obvious way that the metaphor is integrated in the anti-GMO movement is the framing of GMOs within the horror story image of a monster, it more deeply reflects the theme of the fear of overstepping boundaries of what humans are capable of doing. Though this is a less conscious connotation with the Frankenstein image, it is the essence of this Romantic symbol. Science is arguably one of institutionalized allowances of the pushing of boundaries of current society for the pure sake of accumulating more knowledge. Society rejoices when science unfolds a new cure for a disease, new innovations that make our current lifestyle possible like fossil fuels, or new technology like computers that rid us of the confinements of time and space, yet there is also a small fear that still lingers due to the position of science standing on the precipice of the unknown. In being on this precipice, science has the power to prolong life and make lifestyles better, but it also has immense power to control elements on a scale larger than what some people believe to be morally acceptable, such as the creation of the atomic bomb. Do GMOs fall into this category? Are they overstepping the boundaries of human manipulation of food sources that could lead to implications beyond what is imagined? The use of the term Frankenfoods reflects the prevalence of these fears and questions within a large population that needs a way to communicate this struggle with science and power. With the public imposing this term, they are illustrating that there is still a dominant fear of science in public opinion that controls the way scientific advancement is viewed.

The second major reality that the use of Frankenfoods reflects is the fear that stems from the public perception of uncertainty in science. Uncertainty within the scientific vocabulary is necessary; there will never be one hundred percent certainty because science is recreating what it has accepted as truth in order to move forward. Yet when the public sees uncertainty in science, it is viewed negatively because science plays the role as the ultimate unbiased truth, an ideology established in current culture from Enlightenment thinking.[liv] If science, the beacon of truth, is not even sure of the answer then how is the public to be sure? Because modern society exists within a moment where information is abundant due to the Internet, anyone can pick and choose sources that validate their own view. Because of this, both the public and the scientific community act with confirmation bias, looking to the scientific studies that confirm their already formulated views.[lv] In this example of GMOs, one can find scientific writings for both sides of the argument to use to deflect the other side. People predisposed to be against GMOs can point out that some pro-GMO scientific findings are funded by people with interests in the economics of GMOs or that these studies are invalid because not

enough time has passed to truly be able to see the implications. On the opposite side, those that are pro-GMO can dismiss the anti-GMO movement as an emotionally charged minority voice that does not have the scientific evidence to back up these claims. The public perception of uncertainty leaves room for this confirmation bias because the public does not feel as if they have a single truth to believe. The public fears this idea, fueling the need for the use of metaphor within the GMO debate to communicate this concern.

The third reality that is manifested in the use of the term Frankenfoods is the public's inability to deal with issues of slow violence. Rob Nixon discusses this transcendence of paradigm structures when he coins the term "slow violence." He claims that current hegemonic society is propelled by instant gratification and looks for immediate cause and effect relationships for which a solution can be found. In contrast to these hegemonic ideas, areas of slow violence are problems that manifest their ultimate implications on a larger time scale. Because the timeline of the manifestation is so far out of the current paradigms, mainstream society struggles to conceptualize these issues.[lvi] Nixon describes environmental problems in this sense and concludes that it is difficult for modern society to see the immediacy in these issues due to the overstepping of current frameworks.[lvii] Therefore a familiar way of thinking within the current paradigm, a metaphor, must be used to facilitate the sense of urgency and understanding of slow violence issues. If the term Frankenfoods was not used, the public perception of this issue of GMOs, the way it is conceived, and the way it is talked about, if it would be talked about at all, would be in a completely different context due to the lack of this framing structure. But because environmental issues within the context of the Anthropocene fall into this category of slow violence issues, the metaphor must be used in order to conceptualize the problems that the modern moment is facing.

In keeping these three manifestations in mind, should the public actually be worried about GMOs or is this panic just another misunderstanding of science? While a valid question, this is a question that the term Frankenfood does not answer. The metaphor merely illustrates how the public handles issues that go beyond the established languages and systems that have been set up to frame the most pressing problems of the planet. The issues of the Anthropocene, particularly of GMOs, envelope such a wide range of specialized topics like science, public policy, economics, the strength of corporate entities, and public perception in a global society where these issues are all integrally linked. In this case, the public conceptualizes this idea by using an image that is already known and understood which subconsciously communicates beliefs, emotions, and systems. This conceptualization gives depth and validity to an argument that without such a framework would not be so easily understood. The topic is still complicated and nuanced and so the framework of the Frankenfoods metaphor does not necessarily make it easier to decide on a stance on the issue. However, it does make the topic of GMO crops easier to introduce and to engage more people in the conversation because the general public can relate to the topic through this charged metaphor.

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[i] K. Silk, J. Weiner, & R. Parrott, "Gene Cuisine or Frankenfood? The Theory of Reasoned Action as an Audience Segmentation Strategy for Messages About Genetically Modified Foods." *Journal of Health Communication,* 10 (2005): 751

[ii] Paul Lewis, "Mutant Foods Create Risks We Can't Yet Guess; Since Mary Shelley," The New York Times, June 16, 1992.

[iii] Jon Turney, *Frankenstein's Footsteps: Science, Genetics, and Popular Culture* (New Haven: Yale University Press, 1998),16.

[iv] Ibid., 39.

[v] Ibid., 20.

[vi] The image was integrated in film for the first time in 1910 and has been remade countless times since with one estimate at 400 different films in 1992. Ibid., 28.

[vii] Turney, *Frankenstein's Footsteps*, 30-34.

[viii] Susan Blackmore, "Immitation and the Definition of a Meme." *Journal of Memetics-Evolutionary Models of Information Transmission*, 2.2 (1998) 1-13.

[ix] Nina Fedoroff and Nancy Marie Brown, *Mendel in the Kitchen: A Scientists View of Genetically Modified Foods.* (Washington D.C.: Joseph Henry Press, 2004), 36.

[x] Colin J Sanderson, *Understanding Genes and GMOs* (Hackensack, New Jersey: World Scientific Publishing Co., Pte. Ltd, 2007), 79.

[xi] Ibid., 87.

[xii] Fedoroff and Burns, *Mendel in the Kitchen*, 26

[xiii] Ibid., 26-28.

[xiv] Ibid., 26

[xv] qt. Ibid, 27

[xvi] Ibid, 49

[xvii] Ibid., 10

[xviii] Nigel G. Halford, *Genetically Modified Crops* (London: Imperial College Press, 2003), 3

[xix] Fedoroff and Burns, *Mendel in the Kitchen*, 51

[xx] Ibid., 16

[xxi] Paul F. Lurquin, *The Green Phoenix,* 1

[xxii] Nigel G. Halford, *Genetically Modified Crops,* 3

[xxiii] Ibid., 17

[xxiv] Paul F. Lurquin, *The Green Phoenix*, 6

[xxv] Ibid., 14

[xxvi] Ibid,, 17

[xxvii] Fedoroff and Burns, *Mendel in the Kitchen*, 91

[xxviii] Paul Lewis, "Mutant Foods"
[xxix] G. Bruening and J.M. Lyons, "The Case of the FLAVR SAVR Tomato." *CaliforniaAgriculture* 54 (2000):6-7.
[xxx] Nigel G. Halford, *Genetically Modified Crops*, 61
[xxxi] Drake Bennett, "What Are They Doing at Monsanto?" *Bloomberg Businessweek*. July 7, 2014. Accessed March 7, 2015.
[xxxii] Ken Stier, "How Frankenfood Prevailed," *Time Magazine*, June 28, 2010, Accessed March 7, 2015.
[xxxiii]Matha Abell Shrader. "Timeline of Genetics Milestones 1990-2008." *MLO: Medical Laboratory Observer*. 40.3 (2008): 19-45.
[xxxiv]While there are twenty-eight states that have talked about bills over labeling, Vermont is the only state that has mandatory labeling that will go into effect in 2016. Tennille Tracy. "States Weigh GMO Labeling." *The Wall Street Journal.* November 3, 2014.
[xxxv] O'Neill, Kate. "How Two Cows Made a Crisis: U.S.-Canada Trade Relations and Mad Cow Disease" The American Review of Canadian Studies (Summer 2005): 295-319 Accessed November 18, 2014.
[xxxvi] Ibid.
[xxxvii] Johan F.M Swinnen, "The Growth of Agricultural Protection in Europe in the 19th and 20th Centuries." *The World Economy* (2009): 1499 Accessed December 4, 2014. doi:10.1111/j.1467-9701.2009.01247.x,
[xxxviii] Sara Schaffer, "Inside the Seed Industry," *AG Web, Powered by Farm Journal,* July 25, 2013, Accessed March 8, 2015.
[xxxix] Ken Stier, "How Frankenfood Prevailed."
[xl] Drake Bennett, "What Are They Doing at Monsanto?" *Bloomberg Businessweek*. July 7, 2014. Accessed March 7, 2015.
[xli] Donald L. Barlett and James B. Steele, "Monsanto's Harvest of Fear." *Vanity Fair,* May 2008, Accessed March 7, 2015.
[xlii] Drake Bennett, "What Are They Doing at Monsanto?"
[xliii] K. Silk, J. Weiner, & R. Parrott, "Gene Cuisine or Frankenfood?" *Journal of Health Communication,* 10 (2005): 762
[xliv]Ibid.,
[xlv] ABC. "What's a GMO? Jimmy Kimmel Live Videos." Accessed October 20, 2014. http://abc.go.com/shows/jimmy-kimmel-live/video/vdka0_atb4aowq
[xlvi] Golden, Fredric, "Who's Afraid of Frankenfood?" *Time Magazine*, November 21, 1999.
[xlvii] Maria Kniazeva "Marketing Frankenfood," *Journal of Food Products Marketing*, 11 (2006): 33, accessed October 23, 2014. doi: 10.1300/J038v11n04_03
[xlviii] Justin Rocket Silverman and Gina Pace. "New Show 'Frankenfood' on Spike TV Will Celebrate Strange Food Combinations." New York Daily News (New York, NY), June 22, 2014.
[xlix] Qtd. Nacy Leys Stepan, "Race and Gender: The Role of Analogy in Science." *Isis* 77 (1986): 267, accessed February 20, 2015.
[l] Brendon Larson. *Metaphors for Environmental Sustainability*. (New Haven, Connecticut: Yale University Press, 2011), 6.
[li] Ibid., 6.
[lii] Nacy Leys Stepan, "Race and Gender," 261-62.
[liii] Brendon Larson, *Metaphors*, 131
[liv] Joel Archenbach. "Why Do Many Reasonable People Doubt Science?" *National Geographic*, March 2015, Accessed February 10, 2015.
[lv] Ibid, np
[lvi] Rob Nixon. "Introduction." In *Slow Violence and the Environmentalism of the Poor*, (Cambridge, Massachusetts: Harvard University Press, 2011), 6-10.
[lvii] Ibid., 8-9

Bibliography

ABC. "What's a GMO? Jimmy Kimmel Live Videos." Accessed October 20, 2014. http://abc.go.com/shows/jimmy-kimmel-live/video/vdka0_atb4aowq

Anderson, Jennifer. "Oregon Now Epicenter of National GMO Debate." *Portland Tribune*. June 12, 2014. Accessed October 26, 2014. http://portlandtribune.com/sl/223999-82975-oregon-now-epicenter-of-national-gmo-debateCameron,

Archenbach, Joel. "Why Do Many Reasonable People Doubt Science?" *National Geographic*. March 2015. Accessed February 10, 2015.

Barlett, Donald L. and James B. Steele, "Monsanto's Harvest of Fear." *Vanity Fair.* May 2008. Accessed March 7, 2015.

Bennett, Drake. "What Are They Doing at Monsanto?" *Bloomberg Businessweek*. July 7, 2014. Accessed March 7, 2015.

Blackmore, Susan. "Imitation and the Definition of a Meme." *Journal of Memetics Evolutionary Models of Information Transmission*, 2.2 (1998) 1-13.

Bruening, G. and J.M. Lyons, "The Case of the FLAVR SAVR Tomato." *California Agriculture* 54 (2000):6-7. Accessed December 4, 2014. DOI: 10.3733/ca.v054n04p6

Fedoroff, Nina and Nancy Marie Brown. *Mendel in the Kitchen: A Scientists View of Genetically Modified Foods.* Washington D.C.: Joseph Henry Press, 2004.

François, Anne-Lise. "'O Happy Living Things': Frankenfoods and the Bounds of Wordsworthian Natural Piety." *Diacritics*, 33.2 (2003): 42-70, Accessed October 17, 2014.

The Global Mail. Food Fights: How GMO Got Up in Your Grill. Accessed October 26, 2014. http://gmo-food.theglobalmail.org/

Golden, Fredric, "Who's Afraid of Frankenfood?" *Time Magazine*, November 21, 1999.

Google. "Google Trends: Frankenfood." Accessed November 11, 2014. http://www.google.com/trends/explore#q=frankenfood

Halford, Nigel G. *Genetically Modified Crops.* London: Imperial College Press, 2003.

Hazel M. G., "Trends in Agriculture and Agribusiness: Knowledge Is Power." *Journal of Business & Financial Librarianship*. 12.1 (2006): 3-32.

Heffernan, James A.W. "Looking at the Monster: *Frankenstein* and Film." *Critical Inquiry,* 24 (1992): 133-158, Accessed October 28, 2014.

Heilig, Steve. "Genetically-Modified Food: Frantastic or 'Frankenfood'?" *The Huffington Post,* August 8, 2013. Accessed October 28, 2014.

Herring, Ronald J. "Opposition to Transgenic Technologies: Ideology, Interests, and Collective Action Frames." *Nature* 9 (2008): 485-463. Accessed October 16, 2014.

Klaassen, Johann A. "Contemporary Biotechnology and the New "Green Revolution:" Feeding the World with "Frankenfoods?" *Social Philosophy Today* 22 (2007): 103-113. Accessed October 28, 2014.

Kniazeva, Maria "Marketing Frankenfood," *Journal of Food Products Marketing,* 11 (2006): 21-39, accessed October 23, 2014. doi: 10.1300/J038v11n04_03

Larson, Brendon. *Metaphors for Environmental Sustainability*. New Haven, Connecticut: Yale University Press, 2011.

Lewis, Paul. "Mutant Foods Create Risks We Can't Yet Guess; Since Mary Shelley," The New York Times, June 16, 1992. Accessed October 29, 2014.

March Against Monsanto. Accessed October 26, 2014. http://www.march-against monsanto.com/

Miller, Henry I. and Gegory Conko, *The Frankenfood Myth.* Westport, Connecticut: Praeger Publishers, 2004.

Nixon, Rob. "Introduction." In *Slow Violence and the Environmentalism of the Poor,* 1-44. Cambridge, Massachusetts: Harvard University Press, 2011.

O'Neill, Kate. "How Two Cows Made a Crisis: U.S.-Canada Trade Relations and Mad Cow Disease" The American Review of Canadian Studies (Summer 2005): 295-319 Accessed November 18, 2014.

Roff, Robin Jane. "No Alternative? The Politics and History of Non-GMO Certification" *Agriculture Human Values* 26 (2009): 351-363 Accessed October 24, 2014. doi: 10.1007/s10460-008-9166-5

Sanderson, Colin J. *Understanding Genes and GMOs.* Hackensack, New Jersey: World Scientific Publishing Co., Pte. Ltd, 2007.

Schaffer, Sara, "Inside the Seed Industry," *AG Web, Powered by Farm Journal,* July 25, 2013, Accessed March 8, 2015.

Silk, K., J. Weiner, & R. Parrott, "Gene Cuisine or Frankenfood? The Theory of Reasoned Action as an Audience Segmentation Strategy for Messages About Genetically Modified Foods." *Journal of Health Communication,* 10 (2005): 751-767, Accessed October 19, 2014. doi: 10.1080/10810730500326740

Silverman, Justin Rocket and Gina Pace. "New Show 'Frankenfood' on Spike TV Will Celebrate Strange Food Combinations." New York Daily News (New York, NY), June 22, 2014.

Shrader, Matha Abell. "Timeline of Genetics Milestones 1990-2008." *MLO: Medical Laboratory Observer*. 40.3 (2008): 19-45.

Stepan, Nacy Leys. "Race and Gender: The Role of Analogy in Science." *Isis* 77 (1986): 261-77, accessed February 20, 2015.

Stier, Ken. "How Frankenfood Prevailed." *Time Magazine.* June 28, 2010. Accessed March 7, 2015.

Swinnen, Johan F.M. "The Growth of Agricultural Protection in Europe in the 19th and 20th Centuries." *The World Economy* (2009): 1499-1537 Accessed December 4, 2014. doi: 10.1111/j.1467-9701.2009.01247.x

Tracy, Tennille. "States Weigh GMO Labeling." *The Wall Street Journal.* November 3, 2014.

Turney, Jon. *Frankenstein's Footsteps: Science, Genetics, and Popular Culture* (New Haven: Yale University Press, 1998)

Wald, Michael. "FrankenFoods." *Nutritional Perspectives: Journal of the Council on Nutrition of the American Chiropractic Association.* 36.4 (2013): 19-22. Accessed October 26, 2014.

Walker, Ian. "Curse of the Frakenfoods." *ABC.net.au.* September 15, 2013. Accessed October 28, 2014.

Wessels Living History Farm. "The GMO Blacklash: Farming 1970's to Today." Accessed October 26, 2014. http://www.livinghistoryfarm.org/farminginthe70s/crops_14.html