Essentialism, Moral Opposition, and the Aversion to Genetically Modified Foods

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A Dissertation submitted to the Faculty of Graduate Studies in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

Graduate Program in Administration

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Toronto, Canada

June 2018

Abstract

This dissertation examines the psychological underpinning of the consumer aversion to genetically modified foods. Although a substantial body of scientific evidence supports the notion that genetically modified organisms (GMOs) are safe to consume, many consumers continue to reject these products on principle. Drawing on research that distinguishes how people reason about natural and manmade objects, I find that consumers are more accepting of GMOs when marketing cues suggest they are manmade. Evidence from these studies suggests that the moral opposition towards genetically modified foods impedes the perception of their benefits. Critically, this moral opposition is reduced when the product is positioned as being manmade. Specifically, if consumers view the GMO as manmade and if they understand why it was created, moral opposition towards the product diminishes, and the GMO's perceived benefits increase, which subsequently increases purchase intentions for the product.

As a whole, this work offers novel theoretical insights into consumers' negative response to GM foods. Although prior research suggests that consumers dislike GMOs because these products are unnatural, the present work demonstrates that preference for a GMO is actually contingent upon the belief that the object *ought to be* natural. When cues suggest that the product is manmade to begin with, consumers are more accepting of genetically modified foods. This research also represents the first evidence that moral opposition impedes the perception of a GM food's benefits. Finally, this work lends managerial implications in light of the recent GMO food labelling debate.

Acknowledgments

I would like to thank my advisor Theo Noseworthy, whose support and tireless commitment to mentoring me has made my time as a doctoral student truly enriching. He always pushed me to continuously grow as a researcher, and this dissertation would not have been possible without him. I also want to thank my committee members, Peter Darke and Jodie Whelan. I really appreciate all of the interesting discussions we had along the way and the new ideas and perspectives you consistently brought to them. I'm very grateful to my friends and family for their endless encouragement and for being so understanding when I was absent (physically or otherwise) over the course of this program. Finally, I want to thank my wife Lauren for her unwavering support and for believing in me unconditionally. I absolutely could not have done this without her.

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Chapter 1

1 Introduction

Food preference has long been of great interest to marketers (Roberts and Wortzel 1979; Talukdar and Lindsey 2013; Tracey 1949) and in particular, food preference as it relates to public awareness and consumer welfare (Haws and Winterich 2013; Ma, Ailawadi, and Grewal 2013; Raghunathan, Naylor, and Hoyer 2006; Wansink and Chandon 2006; Zlatevska, Dubelaar, and Holden 2014). Recently, consumer advocacy groups in the United States have raised concerns over the lack of transparency regarding the use of genetically modified organisms (GMOs) in food (Chassy and John Entine 2015; Saletan 2015). These groups assert that consumers have the right to know whether their food contains GMOs and thus mandatory labeling laws should be implemented (Consumer Reports 2015; Hamblin 2015). Indeed, this would have significant implications for firms given that an estimated 70% of processed foods in the United States contain GMOs (Scientific American 2013). Although labeling policies are drafted to help consumers make informed decisions (Frech and Barksdale 1974; Vermont 2014), pundits have been quick to weigh in with the charge that mandatory labeling could do more harm than good (Chassy and Jon Entine 2015; Hamblin 2015). The primary concern is that consumers might avoid GMOs, and because of this, firms would stop carrying these products. This is what transpired following the implementation of GMO labeling laws in Europe. GMO labeling ultimately hindered choice and reduced competition as firms scrambled to avoid a potentially negative response from consumers (Scientific American 2013).

The root of the principled opposition to GMOs begins with the intuitive notion that *what is natural is inherently good*, as well as the general belief that humans are often malevolent and deprive nature of its virtues (Leyser 2014; Rozin et al. 2004). These come together to form the basis of a moral opposition to human intervention into the food supply (Frewer et al. 2013; Scott, Inbar, and Rozin 2016). Critically, there is evidence to suggest that this moral opposition may impact the consideration of benefits. For example, in one study, 71% of participants who were opposed to GMOs expressed that genetic modification is wrong regardless of whether it results in positive outcomes (Scott et al. 2016). This is a considerable marketing problem that has gone without notice within the broader political debate around transparent labeling practices.

As of 2015, the global market value of GMO crops was estimated at $15.3 billion (ISAAA 2016). Many of these crops have been designed with the intent of increasing nutritional value (Gunther 2014), enhancing global food security (Qaim and Kouser 2013), and reducing the need for pesticides (Carpenter 2010). Despite the general need for GMO production to meet increasing population demand for food, public sentiment has proven to be a considerable barrier (Juma 2011; Qaim and Kouser 2013; Rotman 2013). Within the growing political discourse around GMOs, scholars and practitioners have yet to address the primary issue of moral opposition. This is an important question as it could lend critical insight into the psychological basis for consumers' aversion to GMOs. From a managerial and policymaking standpoint, this is also relevant if the ultimate goal of food labeling is to help consumers make informed decisions based on all relevant information (Caswell and Padberg 1992; Frech and Barksdale 1974).

In exploring this problem, this dissertation begins with the observation that human intervention into an object's composition is not uniformly problematic. After all, consumers

show little resistance to genetically modified (GM) medicine (Zechendorf 1994). Drawing on research that distinguishes how people reason about manmade objects (e.g., cars) and naturally occurring objects (e.g., apples), I am the first to demonstrate that positioning a genetically modified food as manmade can override moral opposition and subsequently elevate preference. The theoretical contribution of this work rests on the notion that the moral opposition to human intervention into nature is contingent upon the belief that the object ought to be natural in the first place. If that initial belief is extinguished, then the commonly observed correlation between perceived naturalness and acceptability breaks. The importance of this finding is that consumption acceptability is not driven by perceived naturalness per se, but by the belief that the object *ought to be* natural.

This work is also the first to demonstrate that moral opposition overrides consumers' ability to perceive a GMO's benefits. Prior research in this area showed that many consumers who oppose GMOs explicitly state that they would maintain this stance regardless of any benefits these products might offer (Scott et al. 2016). By experimentally reducing moral opposition to genetic modification, the studies reported here offer novel insights into the role of moral opposition in impeding the perceived functional benefits of a GMO. Specifically, circumventing the activation of moral opposition allowed consumers to perceive the functional benefits of a GM-labeled food.

These results also lend theoretical insights to the ideational (i.e. moral) basis of the preference for natural (Rozin et al. 2004). Rozin and colleagues inferred that since people preferred a natural product that was purportedly chemically identical to a less natural alternative, this preference must be ideational (as chemically identical objects should not vary in their

instrumental benefits). By overcoming some methodological shortcomings present in prior research (Rozin 2005; Rozin et al. 2004), the studies reported here were able to parse out and isolate the ideational component of natural preference as it applies to GMOs.

This dissertation also has important implications for managers. In particular, these studies show that by making the object seem manmade to begin with, marketers can override the moral response to genetic modification, allowing consumers to perceive the GMO's benefits, and subsequently, increase preference. In fact, the results revealed that some of the highest preference ratings emerged for products that were perceived to be the least natural. Taken as a whole, this work informs marketers on strategies they can adopt to increase transparency, facilitate GMO acceptance, and more effectively navigate mandatory GM food labeling policies. This work suggests that one of the worst things firms can do is to present GM foods in a way that could allow consumers to infer that they are natural. This is an important point given that GMOs typically resemble, and are sold amongst, their naturally grown counterparts. Furthermore, it seems that firms can benefit from explicit GM food labeling as long as the marketing mix conveys the product for what it is—a manmade object created with intent.

Chapter 2

2 Conceptual Background

In what follows, I first outline existing theory regarding the preference for natural and how this preference impacts consumption. I then cover the literature on people's moral values related to nature and naturalness in general, and highlight prior work demonstrating that there is a moral element that appears to underlie consumers' aversion to GMOs. This section also draws on the protected value literature, which suggests that human intervention into nature may have implications for consumers' ability to perceive the benefits of GMOs. From there, I outline the psychological essentialism literature and discuss how this has been used to explain the difference between how people reason about natural and manmade objects. This is followed by a review of the literature regarding what constitutes the essence of manmade objects. I then develop the theoretical rationale for why the distinction between manmade objects and naturally occurring objects is critical in determining how consumers will respond to GMOs. From this, I predict how evaluations of a GMO will differ depending on the cues that marketers adopt when promoting a GMO product.

2.1 The Preference for Natural

A growing body of research has demonstrated that, especially when it comes to food, people prefer natural things to their less natural alternatives (Rozin 2005, 2006; Rozin et al. 2004). In fact, merely labeling a food product as "All Natural" can elicit a positive response from

consumers (Rozin et al. 2004). The reason is that consumers infer meaning from the label. Two-thirds of Americans think the word natural on food packaging means that it is free of artificial ingredients, pesticides, or GMOs (Olsen 2014; Rozin, Fischler, and Shields-Argelès 2012). However, under federal labeling rules, the word natural carries no such connotation. In fact, both the Food and Drug Administration and the U.S. Department of Agriculture allow food producers to use the word natural on labels as long as nothing artificial or synthetic has been added "that would not normally be expected to be in the food" (Food and Drug Administration 1993, 2407). Thus, under federal guidelines, the term natural means little more than generally accepted practice.

Despite the ambiguity in the use of the term, the concept of natural has significant implications for consumption. For example, American consumers spent approximately $47 billion on organic produce in 2016 (Painter 2017). Mounting evidence suggests that this demand is primarily driven by perceived naturalness (Lockie et al. 2004; Onyango, Hallman, and Bellows 2007). The inverse of this is evident in the GMO literature, which supports a relationship between low perceptions of naturalness and reduced purchase intent (Frewer, Howard, and Shepherd 1996; Tenbült et al. 2005).

The preference for natural is thought to consist of a combination of four instrumental and two ideational beliefs (Rozin et al. 2004). Collectively, these can be viewed as lay beliefs in that they are informal intuitions about the world that people acquire either through personal experience or environmental cues such as popular discourse within their culture (Morris, Menon, and Ames 2001; Ross and Nisbett 2011). Instrumental beliefs refer to the commonly held notion that natural entities are functionally superior to their less natural counterparts. This stems from a

deeply rooted conviction that human intervention causes damage to nature (Rozin et al. 2004). The second belief is that natural entities are better (healthier or more effective). This correlates with the first belief, adding that humans often deprive nature of its virtues. The third belief is that natural entities are superior on a sensory level—be it taste, durability, or quality. The fourth and final instrumental belief is that natural things are purer and, as a result, safer. However, as noted by Rozin and colleagues (2004), there is actually little support for the instrumental superiority of natural kinds. For example, many natural pesticides are equally, if not more, carcinogenic than their synthetic counterparts (Ames, Profet, and Gold 1990; Gold, Slone, and Ames 2001). Nevertheless, these instrumental beliefs are both intuitive and prevalent.

Ideational beliefs, on the other hand, are rooted in the idea that naturally occurring objects possess a moral superiority (Rozin et al. 2004). This constitutes the fifth belief for a preference for normative order, whereby nature came before humans and thus has privileged moral ground (Spranca 1992). This rounds out the sixth belief, that natural is good or "right." In contrasting these two explanations for why people prefer natural, Rozin and colleagues (2004) found that a substantial part of the motivation for preferring natural is ideational (moral), as opposed to instrumental. This body of work suggests many explicit instrumental concerns about GMO production are merely overt rationalizations of latent ideational beliefs. This is consistent with the notion that people have a deep connection with nature and consequently view natural things positively (Kellert and Wilson 1993). Thus, the preference for natural appears to be rooted in people's moral values regarding the natural environment (Rozin et al. 2004; Sjöberg 2000). Next, I will describe the basis of the moral response to humans altering natural objects. Then, I will highlight an important implication of this response.

2.2 Moral Opposition to Human Intervention into Natural Objects

While the literature on the preference for natural has dominantly focused on food, this affinity is rather broad and also includes things such as natural materials used in built structures (e.g., wood) and natural landscapes (Kaplan and Kaplan 1989; Kellert 2011; Kellert and Wilson 1993; Ulrich 1995). This pervasive attachment to nature is referred to as biophilia (Wilson 1984). For example, pioneering research in this area demonstrated that people tend to prefer images of natural environments over built environments (Kaplan and Kaplan 1989). Consistent with the premise that people deeply value connecting with nature, researchers have found that there are numerous benefits to being exposed to nature, such as improved memory (Berman, Jonides, and Kaplan 2008), restored attentional capacity (Berto 2005), and reduced hypertension and inflammation (Mao et al. 2012). Given the pronounced effects of biophilia, it is perhaps unsurprising that people tend to assign a privileged moral status to nature (Cafaro and Primack 2014; Takala 2004; Vucetich, Bruskotter, and Nelson 2015).

There is an important corollary to the previously discussed belief that *what is natural is good or right*, and that is *what is unnatural is bad or wrong* (Takala 2004). Although arguably groundless, this notion is highly intuitive and commonly expressed by those opposing GMOs (Leyser 2014; Sheehan 2009; Takala 2004). Indeed, like the moral motivation underlying the preference for natural, evidence suggests that there is a strong moral motivation underlying the opposition to genetic modification (Bredahl 2001; Frewer et al. 2013; Scott et al. 2016). The two go hand in hand. For example, consumers' pre-existing moral values relating to nature appear to

be highly influential in shaping how they respond to GMOs (Bredahl 2001; Dreezens et al. 2005). Notably, this moral response tends to stem from the notion that those who create GMOs are tampering with, or violating, nature (Sjöberg 2000).

Aside from simply opposing GMOs on moral grounds, there may be additional implications resulting from people's moral values around nature. Research suggests that there are certain values which people are fundamentally unwilling to trade off for some other benefit, such as money (Baron and Spranca 1997; Fiske and Tetlock 1997). These values, such as the notion that nature should be preserved, are referred to as protected values because people believe they should be upheld unconditionally (Baron and Spranca 1997). One relevant example of this is the case of Golden Rice. Golden Rice is a GMO that was created to alleviate vitamin A deficiency, which kills approximately two million people a year and causes blindness in up to half a million children (Harmon 2013). Despite the noble intentions driving the creation and cultivation of this product, it sparked protests from local groups and ultimately, the destruction of test growing plots (Slezak 2013). This offers a clear example of the "moral limits to fungibility" (Fiske and Tetlock 1997, 256), in that the local citizens adopted the stance that humans should not intervene into nature even if it would prevent serious illness or even the death of millions of people.

Although human civilizations have always utilized natural resources as a means of survival, there is something distinct about the notion of permanently altering or even destroying a natural entity (Baron and Spranca 1997). Indeed, this would entail the act of rendering something unnatural, which people deem immoral (Takala 2004). If violating a natural entity contravenes a protected value, how might people respond to such an act? Research suggests that this will elicit a moral response, which leads to punitive reactions and negative judgments (Fiske

and Tetlock 1997; Tetlock et al. 2000). Furthermore, Tetlock (2002) notes that people will be particularly inclined to reject excuses and justifications for such violations. Since utilitarian benefits can be viewed as a potential justification for the act of genetic modification, this suggests consumers may be biased against perceiving those benefits. What this also means is that overriding the moral response to genetic modification may facilitate consumers' ability to perceive a GM food's benefits. In what follows, I outline the psychological essentialism literature and discuss how this has been used to understand how people reason about natural objects (Margolis and Laurence 2007).

2.3 Psychological Essentialism and Natural Objects

Psychological essentialism refers to the tendency for people to reason about things in terms of their underlying essence (Gelman 2003; Medin and Ortony 1989). An essence refers to an object's *true nature*; a deep causal factor that is responsible for the object's category membership and observable, surface level properties (Gelman 2003; Medin 1989). People's notion of an essence may be construed in a number of ways, from abstract concepts like a soul to more concrete concepts, like DNA (Gelman 2003). However, essentialism also frequently emerges in a way that is not represented by a specific concept but rather the simple idea that a category has a core, regardless of whether that core is known (Gelman 2003). Thus, people possess an "essence placeholder" in that they may simply believe that members of different categories are fundamentally distinct in terms of some deep, unobservable factor (Medin 1989). It is also important to note that psychological essentialism does not entail a metaphysical claim

about the actual existence of an essence; it simply refers to the pervasive tendency for people to think about objects *as though* they have an essence (Medin and Ortony 1989).

Fundamental to the essentialist account of categorization is the notion that people reason about the casual relationships between features (Gelman 2003; Gelman and Kalish 1993). As previously mentioned, the concept of an underlying essence is used to refer to the primary causal factor that determines what something is (Medin 1989). This account emerged as a response to the inadequacies of two dominant cognitive models of categories: the classical view, which proposes that categories are defined by lists of necessary and sufficient features, and the prototype view, which argues that categories are defined by one's notion of what represents the best example of the category. These models are notably acausal and fundamentally predicated on a similarity criterion in that they argue that category membership is determined based on similarity to a feature listing (classical view) or similarity to a prototype (prototype view; Smith and Medin 1981). However, Murphy and Medin (1985) argue that similarity alone is inadequate to explain why a given object belongs to a category. For example, judgments of similarity depend entirely on the features one decides to focus on. As a result, a cat and a smartphone could be said to have many features in common since they are both smaller than a car, weigh less than five tons, are visible to the naked eye, and so on. Additionally, similarity based theories do not propose how features should be weighted. For example, when classifying animals, if one were to put more weight on habitat than the way in which something breathes, whales could be classified as fish (Gelman 2003). In response to the inability of similarity to explain conceptual coherence, it was proposed that concepts are made coherent because people draw on domain specific knowledge about the world, including causal knowledge (Murphy and Medin 1985).

The essentialist view addresses the major shortcomings of the classical and prototype accounts by assuming that causal inferences matter and that causes are more important than effects (Gelman and Kalish 1993). Ahn (1998) referred to this as the causal status hypothesis and an accumulating body of evidence supports this premise (Ahn, Gelman, et al. 2000; Ahn, Kim, et al. 2000). With respect to natural objects, genetic composition is the most central feature in categorization because it is causally primary relative to any other features that the entity would possess (Ahn 1998). Thus, by accounting for people's tendency to apply causal knowledge when categorizing objects, the essentialist view was able to offer a superior account of categorization and conceptual coherence.

When reasoning about a naturally occurring object, people typically do not have direct access to information about the structure or integrity of its unobservable properties and in particular, its essence. This raises the question of how this unobservable property is inferred for natural objects. Rehder and Kim (2009) demonstrated that people begin with observable features then reason backwards to infer unobservable properties. That is, perceptual cues are used as a diagnostic indicator of a natural object's deep, unobservable properties. It is in this sense that surface level properties can shape beliefs about an object's status as natural. This is important because, given people's moral values regarding nature, whether a consumer possesses the a priori belief that something is natural may be critical in determining how they respond to genetic modification. Specifically, it suggests that moral opposition may not activate in response to human intervention into an object that does not appear to be natural in the first place.

In the next section, I highlight some key differences between how people reason about manmade and natural objects. I then cover the debate around how people categorize manmade

objects. This will ultimately serve to inform predictions regarding how consumers will respond to a GMO when it is positioned as being a manmade (as opposed to a natural) object.

2.4 The Distinction Between Manmade and Natural Objects

When confronted with an object, people reason about it differently if they perceive it to be manmade (e.g., a clock) as opposed to natural (e.g., a tomato; Margolis and Laurence 2007; Medin, Lynch, and Solomon 2000). One key difference between these types of objects is the process by which they are categorized. As previously discussed, naturally occurring objects intuitively garner a belief in an underlying essence that is responsible for the object's surface level properties and features (Keil 1989; Matan and Carey 2001; Medin and Ortony 1989). A violation of the inherent causal relationship between something's essence and its surface level properties makes it difficult to accept the object as natural. For example, Keil (1989) showed that despite an animal looking like a skunk, smelling like a skunk, and acting like a skunk, it will not be classified as a skunk if these properties are the result of human intervention (e.g., plastic surgery or chemical modification). Furthermore, any indication that a natural object lacks the expected feature associations quickly calls its category membership into question (Hampton et al. 2009).

People also believe that all natural category members possess their shared essential properties to the same extent. This results in categorization being absolute for natural objects (Diesendruck and Gelman 1999; Estes 2003, 2004). For example, people give a more definitive and extreme category membership response when asked if a caterpillar is an insect compared to

when asked if a stool is a chair (Diesendruck and Gelman 1999). This suggests that people consider additional information beyond what a manmade object is called when making judgments about it. Exactly what it is that people consider lies at the root of the debate surrounding how manmade objects are categorized.

Manmade objects are somewhat unique in that they do not have an underlying essence in the way that natural objects do (Bloom 1998). For example, substance is irrelevant to a manmade object's identity; one would never run a chemical analysis to determine if something is a table (Keil 1989). Then how do people categorize manmade objects? It seems that manmade objects are not merely categorized in terms of their superficial, physical features. For example, a digital bedside clock bears very little resemblance to Big Ben, though there is little question about their shared status as clocks. Another possibility is that people use specific functional features as necessary and sufficient indicators of what a manmade object is (Kelter et al. 1984; Tversky and Hemenway 1984). However, evidence suggests that neither functional features (e.g., carries people across a body of water), nor physical features (e.g., wedge shaped with a sail and anchor) alone are sufficient to determine categorization for a manmade object (i.e., a boat; Malt and Johnson 1992). Thus, the debate on how manmade objects are categorized continued (Bloom 1998, 2007; Malt and Johnson 1998).

Although manmade objects do not possess a defining, compositional substance like natural objects do (Keil 1989), there is reason to suspect that people may still apply essentialist reasoning to these objects. Research has demonstrated that people exhibit a general inclination to believe that objects can be imbued with an essence (Argo, Dahl, and Morales 2006, 2008; Hingston, McManus, and Noseworthy 2017; Kramer and Block 2014; Lee et al. 2011; Morales

and Fitzsimons 2007; Rozin and Nemeroff 1990). For example, the common belief that an object can be imbued with a person's essence through physical contact (i.e., the law of contagion; Nemeroff and Rozin 2000; Rozin et al. 1989; Rozin and Nemeroff 1990) has been used to explain the surprisingly high prices paid for celebrity memorabilia and why people become squeamish at the thought of wearing a garment previously worn by someone they think is evil (Nemeroff and Rozin 1994; Newman and Bloom 2014; Newman, Diesendruck, and Bloom 2011). Furthermore, people believe that objects can be imbued with the essence of a brand or creator, and this has implications for how consumers value the product (Newman and Dhar 2014; Smith, Newman, and Dhar 2015). This latter finding is particularly interesting because it suggests that if a manmade object has an essence, it may be somehow related to its creator.

Next, I will discuss an existing theoretical account of how manmade objects are categorized. I will then turn my attention to how this relates to the essence of manmade objects, and what this might mean for consumers' evaluations of GMOs.

2.5 Intent as the Essential Structure of Manmade Objects

If manmade objects' category membership cannot be reliably explained by their physical composition, features, or how they are used, this raises the question of how these objects are categorized. The intentional historical theory of artifact categorization proposes that manmade objects are categorized based on their intended function (Bloom 1996, 1998; Gutheil et al. 2004). This theory serves to explain why feature overlap and object use are insufficient in determining how manmade objects are categorized (Bloom 1996). For instance, simply because someone

stands on a table does not suggest that it is now, or was ever intended to be, a step stool. Furthermore, although step stools and tables share many features, such as legs and a flat surface, they are arguably distinct concepts.

Bloom (1996, 1998) proposes that understanding what a manmade object is necessarily entails reasoning about the function that it was intended to serve. Consistent with this theorizing, a creator's intention for an object has been shown to be a strong determinant of categorization and functional expectations (Barrett, Laurence, and Margolis 2008; Chaigneau, Castillo, and Martínez 2008; Gelman and Bloom 2000). For example, when categorizing a manmade object, people weigh its intended function more heavily than its perceived function (e.g., a teapot used to water flowers is still a teapot; Hall 1995). People also weigh a manmade object's explicit intent over its perceived form (e.g., something that looks like an umbrella but was intended to be a lampshade is considered to be a lampshade; Noseworthy and Trudel 2011; Rips 1989). In fact, intended function is so influential that even children as young as the age of three refer to intent when naming manmade objects (Gelman and Bloom 2000). With respect to the critical role of intended function when categorizing manmade objects, it has been asserted that the original intended function constitutes a manmade object's essence (Matan and Carey 2001). This is also consistent with the causal status hypothesis given that the creator's intentions for the object would represent the primary cause that then determines the object's features (Ahn 1998). It is in this sense that the process of reasoning about manmade objects is fundamentally distinct from reasoning about naturally occurring objects. Specifically, the former necessarily entails inferring functional intent whereas the latter does not.

Given the emphasis put on intent, it is not surprising that manmade objects are typically organized by function (Barton and Komatsu 1989). In a sense, the link between how the object is conveyed and inferences about its functionality is fundamentally unique to manmade things. As a result, manmade objects have gradients (e.g., any one smartphone may be more or less representative of the smartphone category; Estes 2004). Functional intent also determines how manmade objects are evaluated. For example, it would seem absurd to evaluate a stool negatively due to its poor ability to accommodate an afternoon nap since it was never intended to be used in such a way. Instead, people infer that manmade objects will behave as they were designed to (Dennett 1987), and assess them accordingly. Thus, it stands to reason that consumers may respond to a GMO very differently if they are cued to view it as being manmade. Specifically, instead of responding to the violation of a natural entity, they should be inclined to evaluate the GMO in terms of its perceived ability to fulfil its intended function.

In what follows, I will briefly summarize the literature discussed here and develop the formal hypotheses that will be tested in this dissertation. Specifically, I demonstrate that the distinction between how people reason about manmade and natural objects lends predictions regarding the circumstances when consumers' moral opposition to genetic modification will be reduced and when consumers will respond positively to GM foods and even perceive their benefits.

2.6 Hypotheses

Where the distinction between natural and manmade objects becomes particularly relevant to GM foods is in how evaluations may be differentially impacted by human intervention. To recap, human intervention through genetic modification violates a natural entity's essence, rendering it unnatural. Given that people believe that tampering with nature is immoral (Leyser 2014; Sheehan 2009; Sjöberg 2000; Takala 2004), genetic modification elicits a negative response. However, for manmade objects, human intervention is both normative and purposeful—there is nothing inherently immoral about human intervention into manmade things. Therefore, if the negative response to genetic modification is rooted in consumers' moral response to the notion of humans violating nature, consumers should be more accepting of a food product labeled as *Genetically Modified* (GM-labeled) when it is positioned as being manmade, as opposed to being positioned as natural. Of course, such a tactic should markedly differ when it comes to food products labeled as *All Natural* (AN-labeled). In this instance, considering the strong emphasis on naturalness (Rozin 2006; Rozin et al. 2004), consumers should prefer an AN-labeled food product when it is positioned as natural, as opposed to manmade. Stated formally,

H_1: Consumers are more willing to purchase a GM-labeled food product when marketing cues suggest that it is manmade as opposed to natural. Conversely, consumers are more willing to purchase an AN-labeled food product when marketing cues suggest that it is natural as opposed to manmade.

Then there is the question of what will constitute the optimal scenario for a GM-labeled food. Recall that intended function (i.e., why the object was made) constitutes the essence of manmade objects and that this fundamentally distinguishes manmade objects from their naturally occurring counterparts (Bloom 1998; Matan and Carey 2001). This suggests that if marketing cues can convey to consumers that a GM-labeled food is manmade, a statement regarding the product's intent should serve to solidify its status as a manmade object. Arguably, although an object may appear to be manmade based on marketing cues, one cannot fully understand and evaluate a manmade object without knowing its intended function (Bloom 1996). Thus, if viewing a GM-labeled food as manmade overrides the negative response to genetic modification, the addition of a transparent disclosure of the product's intent should elicit the most positive response. This ultimately suggests that preference for a GM-labeled food presented with a manmade cue will be higher when a statement of intent is present (vs. absent). Conversely, although naturally occurring objects can be assigned a function (e.g., water can quench thirst), educated adults generally refrain from reasoning about these objects as having an inherent function (Kelemen, Rottman, and Seston 2013). This implies that a statement of intent would have little impact on consumers' preference for an AN-labeled product. Stated formally,

H_2: The strongest preference for a GM-labeled food product emerges when marketing cues suggest it is manmade and the product is accompanied by a statement of intent. Intent has no effect on an AN-labeled food product, regardless of the marketing cue.

The final goal was to isolate the factors driving the predicted increase in preference for GM-labeled foods positioned as manmade. To that end, the relationship between moral opposition and perceived utilitarian benefits was the primary focus. Given that people prefer natural and possess moral values about the preservation of nature (Rozin et al. 2004; Sjöberg 2000), they tend to weigh these values over any functional benefits that result from human intervention into a natural object (Scholderer and Frewer 2003; Scott et al. 2016). Conversely, since there is nothing immoral about human intervention into a manmade object, moral opposition should not activate when the GM-labeled food is positioned as manmade. Furthermore, given the emphasis on a manmade object's intended function, human intervention promotes inferences about the purpose and functional implications of the intervention (Bloom 1996; Dennett 1987). If the object is perceived to be able to achieve its intended function, then arguably, this object is "good." Stated formally,

H_3: The effect of positioning a GM-labeled food as manmade with an explicit statement of intent on purchase intentions is serially mediated by moral opposition through perceived utilitarian benefits, such that the decrease in moral opposition corresponds with an increase in perceived utilitarian benefits, which in turn, augments purchase intentions.

In sum, it was predicted that the negative response to the genetic modification of food is contingent upon how people reason about the object. Thus, cueing consumers to view a GM-labeled food as manmade (as opposed to natural), and conveying the product's intended function should override this negative response.

Chapter 3

3 Study 1

The objectives of Study 1 were to test whether the way in which consumers reason about a GM-labeled food influences preference and also to explore predictable gradients within this process. Specifically, if my theorizing is correct, consumers should demonstrate the greatest preference for a GM-labeled food when it looks like a manmade product and is accompanied by a statement for why it was made—i.e., a statement of intent. Furthermore, I predicted that the positive response for a GMO positioned as a manmade product with a statement of intent would emerge despite a drop in perceived naturalness. Thus, in contrast to the established correlation between perceptions of naturalness and preference (Frewer et al. 1996; Rozin 2006; Tenbült et al. 2005), I expected to augment purchase intentions for something that was fundamentally unnatural.

3.1 Method

3.1.1 Participants and design

Three hundred and fifty-one consumers (55.3% female; M_{age} = 26.6) were recruited through public posters and paid $20 for participating in an advertisement study. Participants were randomly assigned to one of eight conditions in a 2 (Label: GM-Labeled vs. AN-Labeled) × 4 (Positioning: Manmade Cue with Intent vs. Manmade Cue without Intent vs. Natural Cue with Intent vs. Natural Cue without Intent) between-subjects factorial design.

Although seemingly complex, this design was carefully crafted in accordance with prior work on how people reason about manmade and natural objects. Given that physical appearance plays a role in classification (Hampton et al. 2009; Malt and Johnson 1992), manipulating whether an object looks natural or manmade should cue people to reason about it accordingly. However, unlike natural objects, intent also comes into play for manmade objects (Bloom 1996, 1998). As previously discussed, although an object may appear to be manmade based on its physical structure, one cannot fully understand and evaluate a manmade object without knowing its intended function (Bloom 1996). It is in this sense that physical structure and intended function are related and act together to complete one's understanding of a manmade object. Thus, by manipulating the product's Label (GM-labeled vs. AN-labeled) and by creating a single Positioning factor with four levels to account for the combination of physical appearance and intent, this design offered the ability to manipulate the extent to which the product would be viewed as manmade or natural.

The stimuli for this study were designed to represent both a conservative and realistic test of H_1. Inspiration was taken from the recent trend of well-known brands engaging in the manipulation of food products (e.g., Coke's new Fairlife Milk). The goal was to take an analogous position and use a well-known brand and have it foray into the marketing and manipulation of something that is typically natural. In this case, fruit was chosen as the product and some noise was deliberately introduced for the sake of ecological validity (e.g., stylized fonts, marketing claims, and logos). Furthermore, the manipulation of the label was conservative in that it incorporated the most severe case of a GMO by explicitly stating "genetically modified" and acknowledging the splicing of DNA from two distinct natural entities—a

manipulation known to cause the most severe drop in perceived naturalness and acceptability, and one that represents the majority of GMOs (Rozin 2005, 2006).

For the Positioning manipulation, ad imagery was used to promote the product in its natural setting (i.e., growing in a tree) or showcase the product packaged more as a manmade good (i.e., in a box). In the latter case it was critical that people could see that the object was a fruit in order to be conservative in that natural inferences would still be available. It was also critical that the packaging more closely approximated that of a manmade product than something one would find in the produce section of a grocery store. The end result of screening various stock photographs for plausibility, natural inferences, and commercial associations, was the "*Fruit by Nike*" photograph by artist Peddy Mergui (2016). Thus, the Nike brand was held constant across all conditions.

Finally, if people are more likely to view an object as manmade when it is packaged like a manmade product, and if intent matters for manmade things (Bloom 1996), then the addition of a statement noting the object's intent should complete this process. To that end, the product was given a category relevant statement of intent: "*The goal was to reduce the reliance on sports energy drinks, avoiding hyponatremia (over-hydration) of the cells, which causes dangerously low sodium levels*." This intended function was adopted given the thematic fit with Nike (i.e., athletic performance). Not only is hyponatremia an actual issue (Dugas 2006), but the statement also afforded the plausible guise that an energy fruit would solve this issue by allowing consumers to eat, as opposed to drink, their supplement. Thus, the label and positioning manipulations were combined to configure eight variations of the same stimulus (see Appendix A).

3.1.2 Design predictions

Based on my theorizing, the strongest preference for a GM-labeled food should emerge when there are cues to support viewing it as a manmade object (i.e., when the entity is packaged as a manmade product accompanied by a statement of intent: stimulus *i* in Appendix A. Roman numerals represent each respective stimulus in the appendix). Conversely, the strongest preference for an AN-labeled food should emerge when there are cues to facilitate viewing it as a natural object (i.e., when the entity is seen in natural form; stimuli *vi* and *viii*). Critically, given that people guard against reasoning about functional intent for natural entities (Kelemen et al. 2013), preference for the natural product should not depend on the presence of a statement of intent (*vi* and *viii* should be equally favored). This design also lends predictions of suboptimal outcomes. Specifically, the most detrimental outcome for a GMO should emerge when the available cues lead consumers to view it as a natural object (i.e., when the entity looks like a natural object with no statement of intent: stimulus *vii*). Note: this is how consumers most commonly encounter GMOs in that they are typically sold amongst natural foods and/or retain the physical appearance of their non-GM counterparts. Lastly, the most detrimental outcome for a natural product should come when the marketing cues suggest it is manmade, but even then, this should not vary by intent (stimuli *ii* and *iv* should be equally unfavorable).

3.1.3 Pretest

Participants from Amazon's Mechanical Turk (MTurk; N = 80; 51.2% female; M_{age} = 36.37) were randomly assigned to view either a photograph of the packaged fruit or a photograph of fruit hanging on a tree in a between-subjects main effect design. The images were identical to the advertising stimuli used in the study, except that all ad copy was removed. Participants rated the similarity of the object depicted in the image to two randomized comparisons: "*a thing that was created by humans*" (manmade object comparison) and "*a thing that grows naturally in the wild*" (natural comparison; anchored: 1 = *not at all similar*; 9 = *extremely similar*). Given that there was both a between-subjects independent variable (i.e., the manmade or natural cue) and a repeated measures dependent variable, a mixed-design ANOVA was conducted. The results revealed that the photograph of packaged fruit was more comparable to a manmade object (M = 6.70) than to a natural object (M = 3.55; $F(1, 78) = 37.80$, $p < .001$). Conversely, the photograph of fruit hanging on a tree was more comparable to a natural object (M = 7.95) than to a manmade object (M = 2.50; $F(1, 78) = 113.15$, $p < .001$). Therefore, this cue manipulation was carried forward and used in the study.

3.1.4 Procedures and dependent measures

Participants were brought into a product testing lab under the explicit guise that the study was interested in their thoughts on modern advertisements. Participants were then directed to a computer screen and told that they will see a working version of a print advertisement. They were asked to consider how they would feel if they saw this product while shopping. Participants were permitted to view the ad at their leisure and were informed that once ready, they may click

"next" to fill out an electronic questionnaire. The questionnaire commenced with the core dependent variable of purchase intent, collected on a three item, 7-point scale ("*unlikely*/*likely*," "*improbable*/*probable*," and "*impossible*/*possible*"; Chattopadhyay and Basu 1990). Next, perceptions of naturalness were collected on a single item (anchored: 0 = "*not natural at all* [like a plastic toy model of a car]" to 100 = "*completely natural* [like a tree growing on a mountain peak that has never been visited by humans]"; Rozin 2006). This was captured in order to rule out the alternative explanation that preference for the GM-Labeled product increased because it was perceived as being more natural (given the established positive relationship between naturalness and preference; Rozin 2006; Tenbült et al. 2005). The questionnaire concluded with probes of awareness and demographic questions.

3.2 Results

3.2.1 Purchase intent

A two-way ANOVA on purchase intent ($\alpha = .73$) yielded a significant Label × Positioning interaction ($F(3, 343) = 10.32$, $p < .001$, $\eta^2 = .08$). As illustrated in Figure 1, pairwise comparisons confirmed that participants were more likely to purchase the GMO when it was viewed with a manmade cue accompanied by a statement of intent (*i*) (M = 4.54) than when viewed either with a manmade cue and without intent (*iii*) (M = 3.72; $F(1, 343) = 8.78$, $p < .005$,

η^2 = .02), natural cue with intent (*v*) (M = 3.93; F(1, 343) = 4.81, $p < .05$, η^2 = .01), or natural cue without intent (*vii*) (M = 3.25; $F(1, 343) = 21.73$, $p < .001$, η^2 = .06).[1]

Then, a complex contrast was conducted to further test the prediction that the optimal scenario for a GM-labeled food would emerge when it both appeared manmade and was accompanied by a statement of intent (H_2). A complex contrast entails testing the difference between combinations of experimental conditions. This analysis revealed that stimulus *i* in Appendix A (the GMO most likely to be viewed as manmade) was favored above a linear combination of all other cells within the GMO label condition ($F\psi(1, 343) = 16.06$, $p < .001$, η^2 = .04), whereas stimulus *vii* (the GMO most likely to be viewed as a natural object) was least favored ($F\psi(1, 343) = 12.99$, $p < .001$, η^2 = .03).

As predicted, the effects were quite different for the naturally grown product. Consistent with the findings that people guard against reasoning about naturally occurring objects in terms of their function (Kelemen et al. 2013), participants were more likely to purchase the natural product when viewed with a natural cue (*vi* and *viii*), regardless of whether intent was presented (M_{vi} = 4.80 vs. M_{vii} = 4.89, p = .76), compared to when viewed either with a manmade cue and without intent (*iv*) (M = 4.22; F(1, 343) = 5.67, $p < .05$, η^2 = .01 and F(1, 343) = 4.33, $p < .05$, η^2

[1] Simple effects were analyzed using the pooled error term from the full ANOVA, as opposed to manually splitting the file with two or more unique error terms. This explains the inflated denominator degrees of freedom (i.e., it does not indicate how many individuals made up the comparison). Analyzing the data this way was deemed appropriate given that the assumption of homogeneity of variance was met and carried with it the benefit of enhancing the statistical power of the test.

= .03, respectively) or a manmade cue with intent (*ii*) (M = 4.04; F(1, 343) = 9.41, $p < .005$, η^2 = .03 and $F(1, 343) = 7.67$, $p < .01$, $\eta^2 = .02$, respectively). Similar to the natural cue results, a statement of intent did not influence participants' likelihood of purchasing the natural product presented with a manmade cue ($M_{ii} = 4.04$ vs. $M_{iv} = 4.22$, $p = .51$). Therefore, as detailed in the design predictions, positioning the product as manmade (i.e., in packaging and with an explicit intent) only increased preference for the GMO. In fact, although my theorizing was across Positioning, there was a single instance in the design when a GMO was preferred to a natural product, and that was when both products were were packaged like manmade products and accompanied by a statement of intent ($M_i = 4.54$ vs. $M_{ii} = 4.04$; $F(1, 343) = 3.28$, $p = .07$, η^2 = .01). Finally, although this study was analyzed as a 2 × 4 design (because the manmade cue and statement of intent are not independent), it may be useful from a substantive point of view to split the cue and a statement of intent into different independent variables, thus making it a three-way design. See Appendix B for additional analyses conducted based on this alternative design.

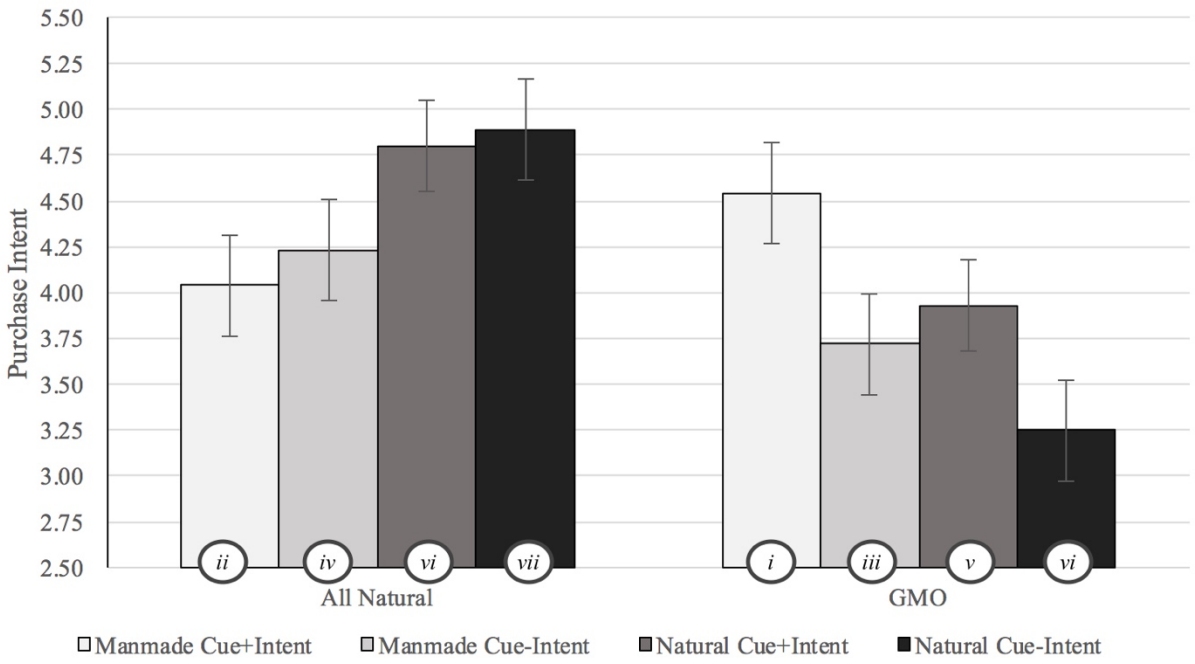


Figure 1: Purchase Intent Results for Study 1

3.2.2 Confound check: Perceived naturalness

A two-way ANOVA on perceived naturalness revealed the expected main effect of Label, such that participants perceived the AN-Labeled product to be more natural (M = 83.14) than its GM-Labeled counterpart (M = 61.77; $F(1, 343) = 147.16$, $p < .001$, $\eta^2 = .28$). There was also a main effect of Positioning ($F(3, 343) = 6.49$, $p < .001$, $\eta^2 = .04$). Pairwise comparisons confirmed that although manmade cue with intent did not vary from manmade cue without intent (M = 66.99 vs. M = 70.23; $p = .18$), it was perceived as significantly less natural than the products seen either with a natural cue with intent (M = 74.23; $F(1, 343) = 8.53$, $p < .005$, $\eta^2 = .02$) or natural cue without intent (M = 77.20; $F(1, 343) = 17.01$, $p < .001$, $\eta^2 = .03$; see Table 1). The Label × Positioning interaction was not significant ($p = .22$). Although not predicted, the

main effect of Positioning makes sense considering the anchors on the scale adapted from Rozin (2006) represent a manmade object on one end (“Like a plastic toy model of a car”) and a naturally occurring object on the other (“Like a tree growing on a mountain peak that has never been visited by humans”). Nevertheless, the Label manipulation worked as expected and did not interact with Positioning.

Table 1: Treatment Means and Cell Counts for Study 1

	AN-Labeled				GM-Labeled			
	Manmade Cue + Intent (*i*)	Manmade Cue – Intent (*iii*)	Natural Cue + Intent (*v*)	Natural Cue – Intent (*vii*)	Manmade Cue + Intent (*ii*)	Manmade Cue – Intent (*iv*)	Natural Cue + Intent (*vi*)	Natural Cue – Intent (*viii*)
Purchase Intent	4.04 (1.38)	4.22 (1.23)	4.80 (1.14)	4.89 (1.28)	4.54 (1.48)	3.72 (1.21)	3.93 (1.25)	3.25 (1.40)
Naturalness	75.91 (20.03)	79.28 (17.63)	85.64 (13.94)	90.50 (9.02)	58.07 (16.93)	61.39 (15.06)	62.82 (15.53)	63.91 (20.49)
Cell Size	44	43	44	44	44	44	44	44

Note—Standard deviations are reported in parentheses; Roman numerals correspond to stimuli in Appendix A.

3.3 Discussion

The results of Study 1 demonstrated that the negative response to GMOs is highly contingent on how marketers convey the product. In support of H_1, when the product was accompanied by cues that it was manmade, genetic modification did not elicit a negative response. Thus, unlike prior work (Frewer et al. 1996; Rozin 2006; Tenbült et al. 2005), I found that preference for a GMO is a function of how consumers reason about the product, not the degree to which it is seen as natural. Indeed, the GMO that was packaged like a manmade product and accompanied by a statement of intent had one of the lowest naturalness ratings, yet was still quite desirable. Furthermore, the lowest purchase intent out of all GMO conditions (and all Natural conditions, for that matter) was the GMO that featured cues that it was natural. These results suggest that the aversion to GMOs may only emerge when consumers see the product as a natural object that humans have violated. This is particularly relevant to marketers, given that

most GMOs look natural or are typically presented amongst their natural counterparts with no statement of intent.

These findings also highlighted the critical role of intent. Intended function is essential to understanding manmade objects (Bloom 1996, 1998) and is therefore necessary to support a manmade cue in allowing consumers to view the product as manmade. This assumption was validated for all studies through pilot testing (see Appendices D, F, and I). Given this, all subsequent studies were designed to include a statement of intent across all conditions. This also afforded the benefit of holding the amount of information conveyed constant across all conditions. As a whole, these results supported the prediction that the negative response to genetic modification would be reduced when the object is viewed as being being manmade. The question was, why? This led to the second study.

Chapter 4

4 Study 2

The goal of Study 2 was to take the phenomenon into the field to explore what was driving preference. The first step was to test the premise that making a GM-labeled food look manmade alters the moral response to genetic modification. As discussed, researchers have shown that the strong moral opposition to GMOs is rooted in the notion that tampering with nature is inherently immoral (Leyser 2014; Sheehan 2009; Sjöberg 2000; Takala 2004). However, there is nothing immoral about humans altering manmade objects. While natural entities are viewed as being sacred in a sense (Baron and Spranca 1997; Tetlock et al. 2000), it would be surprising to observe consumers expressing that it is immoral to change the way a toaster functions. Given this distinction between the response to human intervention into manmade and natural objects, it was predicted that a GM-labeled food that is positioned as being manmade would not activate moral opposition, and this should account for the subsequent increase in preference.

4.1 Method

4.1.1 Participants and design

Consumers (N = 160; 46.9% female; M_{age} = 32.3) were recruited at a farmer's market in the Midwest United States and paid $20 for participating and they were randomly assigned to one of four conditions in a 2 (Label: GM-Labeled vs. AN-labeled) × 2 (Positioning: Control [Red] vs. Manmade Cue [Blue]) between-subjects factorial design.

The product selected was apples. Instead of altering ad imagery, I took a more nuanced approach and altered the product itself—specifically, the product's color. This afforded an opportunity to employ a pure control condition, whereby a manmade cue (i.e., a blue dyed apple) could be compared to an unaltered condition (i.e., a standard red apple; see Appendix C). The manmade manipulation followed the controversial practice of dying fruits in order to make them more vibrant (Vandersteen 2011), except here the color that was used was unassociated with a natural apple.

4.1.2 Pretest

Participants from MTurk (N = 80; 48.8% female; M_{age} = 36.65) were randomly assigned to view either a blue apple or an unaltered red apple in a between-subjects design. Participants were asked to rate the apple using the same items described in the Study 1 pretest. The results revealed that the blue apple was more comparable to a manmade object (M = 5.59) than to a natural object (M = 4.00; F(1, 78) = 7.81, $p < .01$). Conversely, the red apple was more comparable to a natural object (M = 7.59) than to a manmade object (M = 3.69; F(1, 78) = 44.88, $p < .001$). Therefore, this cue manipulation was carried forward and used in the study.

4.1.3 Procedures and dependent measures

The study was conducted by two confederates located at separate locations in a farmer's market. The cover story was that a major farming conglomerate is looking to introduce a new variety of apple and before doing so, its representatives wanted to hear some initial impressions about the product. Thus, this story was designed such that the producer was associated with

natural products. This allowed me to rule out the possibility that consumers in Study 1 exhibited a stronger preference for the GM-labeled food when they viewed it as manmade simply because the brand (Nike) was dominantly associated with manmade products. If the current theorizing is correct, cueing consumers to view the GM-labeled food as manmade should augment preference even if the firm is associated with natural products.

Following the cover story, the research assistants presented participants with a pamphlet and directed them to view two apples on a table. The apple on the right either looked like a typical apple (control) or was blue in color (manmade cue). The apple on the left was always a typical, unaltered apple. The pamphlet stated that the apple on the left was their standard offering and the apple on the right was their new "naturally grown" ("genetically modified") variety. Each condition explicitly conveyed that the goal was to cultivate a variety that would "*reduce a farmer's reliance on pesticides*." Nothing was mentioned about the apple's color. This claim was selected because reduced pesticide use is a common reason for cultivating GMOs (Carpenter 2010; Wossink and Denaux 2006) and because pesticides are a concern for a majority of consumers (Govindasamy and Italia 1999).

After reading the pamphlet, participants were handed a tablet computer to complete what was conveyed as a brief consumer response survey. Purchase intent and perceived naturalness were captured using the same items detailed in Study 1. Moral opposition was captured on a single item ("Selling this product is morally wrong"; anchored: 1 = *not at all*; 9 = *very much*; Laham, Alter, and Goodwin 2009). The survey concluded with basic demographic questions.

4.2 Results

4.2.1 Purchase intent

A two-way ANOVA on purchase intent ($\alpha = .70$) yielded only a significant Label × Positioning interaction ($F(1, 156) = 11.58$, $p < .005$, $\eta^2 = .06$). As illustrated in Figure 2, simple effects further confirmed H_1 in that participants were more likely to purchase the GM-labeled apple in the manmade cue condition ($M = 4.43$) rather than in the control condition ($M = 3.80$; $F(1, 156) = 4.57$, $p < .05$, $\eta^2 = .03$). Conversely, participants were more likely to purchase the AN-labeled apple in the control condition ($M = 4.73$) rather than in the manmade cue condition ($M = 3.94$; $F(1, 156) = 7.15$, $p < .01$, $\eta^2 = .04$).[2] The next question was whether this difference was being directly influenced by moral opposition.

[2] Another way to look at this is that purchase intent did not diminish and was in fact elevated for the GM relative to the AN product when both looked manmade ($M_{GM\text{-}labeled} = 4.43$ vs. $M_{AN\text{-}labeled} = 3.94$; $F(1, 156) = 2.76$, $p = .09$), but purchase intent for the GMO declined markedly when both looked like ordinary apples ($M_{GM\text{-}labeled} = 3.80$ vs. $M_{AN\text{-}labeled} = 4.73$; $F(1, 156) = 9.94$, $p < .005$).

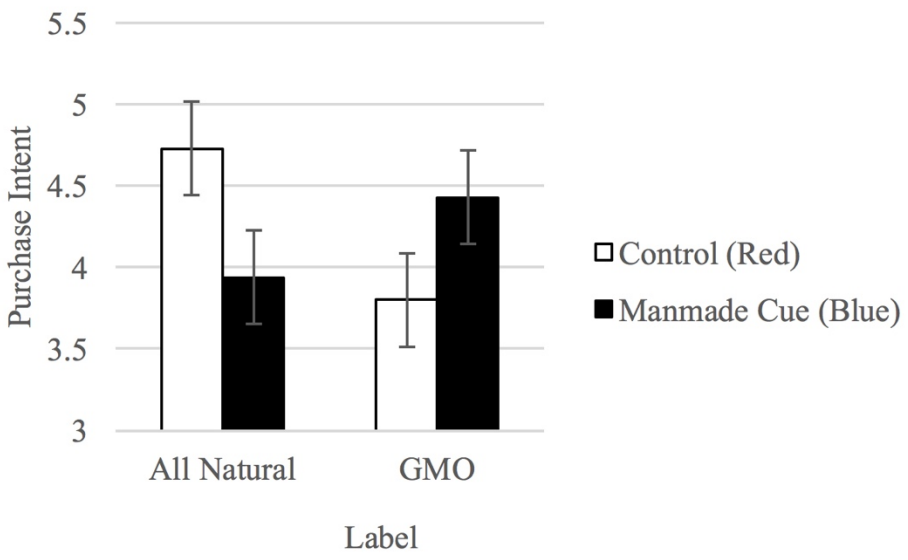


Figure 2: Purchase intent results for Study 2

4.2.2 Moral opposition

Overall, despite relatively low means for moral opposition across all conditions, the results were as predicted. Consistent with prior work, there was a significant main effect of Label on moral opposition, such that consumers were more morally opposed to the sale of a GM-labeled apple (M = 1.96) than to the sale of the AN-labeled apple (M = 1.50; $F(1, 156) = 9.81$, $p < .005$, $\eta^2 = .06$). The main effect of Positioning was not significant ($M_{Control} = 1.66$ vs. $M_{Manmade\ Cue} = 1.80$, $p = .35$). Critically, the effect of Label was qualified by a significant Label × Positioning interaction ($F(1, 156) = 6.88$, $p < .05$, $\eta^2 = .03$). As predicted, participants were less morally opposed to the GM-labeled apple in the manmade cue condition (M = 1.70) compared to the control (M = 2.22; $F(1, 156) = 6.32$, $p < .05$, $\eta^2 = .03$). Moral opposition did not differ by Positioning for the AN-labeled apple ($M_{Control} = 1.38$ vs. $M_{Manmade\ Cue} = 1.63$; $p = .23$). This was

consistent with the notion that no moral violation had taken place in the case of the AN-labelled apple. Indeed, debriefs confirmed that consumers did not infer chemical or genetic intervention into the blue apple. Rather, given the farmer's market setting, they tended to infer selective breeding or domestication.

To determine whether the decrease in moral opposition accounted for the increase in purchase intent, a mediated moderation analysis was conducted (Muller, Judd, and Yzerbyt 2005). Mediated moderation was deemed appropriate since the Label × Positioning interaction on purchase intent was significant, and I sought to determine the mediating effect that could explain that moderation. Furthermore, given that my theorizing predicted that Label and Positioning would have an interactive effect on the mediator (i.e., moral opposition), and the above results confirmed this, the appropriate model to run would account for a-path (i.e., front end) moderation. Thus, a mediated moderation analysis was conducted using Model 8 in the PROCESS macro (Hayes 2013; bootstrapped with 20,000 draws). As predicted, the results revealed a significant conditional indirect effect of Positioning on purchase intent through moral opposition for the GM-labeled apple (95% CI: .04; .65) but not for the AN-labeled apple (95% CI: −.37; .02).

4.2.3 Confound check: Perceived naturalness

A two-way ANOVA on perceived naturalness once again revealed the expected main effect of Label, such that participants perceived the GM-labeled apple to be less natural (M = 59.90) than the AN-labeled apple (M = 80.74; $F(1, 156) = 60.50$, $p < .001$, $\eta^2 = .26$; see Table 2). There was also a main effect of Positioning such that participants perceived the apple to be less

natural in the manmade condition (M = 66.36) than in the control condition (M = 74.27; F(1, 156) = 8.72, $p < .005$, $\eta^2 = .04$). Critically, the Label × Positioning interaction was not significant ($p = .40$).

Table 2: Treatment Means and Cell Counts for Study 2

	AN-Labeled		GM-Labeled	
	Control	Manmade Cue	Control	Manmade Cue
Purchase Intent	4.73[c] (1.12)	3.94[c] (1.36)	3.80[a] (1.33)	4.43[a] (1.46)
Moral Opposition	1.38 (.59)	1.63 (.93)	2.22[b] (1.29)	1.70[b] (.79)
Naturalness	85.82 (13.56)	75.65 (20.51)	62.73 (15.72)	57.07 (17.22)
Cell Size	40	40	40	40

Note—Standard deviations are reported in parentheses. Means with matching superscripts represent simple effects of at least $p < .05$.

4.3 Discussion

The results of Study 2 lent support to the first causal pathway of the third hypothesis. Specifically, consumers experienced more moral opposition when confronted with a GMO that looked like an ordinary apple compared to when its appearance was altered to suggest that it was a manmade object. This was consistent with the notion that although people believe that it is immoral to tamper with nature (Leyser 2014; Sheehan 2009; Sjöberg 2000; Takala 2004), they are not morally opposed to human intervention into manmade objects. Furthermore, a mediated moderation analysis revealed that the reduction in moral opposition accounted for the observed increase in purchase intent for the GM-labeled food that looked manmade. However, there was still the question of whether shutting down the moral response to genetic modification would

impact consumers' ability to perceive a GM-labeled food's utilitarian benefits (H_3). Study 3 was designed with this specific question in mind.

Chapter 5

5 Study 3

Study 3 was designed to address a number of objectives. First, the manipulations that were adopted in the previous studies directly altered how consumers visually perceived the product. This made it difficult to disentangle the manmade cue from the product label. Thus, I sought to adopt a more indirect means of cuing consumers to reason about the product as either natural or manmade. Specifically, I manipulated the context where the GM-labeled food was sold. This afforded the benefit of being able to hold the product's promotional content and physical design constant.

Prior work has demonstrated that store placement can influence consumers' inferences about a product (Baker, Grewal, and Parasuraman 1994; Chandon et al. 2009; Noseworthy, Wang, and Islam 2012). The results from this work suggest that seeing a product sold amongst natural (manmade) products might increase the likelihood that it would be evaluated as though it is natural (manmade). If so, then effects similar to the previous two studies would be expected to emerge. This was also substantively relevant given that GMOs are often sold amongst their natural counterparts. Based on my theorizing and the results of the previous two studies, I predicted that this conventional practice would have a detrimental impact on preference relative to when a GM-labeled food is sold amongst manmade products.

Second, the products in the previous stimuli had all been whole entities (e.g., apples). Given that GMOs are also used as ingredients in other products (Chassy and Jon Entine 2015),

the stimuli was constructed such that the product of interest had a genetically modified ingredient. This enhanced the practical relevance of the study given that more than 70% of processed foods in the United States contain genetically modified ingredients (Grocery Manufacturers Association 2016).

Finally, this study was designed to address the initial discussion around the concept of perceiving the benefits of a GMO, which I specifically refer to as the utilitarian benefits of the product (Voss, Spangenberg, and Grohmann 2003). As discussed, research suggests consumers morally oppose genetic modification regardless of any functional benefits that may result from such an intervention (Scott et al. 2016). Furthermore, since the moral response to the violation of protected values may bias people to reject any potential justifications for the violation (Tetlock 2002), I predicted that consumers would actually perceive fewer utilitarian benefits in a GMO product, but only when the GM-labeled food is positioned as being natural. Conversely, because cueing consumers to reason about the GM-labeled food as a manmade object attenuates the moral response (as shown in Study 2), moral opposition should no longer inhibit the perception of a GMO's utilitarian benefits. In sum, Study 3 was designed to test H_3 and thus, examined whether the observed increase in purchase intent when a GMO is promoted as a manmade object is accounted for by a decrease in moral opposition and a subsequent increase in perceived utilitarian benefits.

5.1 Method

5.1.1 Participants and design

Three hundred sixteen participants were recruited from a Qualtrics panel to approximate the demographic distribution (age and income) of primary household food shoppers in the US. Due to attrition, the sample was topped up with participants from MTurk. There were no significant differences between the Qualtrics and MTurk results. Participants (71.2% female; M_{age} = 42.5) were randomly assigned to one of four conditions in a 2 (Label: GM-labeled vs. AN-labeled) × 2 (Positioning: Natural Cue [Produce] vs. Manmade Cue [Energy Drinks]) between-subjects factorial design. The goal was to determine whether store placement context could alter how consumers see the product (see Appendix E).

5.1.2 Pretest

Participants (N = 80; 56.3% female; M_{age} = 34.13) were randomly assigned to view either an image of the produce aisle of a store or the energy drink aisle. Then, they evaluated the products depicted in the aisle in terms of how manmade or natural they were using the same items described in the Study 1 pretest. To confirm that the products were similar in terms of cost, participants were also asked to report how much they thought the products in the aisle cost on a single item: "Compared to other products sold in a grocery store, how much do the products sold in this aisle cost?" (anchored: 1 = *not a lot*; 9 = *a lot*). The results revealed that the products sold in the energy drink aisle were more comparable to a manmade object (M = 7.88) than to a natural object (M = 2.32; $F(1, 78) = 95.61$, $p < .001$). Conversely, the products sold in the produce aisle

were more comparable to a natural object (M = 6.90) than to a manmade object (M = 4.59; F(1, 78) = 15.66, $p < .001$). Thus, this manipulation was adopted as a means of cueing participants to reason about the target product as if it were either a manmade or natural product. Furthermore, as expected, cost inferences did not differ across contexts ($M_{Manmade\ Cue} = 5.73$, $M_{Natural\ Cue} = 5.33$; $p = .31$).

5.1.3 Procedures and dependent measures

Participants were first presented with the cover story that General Mills commissioned a study to get consumer opinions about a new cereal the company is preparing to launch. Two in-store contexts were selected because they had similar attributes to cereal (e.g., energy, vitamins, etc.), but also differed in the extent to which they were manufactured (manmade) versus natural. To that end, energy drinks and fresh produce were selected. These aisles were also chosen because they are both novel locations for cereal to be sold. Participants first viewed an image of either the energy drink or produce aisle and were asked to evaluate the products in the aisle. They were then shown the new (fictional) breakfast cereal being sold on a display in that aisle. In the AN-labeled condition, the ad stated that the oats used in the cereal had been grown naturally. Conversely, in the GM-labeled condition the ad stated that the oats in the cereal were genetically modified. All participants read that the oats consequently contained more vitamin B6 and produce high yields without needing fertilizer. Participants then completed an electronic questionnaire that consisted of the same purchase intent and perceived naturalness items described in Study 1. In an effort to gain more insight into the construct of moral opposition, a multi-item scale was adopted to tap the moral response to both the sale and manufacturing of the

product ("Selling this product is morally wrong" and "It is morally wrong for General Mills to use these oats in their cereal" anchored: 1 = *disagree strongly*; 7 = *agree strongly*; Laham et al. 2009). Lastly, participants were asked to rate the perceived utilitarian benefits of the product on five seven-point items (anchored: 1 = *ineffective/unhelpful/not functional/unnecessary/impractical*; 7 = *effective/helpful/functional/necessary/practical*; Voss et al. 2003). The survey concluded with basic demographic questions.

5.2 Results

5.2.1 Purchase intent

A two-way ANOVA on purchase intent ($\alpha = .96$) yielded a significant main effect of Label such that purchase intent was higher for the AN-labeled cereal (M = 4.02) compared to the GM-labeled cereal (M = 3.33; $F(1, 312) = 12.83$, $p < .001$, $\eta^2 = .04$). The main effect of Positioning was not significant ($M_{\text{Manmade Cue}} = 3.76$ vs. $M_{\text{Natural Cue}} = 3.59$; $p = .39$). Critically, the main effect of Label was qualified by a significant Label × Positioning interaction ($F(1, 312) = 4.60$, $p < .05$, $\eta^2 = .01$). As illustrated in Figure 3, simple effects confirmed that purchase intent for the GM-labeled cereal was higher when it was viewed amongst manmade products (M = 3.62) compared to natural products (M = 3.05; $F(1, 312) = 4.52$, $p < .05$, $\eta^2 = .01$). Conversely, purchase intent for the AN-labeled cereal did not differ as a result of the aisle it was sold in ($M_{\text{Manmade Cue}} = 3.89$; $M_{\text{Natural Cue}} = 4.14$, $p = .37$). The question was whether the placement manipulation would reduce moral opposition as in Study 2, and whether this would subsequently allow consumers to perceive the product's utilitarian benefits.

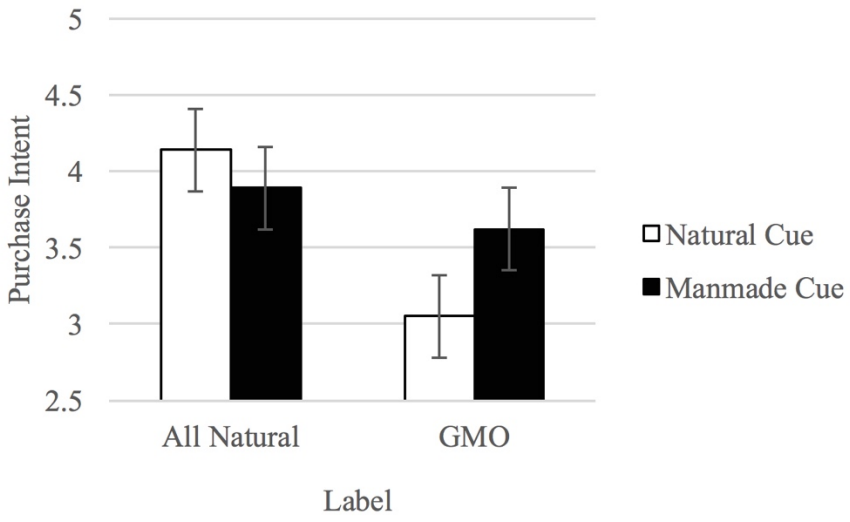


Figure 3: Purchase intent results for Study 3

5.2.2 Moral opposition

A two-way ANOVA on moral opposition (r = .82) yielded a significant main effect of Label such that participants were more morally opposed to the GM-labeled cereal (M = 2.57) than to the AN-labeled cereal (M = 1.65; F(1, 312) = 34.81, $p < .001$, $\eta^2 = .10$). There was also a significant main effect of Positioning, such that participants were more morally opposed to the cereal positioned amongst produce (M = 2.28) versus energy drinks (M = 1.94; F(1, 312) = 4.71, $p < .05$, $\eta^2 = .01$). As predicted, these main effects were qualified by a significant Label × Positioning interaction (F(1, 312) = 8.41, $p < .005$, $\eta^2 = .02$). Consistent with my theorizing, simple effects confirmed that moral opposition to the GM-labeled cereal was lower when it was positioned amongst energy drinks (M = 2.17) rather than produce (M = 2.96; F(1, 312) = 12.85, $p < .001$, $\eta^2 = .04$). Conversely, moral opposition for the AN-labeled cereal did not differ as a result of where it was sold ($M_{\text{Manmade Cue}} = 1.70$; $M_{\text{Natural Cue}} = 1.59$, $p = .61$). This supports the notion that no moral violation has taken place in the case of AN-labeled cereal. Next, I sought to

test whether the reduction in moral opposition towards the GM-labeled cereal allowed consumers to perceive its utilitarian benefits.

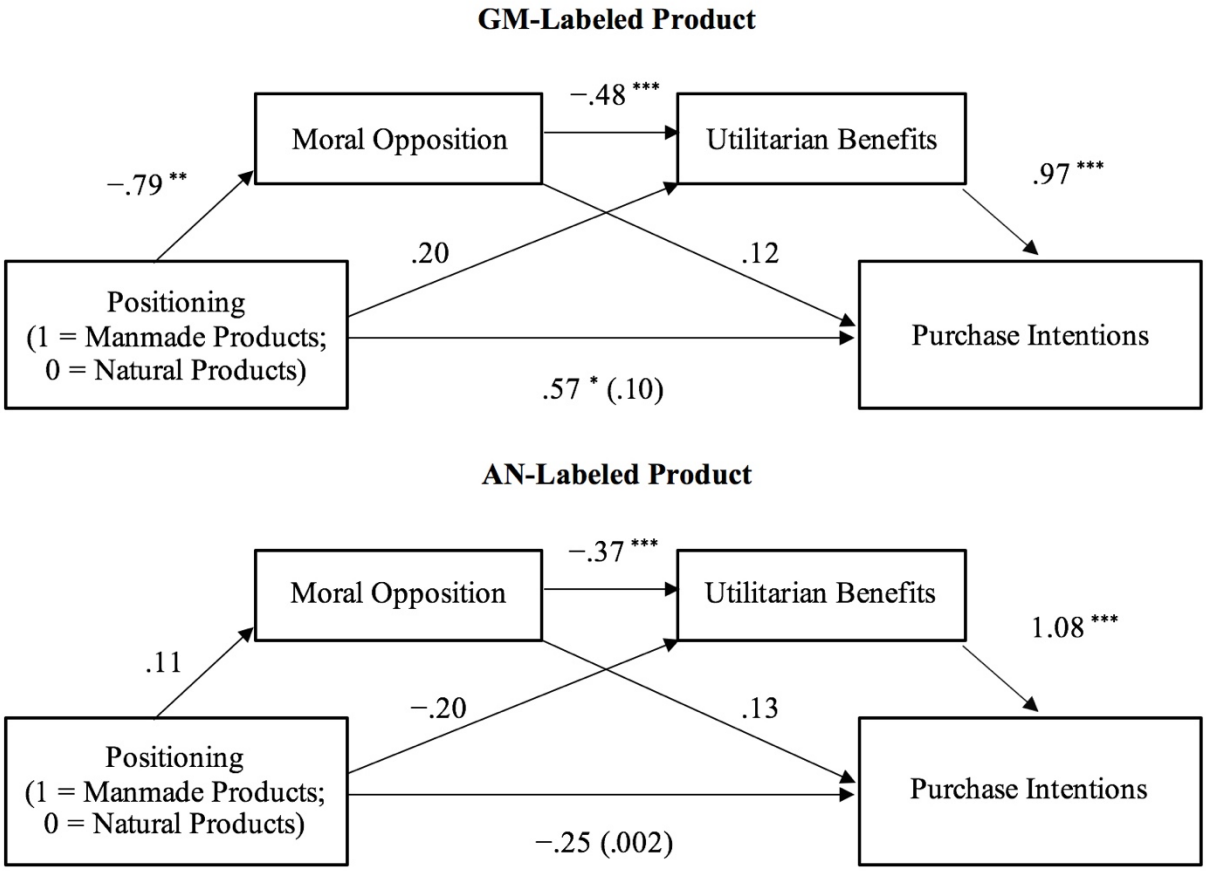
5.2.3 Utilitarian benefits

A two-way ANOVA on utilitarian benefits ($\alpha = .93$) yielded a main effect of Label, such that participants perceived greater utilitarian benefits for the AN-labeled cereal ($M = 4.67$) compared to GM-labeled cereal ($M = 3.92$; $F(1, 312) = 29.22$, $p < .001$, $\eta^2 = .08$). Similar to the purchase intent results, the main effect of Positioning was not significant ($M_{Manmade\ Cue} = 4.38$; $M_{Natural\ Cue} = 4.21$; $p = .22$). As predicted, the effect of Label was qualified by a significant Label × Positioning interaction ($F(1, 312) = 8.79$, $p < .005$, $\eta^2 = .03$). Simple effects confirmed that the GM-labeled cereal was perceived to offer greater utilitarian benefits when it was positioned amongst manmade products ($M = 4.21$) compared to natural products ($M = 3.63$; $F(1, 312) = 8.75$, $p < .005$, $\eta^2 = .03$). Conversely, perceived utilitarian benefits of the AN-labeled cereal did not differ as a result of where it was sold ($M_{Manmade\ Cue} = 4.55$; $M_{Natural\ Cue} = 4.79$, $p = .22$). Consistent with the notion that consumers do not consider the functional benefits associated with GMOs, a complex contrast revealed that participants who viewed the GM-labeled product amongst natural products reported the lowest perceived utilitarian benefits compared to a linear combination of all other cells ($F\psi(3, 312) = 13.16$, $p < .001$, $\eta^2 = .11$).

To determine whether a decrease in moral opposition allowed consumers to perceive the GM-labeled food's utilitarian benefits, a mediated moderation analysis was conducted (Hayes 2013; Model 8; bootstrapped with 20,000 draws). As predicted, the results revealed a significant conditional indirect effect of Positioning on utilitarian benefits through moral opposition for the

GM-labeled cereal (95% CI: .12; .62) but not for the AN-labeled cereal (95% CI: −.19; .09). To test H_3, a conditional serial mediation analysis was conducted (Hayes 2013; Model 6 split on Label; bootstrapped with 20,000 draws). As predicted, the results revealed that moral opposition and perceived utilitarian benefits serially mediated the effect of Positioning on purchase intent for those who viewed the GM-labeled cereal (95% CI: .13; .69; see Figure 4) but not for those who viewed the AN-labeled cereal (95% CI: −.19; .07).[3]

[3] When running Model 6 for the GM-labelled cereal again with the order of the mediators reversed, the analysis did not reveal significant serial mediation (95% CI: −.17; .01). An additional analysis was conducted to test for the possibility of parallel mediation across the same comparisons used in the serial mediation. Although there was a conditional indirect effect of perceived utilitarian benefits (95% CI: .78; 1.16), this was not significant for moral opposition (95% CI: −.03; .27). Thus, parallel mediation was not observed and the predicted serial mediation model best explained the data.



Note: All path coefficients represent unstandardized betas. * $p < .05$, ** $p < .005$, and *** $p < .001$.

Figure 4: Serial Mediation Results for Study 3

5.2.4 Confound check: Perceived naturalness

A two-way ANOVA on perceived naturalness yielded a significant main effect of Label such that the GM-labeled cereal was perceived to be less natural (M = 46.62) than the AN-labeled cereal (M = 69.59; F(1, 311) = 66.10, $p < .001$, $\eta^2 = .17$; see Table 3). Neither the main effect of Positioning ($M_{Manmade\ Cue} = 58.66$; $M_{Natural\ Cue} = 57.62$; $p = .73$) nor the Positioning × Label interaction were significant ($p = .19$).

Table 3: Treatment Means and Cell Counts for Study 3

	AN-Labeled		GM-Labeled	
	Natural Cue	Manmade Cue	Natural Cue	Manmade Cue
Purchase intent	4.14 (1.53)	3.89 (1.79)	3.05[a] (1.74)	3.62[a] (1.72)
Moral opposition	1.59 (.86)	1.70 (1.11)	2.96[b] (1.94)	2.17[b] (1.40)
Utilitarian benefits	4.79 (1.09)	4.55 (1.18)	3.63[c] (1.44)	4.21[c] (1.19)
Naturalness	70.95 (18.65)	68.23 (22.65)	44.29 (28.79)	48.97 (28.71)
Cell size	79	79	79	79

Note—Standard deviations are reported in parentheses. Means with matching superscripts represent simple effects of at least $p < .05$.

5.3 Discussion

The results of Study 3 provided additional evidence to suggest that marketing cues can reduce the negative response to GM-labeled foods and offered insights into how this can occur. Consistent with H_3, when consumers viewed the GM-labeled cereal amongst manmade products, the moral response to genetic modification was attenuated, which allowed consumers to perceive the product's benefits. This finding was of particular significance given that simply educating consumers on the benefits GMOs offer has been demonstrably ineffective at improving attitudes towards GMOs (Scholderer and Frewer 2003). Furthermore, although it has been found that consumers will explicitly state that they oppose genetic modification regardless of the benefits it may offer (Scott et al. 2016), this study offered the first empirical evidence that moral opposition impedes consumers' ability to perceive a GM-labeled food's benefits. Finally, building on prior

work showing that violating protected values can colour judgments of the individual who commits the immoral act (Tetlock et al. 2000), the results of this study demonstrated that consumers' perceptions of a product can be negatively impacted if that product violates a protected value.

As a final note, it seemed worthwhile to discuss the serial mediation results for the AN-labeled product. Consistent with Study 2, moral opposition did not activate for the AN-labeled product and as predicted, the serial mediation model was not significant for the AN product. However, moral opposition did significantly predict perceived utilitarian benefits, which subsequently predicted purchase intent (see Figure 4). This makes sense given that moral opposition was uniformly low across Positioning conditions and perceived utilitarian benefits were relatively high. The utilitarian benefits associated with the AN product were possibly the result of participants rationalizing their preference for natural (Rozin et al. 2004). Finally, it is not surprising that perceived utilitarian benefits would predict purchase intent. Thus, the results for the AN-labeled product depicted in Figure 4 are consistent with what one might expect from an ordinary food product. What this study offered was insight into the unique role of moral opposition and perceived utilitarian benefits in predicting the acceptability of a GM-labeled food and how this is impacted by the way in which the product is positioned.

Chapter 6

6 Study 4

Collectively, the previous studies demonstrated that the moral response to genetic modification will not emerge when consumers are cued to perceive the GM-labeled food as manmade. The rationale was that there is nothing morally questionable about humans altering manmade products. Thus, embedded in my theorizing was the assumption that the moral response to genetic modification is not activating when there is a manmade cue present. This assumption was consistent with research showing that moral intuition is a rapid, automatic process and that people are dominantly motivated to reason in a manner that is consistent with these intuitions (Ditto, Pizzaro, and Tannenbaum 2014; Haidt 2001, 2007). This ultimately suggested that the manmade cue increased preference for the GM-labeled product by reducing the moral response, rather than leading consumers to correct for the moral response after the fact. This study was designed to test this assumption by varying when consumers are exposed to the manmade cue. If consumers are first informed that the object is genetically modified, seeing the manmade cue after the fact should not attenuate their already activated moral opposition. However, if seeing a GM-labeled food as manmade to begin with circumvents moral opposition, then preference should be elevated in this condition.

Finally, due to the nature of the naturalistic field experiment, it was only possible to capture a single dependent variable (i.e., product trial). Thus, a pilot study was conducted as a means of testing this study design using the same dependent variables as in Study 3 (see

Appendix G). The pilot study demonstrated that preference for the GM food was higher when the manmade cue was presented before (vs. after) the label. Consistent with Study 3, the increase in purchase intent was serially mediated by moral opposition and utilitarian benefits—generalizing the effect to a whole GMO as opposed to an ingredient. The question was whether this shift in preference would manifest in a naturalistic setting. I followed Gneezy (2017) who argued that a true field experiment should involve participants "engaging in activities as they normally would, regardless of the experiment" (p. 140). Additionally, consumers should not be aware that the experimenter is manipulating factors and measuring behavior (Gneezy 2017). Study 4 was designed accordingly.

6.1 Method

6.1.1 Participants and design

Three hundred and ninety-eight shoppers were monitored in a small boutique grocery store in the Midwestern United States. These shoppers, who were unaware of the experiment, were randomly assigned to one of four conditions in a 2 (Label: GM-labeled vs. AN-labeled) × 2 (Order: Manmade Cue First vs. Label First) between-subjects factorial design. The product selected was plums. The manmade cue was present across all conditions and was in the form of product packaging (see Appendix H).

6.1.2 Pretest

Participants from MTurk (N = 40; 77.5% female; M_{age} = 38.9) were asked to rate the packaged plum using the same items described in the Study 1 pretest. The results revealed that the packaged plum was indeed more comparable to a manmade object (M = 6.88) than to a natural object (M = 4.18; $t(1, 39) = 4.37$, $p < .001$). Therefore, this manmade cue was carried forward and used in the study.

6.1.3 Procedures and dependent measure

A sampling table was ostensibly set up by a fictional company called Pure Plum. The product was conveyed as an advanced plum that was naturally grown (genetically modified) to possess enhanced cleansing properties. This explicit statement of intent was chosen in order to be conservative. Eating or drinking products that are thought to cleanse the body of toxins is a common practice engaged in by consumers who are particularly oriented toward buying natural products (Thompson and Troester 2002). Thus, the concept of a GM-labeled cleansing product should be fairly unappealing to most consumers interested in cleansing. A cleanse product also fit well with the grocery store the study was conducted in, since the store sold many organic and health-focused products. However, this context would also conservatively bias against the predicted results in that many consumers who buy organic foods do so because they are seen as natural (Lockie et al. 2004; Onyango et al. 2007). Given that GMOs are perceived to be unnatural (Rozin 2005; Rozin et al. 2004), it seemed likely that consumers shopping at this store would generally view GMOs unfavourably.

Participants were either first shown the packaged plum and then told that the product was naturally grown (genetically modified) or they were told that the product was naturally grown (genetically modified) and then shown the product. Afterwards, the technician lifted the cover off a sampling plate to reveal plum slices and toothpicks and asked if the customer would like to sample the product. Whether or not participants agreed to sample the plum served as the core dependent variable. Due to the nature of the naturalistic field experiment, participants did not complete a questionnaire. Thus, no other dependent variables were captured and no demographic information was collected.

6.2 Results and Discussion

A binary logistic regression on product trial (0 = *no trial*; 1 = *trial*) revealed a main effect of Label such that participants were less likely to try the GM-labeled product (36%) compared to the AN-labeled product (50%; $B = -1.30$, $SE = .30$, $p < .001$, OR = .27). There was also a main effect of Order such that participants were less likely to try the plum when the packaging was displayed before the label ($B = -.61$, $SE = .29$, $p < .05$, OR = .54). Critically, these main effects were qualified by a Label × Order interaction ($B = 1.41$, $SE = .42$, $p < .005$, OR = 4.07; see Figure 5). The nature of this interaction was such that participants were about twice as likely to try the GM-labeled plum when its packaging was presented before (45%), compared to after (27%), the label was conveyed ($B = .79$, $SE = .30$, $p < .01$, OR = 2.21). This was consistent with my prediction as well as the pilot study results. Conversely, participants were less likely to try the AN-labeled plum when its packaging was presented before (42%), compared to after (58%),

the label ($B = -.61$, $SE = .29$, $p < .05$, OR = .54). Although not predicted, it seemed possible that the manmade cue (i.e., the packaging) was impacted by the boutique grocery store context, leading to an effect of Order for the natural product. This was similar to Study 2 (which was conducted at a farmer's market) where the manmade cue reduced preference for the AN-labeled apple. Notably, in the Study 4 pilot study (see Appendix G), which was devoid of context, there was no effect of Order for the natural product. This further suggests that the store context may explain the observed effect of Order on preference for the natural product. Nevertheless, these results (and those from the pilot study) supported the premise that seeing a GMO as manmade can reduce consumers' negative response as long as the manmade cue precedes the label.

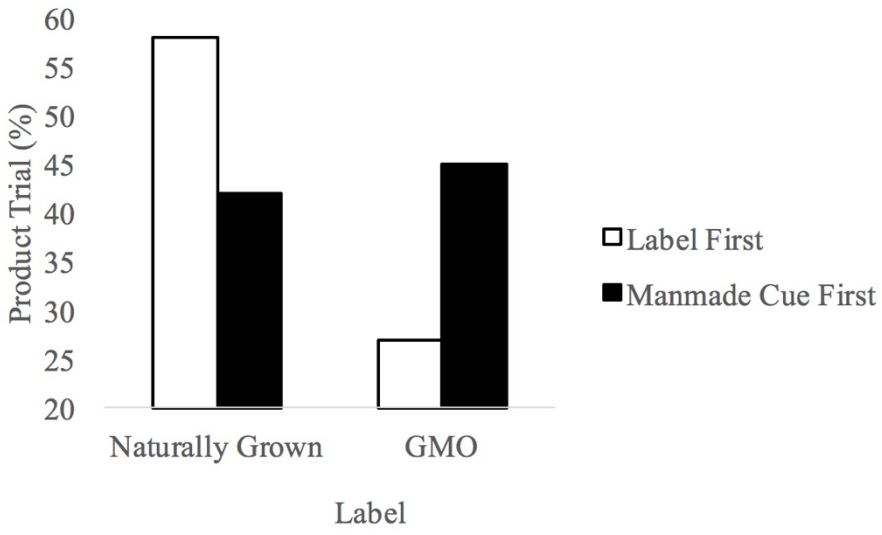


Figure 5: Product trial results in Study 4

Chapter 7

7 General discussion

This work is the first to demonstrate that the moral response to genetic modification is contingent upon the a priori belief that the product ought to be natural. Specifically, while it has been argued that consumers dislike GMOs because they are unnatural (Frewer et al. 1996; Tenbült et al. 2005) and therefore, somehow morally wrong (Scott et al. 2016; Takala 2004), the results of the current work demonstrate that this is not the case when marketing cues suggest that a GM food is manmade. Ultimately, these findings indicate that it may not be unnaturalness per se that consumers dislike about GMOs. Instead, it seems that the aversion to GMOs results from consumers being unable to view a GMO as anything more than something natural that humans have violated.

The vast majority of packaged food in the USA contains GMOs (Scientific American 2013). Although firms are not putting consumers at risk by selling these products, consumer acceptance remains low (Koch et al. 2015; Nicolia et al. 2014; Saletan 2015). Due to the strong movement towards mandatory GMO labeling in the USA, food companies are increasingly concerned about the negative implications this will have on sales and have spent millions opposing these policies (Ludwig 2013; Moodie 2016). The concern is largely derived from the intuitive assumption that consumers will respond negatively to products labeled as containing GMOs (Scientific American 2013). Across the studies reported here, I found that there are steps firms can take to reduce the likelihood of this outcome.

Drawing on research suggesting that the negative consumer response to GMOs is rooted in moral values about nature (Bredahl 2001; Frewer et al. 2013; Scott et al. 2016), I predicted and found that simple marketing cues can override the moral response to genetic modification. Specifically, Study 1 revealed that consumers preferred a GM-labeled food when they were told its intended function and an advertisement depicted it packaged like a manmade product. This offered initial evidence that the aversion to GMOs is malleable and may not emerge when consumers see the product as something humans have created. Study 2 replicated this phenomenon and demonstrated that moral opposition to genetic modification was attenuated when the GM-labeled food was made to look manmade. This supported the assertion that although people believe it is immoral to tamper with nature, they have no such belief about manmade objects. Study 2 also employed a control condition, making it possible to test (and ultimately supporting) the notion that the manmade cue increases preference for a GM-labeled food relative to a control. Study 3 replicated this effect yet again using a subtler placement manipulation, and demonstrated that the increase in preference for the GM-labeled food was serially mediated by a reduction in moral opposition and a subsequent increase in the product's perceived utilitarian benefits. Study 4 identified a critical moderator, whereby consumers must first see the manmade cue before knowing the organism has been modified.

7.1 Theoretical Implications

This work makes a number of theoretical advancements. First, I demonstrate that the moral response to genetic modification is contingent upon the product being viewed as a natural

object. As a result, positioning GM foods as manmade can override the moral opposition to genetic modification (Bredahl 2001; Frewer et al. 2013; Sjöberg 2000). Drawing on the distinction between how people reason about natural and manmade objects, these studies identify a novel means of reducing the negative response to genetic modification. By adopting cues to suggest that a GM food is manmade, I attenuated moral opposition, and this resulted in consumers being more responsive to the product's listed benefits. Importantly, this finding offers new insight to the existing theoretical explanations for why consumers generally dislike GMOs. Specifically, it adds an important caveat to the notion that people prefer natural (Rozin 2006; Rozin et al. 2004) and have moral values around naturalness (Takala 2004). This dissertation demonstrates that this only predicts how consumers will respond to a GM food when they have the initial belief that the product is natural. Thus, it appears that consumers' aversion is not to genetic modification per se, but to the idea that humans have fundamentally altered something natural.

These studies also extend prior work on the moral opposition to GMOs by isolating the moral barrier to the perception of benefits. Previous work drawing on the protected values literature has shown that people weigh the perceived immorality of genetic modification to be more important than any potential benefits it may offer (Scott et al. 2016). However, my research is the first to show that the moral response to genetic modification manifests as consumers not perceiving the GM food's benefits (see Limitations and Future Research). This therefore lends unique insights to and further synthesizes prior work on the moral response to GMOs (Scott et al. 2016) and protected values (Baron and Spranca 1997).

This research also directly contributes to the literature on the preference for natural (Rozin et al. 2004; Tenbült et al. 2005). Contrary to the widely held belief that consumers dislike GMOs because they are unnatural (Frewer et al. 1996; Rozin 2006; Tenbült et al. 2005), the studies reported here demonstrate that preference for a GM food is contingent upon how consumers reason about the product, not the degree to which it is seen as natural. In fact, by cueing consumers to view the GM food as a manmade object, purchase intent increased despite a marked drop in perceived naturalness (relative to the AN-labeled product). This builds on recent work exploring how visual changes in product design can enable the acceptance of more meaningful unobserved innovations (Noseworthy, Murray, and Di Muro 2018). Furthermore, this research is also the first to isolate and confirm the ideational (i.e., moral) underpinning of the preference for natural by overcoming methodological limitations inherent in prior work (Rozin 2006; Rozin et al. 2004). In particular, Rozin and colleagues (2004) concluded that since participants preferred a natural alternative despite being told that it was chemically identical to a less natural option, natural preference must therefore result from ideational (moral) beliefs since chemically identical objects could not reasonably differ in terms of their instrumental properties. However, the authors note that this conclusion can only be inferred and a significant limitation of the research was that it must be assumed that participants in fact believed that a natural object can be chemically identical to its less natural counterpart. Recent evidence does not support this assumption (Li and Chapman 2012). By holding the object constant (whether AN-labeled or GM-labeled) and altering how people reason about it, the studies presented here were able to parse out and isolate the ideational component of natural preference as it applies to GM foods. Specifically, I demonstrated that the established relationship between perceived naturalness and

acceptability in response to genetic modification (i.e., the drop on both of these measures) only holds when the product was viewed as a natural (as opposed to a manmade) object. Consistent with the notion that there is nothing inherently immoral about humans altering manmade objects, the reduction in moral opposition accounted for the subsequent increase in purchase intentions for the GM-labeled food that was positioned as a manmade product. This supported the notion that the unacceptability of unnaturalness has an ideational (i.e., moral) basis.

Finally, these findings also offer theoretical insights into one proposed explanation for the negative response to GMOs. Rozin and colleagues (2004) speculated that the aversion to human intervention into the food supply may extend from a more general application of the contagion principle, which posits that properties can transfer via mere physical contact (Mauss 2001; Rozin and Nemeroff 1990). The basic idea being that human intervention negatively contaminates natural entities (Rozin et al. 2004). Although it was not the goal of this dissertation to directly test this premise, the current findings offer some insight in this regard. In particular, despite the fact that all of the GM foods across my studies should have been equally contaminated in the eyes of participants, I reliably observed that the negative impact of human intervention could be attenuated. In particular, my results suggested that human intervention was not contaminating when the GM product was positioned as manmade. Thus, it may not be contagion per se that makes GM foods unappealing. Instead, it may be a more general negative response to the notion of humans violating a natural entity. Nevertheless, given the wealth of evidence that contagion impacts consumption (Argo et al. 2006; Di Muro and Noseworthy2013; Galoni and Noseworthy 2015; Newman et al. 2011), the notion that contagion may also play a

role in this context does seem plausible and thus more research is required to further investigate the role of contagion in the aversion to GMOs.

7.2 Managerial Implications

This research offers important insights in light of emerging labeling policies. Although many firms will likely be motivated to avoid being associated with GMOs due to the fear of stigmatization (Scientific American 2013), there will also be significant costs associated with falsely claiming that products are free from GMOs (Chassy and Jon Entine 2015). I show how firms can operate in a legislative climate that requires transparency while circumventing potentially negative sentiment from the public. Critically, I am not suggesting that firms trick or manipulate consumers. Instead, this work shows how firms can provide complete information in a way that avoids moral barriers.

The findings presented here highlight several ways in which marketers can strategically respond to calls for transparent GM labeling practices. For example, firms selling GMOs may want to alter their ad content to explicitly state why the GM product was altered and to avoid conveying the product in a way that could lead consumers to infer that it is natural. Although a transparent statement of intent alone may increase preference for a GM food paired with a natural cue, Study 1 revealed that people responded most positively to a GM food when it was paired with both a manmade cue and a statement of intent. The findings in Study 3 can also inform placement strategies. Specifically, it may be advantageous to locate a GM-labeled product in an aisle featuring processed foods, and not amongst natural produce. Furthermore, the

results of Study 2 spoke to the strategic design of GM foods. For example, it may be advantageous for firms to alter a GM fruit's physical appearance to override the moral response to genetic modification. Finally, Study 4 highlighted the strategic importance of ensuring that consumers are exposed to the manmade cue prior to learning that the product is a GMO. Given that moral responses tend to be automatic (Haidt 2001, 2007), it would be advantageous for managers to avoid activating them in the first place.

The current findings also lend a cautionary note to marketers in light of the recent GM food labeling debate (Chassy and Jon Entine 2015). Simply conforming to GM food labeling regulations has the potential for negative outcomes. Since GMOs typically look natural or are ingredients in products that consumers assume are natural, my results show that merely labeling a product as a GMO without incorporating a manmade cue and intent will elicit a negative response from consumers. Recall that the negative response to a GM-labeled food was strongest when the available cues suggested it was natural. Thus, marketers could adopt the strategic cues highlighted in this research to reduce the likelihood that consumers will infer that these GM foods are natural.

Finally, marketers often strive to convey a product's benefits to consumers and a new product's perceived benefits strongly predict its success in the market (Keller, Heckler, and Houston 1998). Furthermore, marketers often segment customers based on the benefits they expect from products (Dhalla and Mahatoo 1976; Haley 1968). However, GMOs represent a challenge for marketers in that consumers have been shown to be unreceptive to information about the benefits of GMOs (Scholderer and Frewer 2003; Scott et al. 2016). Indeed, educating consumers about the benefits of GMOs can even backfire, reducing consumers' likelihood of

purchasing these products (Scholderer and Frewer 2003). The current work speaks to this directly and identifies how marketers can help consumers to perceive a GMO's benefits.

7.3 Robustness Check

A meta-analysis is a widely used statistical technique for compiling and analyzing the results from multiple studies that have examined the same phenomenon. However, it can also offer a powerful tool for analyzing the studies reported in a single paper (McShane and Böckenholt 2017). In contrast to research in many other disciplines, there can never be exact replications in behavioural research (Brandt et al. 2014). This can complicate a meta-analysis because replications of these types of studies will, at the very least, differ in terms of methods factors such as the operationalization of manipulations, the subject pool that the sample is drawn from, where the study is conducted, etc. (McShane and Böckenholt 2017). This ultimately results in between study variation (i.e., heterogeneity). Recently, a framework for a Single Paper Meta-analysis (SPM; McShane and Böckenholt 2017) was specifically designed to accommodate the heterogeneity resulting from methods factors. Thus, the SPM offers a powerful means of assessing an effect revealed through behavioural research.

In order to assess the robustness of the effect observed across the studies in this dissertation, an SPM was conducted. Since the key contrast tested across all studies compared the manmade and natural cue conditions for the GM-Labeled product, this was the contrast that the SPM was built to analyze. However, due to the variation in the experimental designs used across the studies, a number of decisions had to be made when compiling the data for the SPM.

Recall that Study 1 manipulated whether intent was conveyed, whereas all subsequent studies conveyed intent across all conditions. In order to implement a consistent contrast across all studies, the Manmade Cue + Intent condition was compared to the Natural Cue + Intent condition (for the GM-Labeled product). With regard to Study 4, the field study data could not be used because the SPM software can only accommodate dependent variables reported as either means or proportions across all studies, not a combination across studies. Thus, I only included the Study 4 pilot study (Appendix G), which used a dependent variable that produced mean values, which was consistent with the other studies. Furthermore, the Study 4 pilot study had a different independent variable (i.e., Order) compared to the other studies. Although the "label first" vs. "manmade cue first" conditions are not identical to the manmade and natural cue conditions in the other studies, they were conceptually similar in the sense that they manipulated whether moral opposition would activate. Thus, the "manmade cue first" condition was treated as the "manmade cue" condition, while the "label first" condition was treated as the "natural cue" condition.

An SPM of these studies estimated the key contrast at .57 (95% CI: .20–.95; see Figure 6). In order to assess heterogeneity and gain a better understanding of the variation in the observations beyond what resulted from the experimental manipulations, an I^2 measure was generated in the SPM (Higgins et al. 2003). I^2 was estimated at 94% (95% CI: 92%–96%), suggesting that heterogeneity was very high. Recall that heterogeneity (i.e., between-study variation) can be caused by various factors, including the operationalization of experimental manipulations, social context, and the subject pool that participants were drawn from (McShane and Böckenholt 2017). Thus, the high heterogeneity reported here was not surprising given that

the studies in this dissertation were conducted in very different contexts (a lab, in the field, and online) and adopted very different Positioning manipulations (packaging, product colour, store context). Furthermore, the Order variable in the Study 4 pilot rather loosely mapped onto the Positioning independent variable, which would have further contributed to the observed heterogeneity. Nevertheless, the SPM estimate confirmed that the observed effect was robust.

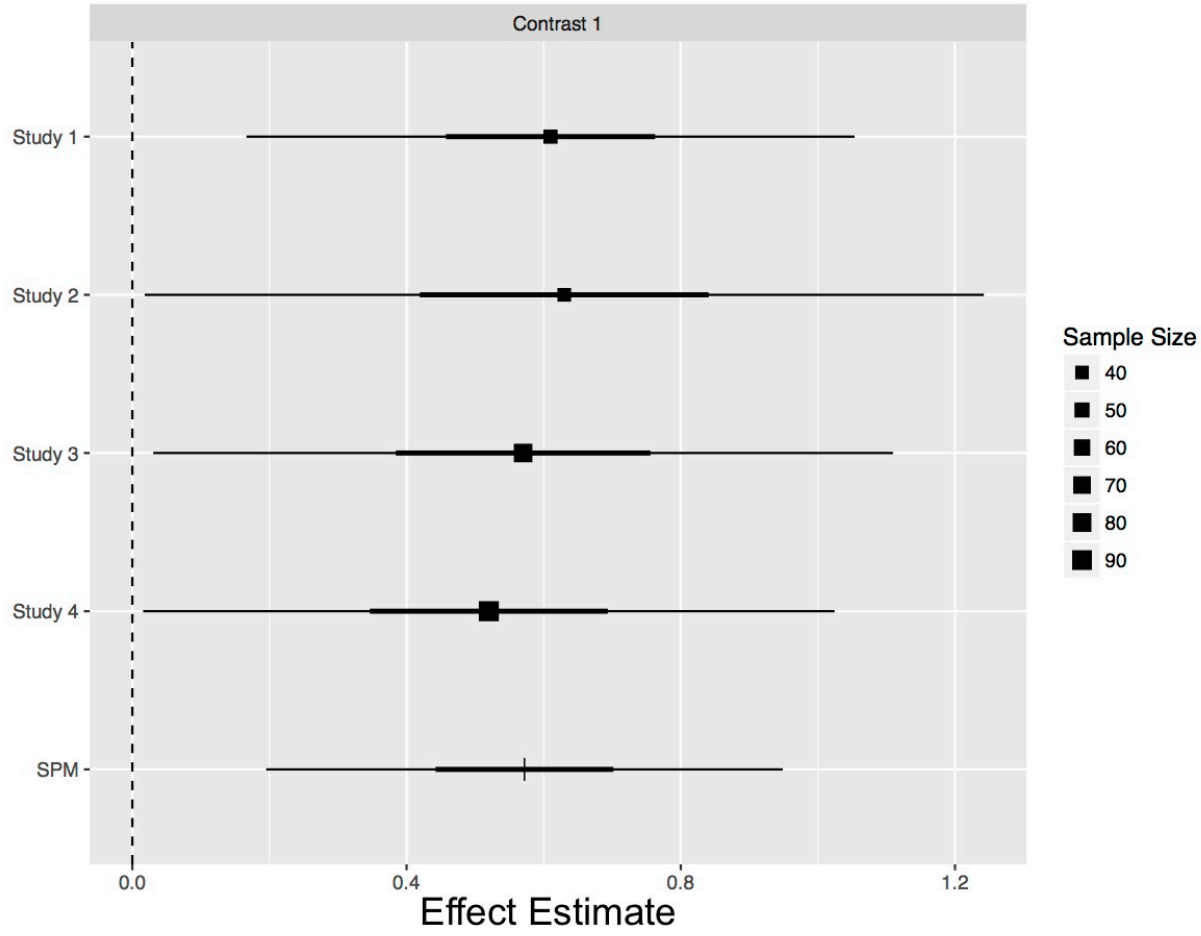


Figure 6: Single Paper Meta-analysis Plot

Finally, an additional analysis was conducted in an attempt to accommodate the additional study reported in Appendix J. Given the nonsignificant results in the half of the design featuring the corn product (presumably because the corn was displayed in a way that was problematic and had an unintended effect on the results), only the cereal condition was included in the follow up SPM. This was still conservative in that the predicted effect for the cereal product was not statistically significant. Nevertheless, the results estimated the key contrast at .55 (95% CI: .15–.95), indicating that it was robust.

7.4 Limitations and Future Research

Across four studies, I manipulated whether marketing cues indicated that the product was natural or manmade. While there was a pure control on the cue condition (re: Study 2), no study included a condition where there was no label. This was primarily in order to keep the studies balanced in terms of the amount and style of information conveyed. However, the notion of something being "all natural" would seemingly come with its own set of inferences. Nevertheless, my data suggests that in the absence of a label to the contrary, most consumers believe food products are natural. This may explain why GMO labeling is so contentious. It would be interesting for future research to investigate whether there are unanticipated effects of AN-labeling on consumer preference. For example, if a product is noted as AN and a neighbouring product is not, it is possible that consumers will infer that the neighbouring product is less natural, less healthy, more affordable, etc.

An unanticipated finding in Study 3 was that utilitarian benefits were higher for the AN-labeled product. Based on Rozin and colleagues' work (2004), it seems that this may be indicative of consumers rationalizing their preference for natural foods by expressing beliefs about its functional superiority (e.g., natural is healthier). It is also possible that functional concerns surrounding a GM-labeled food may arise for some products even when moral opposition is not activated. Despite there being little evidence to suggest that GMOs have a negative impact on consumers, continued politicization could lead to the general fear that GMOs may do more harm than good.

In my studies, consumer preference for GMOs with various intended functions (e.g., rehydration, reduced pesticides, augmented vitamin content, and cleansing) was explored. However, this is by no means an exhaustive test of all potential GMO functions and did not address whether some functions are more appealing than others. Furthermore, by definition, a GM ingredient constitutes an augmentation or addition to what is technically a manmade object (e.g., the cereal in Study 3). This raised the question of whether a GM food would be more acceptable as an ingredient in a manmade product (relative to a whole object) given that this kind of product could seem relatively more manmade, potentially making it easier to override moral opposition. An additional study was conducted to test this (see Appendix J). However, due to some shortcomings in the study, the results remain inconclusive. In the end, this question may be of little importance given that my effect was observed for both whole (e.g., apples) and processed foods (e.g., cereal).

In this work, I purposively varied the brands across studies. The brands used varied in terms of whether they were real (e.g., Nike) or fictional (e.g. Pure Plum). Given that the

predicted effects emerged regardless of whether the target product was made by a real or fictional brand, this ultimately lent support for the robustness of the effect. This doesn't suggest that branding is irrelevant, but simply that it was less impactful relative to the other cues I was implementing. Nevertheless, it would be interesting for future research to further investigate the possibility that different brands may be more or less successful in introducing a GM food product. For example, findings from prior research raise the possibility that dominant brands may be better able to launch GM food products (Bagga, Noseworthy, and Dawar 2016).

It is also worth noting that it was never formally predicted that the Positioning cue would have an effect on perceived naturalness. Although some movement was expected (particularly when changing the actual color of a product), there was nothing in the literature to suggest that such cues could override an explicit label stating the object is all natural. That said, there was movement in three studies, but this did not influence the predicted results in so much as there were no interactions to suggest that perceptions of naturalness could account for preference.

In this dissertation, I did not manipulate who was responsible for producing the product. The products used in my studies were generally conveyed in such a way that marketer involvement was rather salient (Study 2 may be an exception). For instance, the target products were presented in advertisements, in a store aisle, etc. Additionally, the statement of intent could have been perceived as a marketer's intent for the product. However, it is possible that the response to a GMO may vary depending on what kind of professional is associated with it. Recent polls indicate that 42% of consumers distrust brands and 69% distrust advertising (Tenzer and Chalmers 2015). Furthermore, consumers are particularly sensitive to deceptive practices by marketers and this can have broad negative implications even for non-offending firms (Darke,

Ashworth, and Main 2010; Darke, Ashworth, and Ritchie 2008; Darke and Ritchie 2007). Thus, consumers may be especially weary of marketers intervening and altering natural objects. This ultimately suggests that the studies reported here were rather conservative in that participants could have responded more negatively towards the GM-labeled products due to marketing's involvement. Conversely, given that 40% of Americans report that they have a great deal of confidence in the scientific community (Funk and Kennedy 2017), perhaps the negative response to a GM-labeled food would be relatively lower when it is framed as something produced by scientists as opposed to marketers. However, based on my theorizing, I would predict that the profession associated with a GM food should not matter. Generally speaking, people believe it is immoral to "play God" and tamper with nature (Sjöberg 2000; Takala 2004). Furthermore, if a protected value is relevant (Scott et al. 2016), then people should expect unconditional adherence to that value regardless of the profession one works in. Collectively, this suggests that the identity of the agent engaging in this behaviour will not impact consumers' response.

As previously mentioned, this work is the first to show that the moral response to genetic modification overrides the perception of the GMO's benefits. Although I demonstrated that this is the process that accounts for the higher purchase intentions for a GM-labeled food positioned as being manmade, I did not directly test the underlying process for the relationship between moral opposition and perceived utilitarian benefits. I reasoned that the reduction in perceived benefits would result from a tendency to reject potential justifications for the violation of a protected value (Tetlock 2002). Thus, people may be negatively biased against the notion that something they are morally opposed to has any beneficial properties. It would be interesting for

future research to further investigate the process by which moral opposition impacts subsequent judgments, including the perception of benefits.

Recently, firms have expanded the use of genetic engineering beyond food crops to include non-food applications such as trees. For example, trees have been genetically modified to grow faster and resist pests (The Economist 2013). Currently, there is scant research on how consumers respond to non-food products that are genetically modified. The dominant focus on food is likely due to the extensive use of GMOs in food and consumers' often vocal response to these products. Given that people exhibit a general affinity for nature that extends to non-food objects (Kaplan and Kaplan 1989; Kellert 2011; Kellert and Wilson 1993; Wilson 1984), it seems likely that the genetic modification of non-food products would elicit a similar moral response from consumers. However, this is an empirical question and more research is required to determine whether manmade cues can also reduce the moral response to genetic modification in non-food products as well.

7.5 Extending this Research

One potential extension of this work could be into the domain of "ugly produce", which is a term that refers to fresh fruits and vegetables that have physical imperfections. Research has shown that the way a food looks has an important influence on consumers' preferences (Bunn et al. 1990; de Hooge et al. 2017; Loebnitz, Schuitema, and Grunert 2015). In particular, Leobnitz and colleagues (2015) found that consumers were less willing to purchase fruits and vegetables that were abnormally shaped. While prior work has dominantly investigated how physical

features such as ripeness (Symmank, Zahn, and Rohm 2018) and blemishes (Bunn et al. 1990) impact preference, little is known about why consumers respond negatively to fruits and vegetables with an atypical form. Furthermore, the literature on suboptimal produce has been largely descriptive, demonstrating that consumers dislike these products as opposed to investigating why this is the case (Bunn et al. 1990; Loebnitz et al. 2015; Yue et al. 2007).

Misshapen produce seemed an interesting and relevant domain to extend my findings to for a number of reasons. First, similar to GM foods, it seemed plausible that the aversion to these products resulted from essentialist reasoning. In particular, if people tend to infer a causal relationship between a natural object's surface level properties and its underlying essence (Gelman 2003; Medin 1989), observing a form violation may lead consumers to question the object's category membership. This would also be consistent with research showing that people draw on natural objects' appearance as a diagnostic cue of their unobservable properties (Rehder and Kim 2009). Thus, it seemed possible that drawing on similar theory could lend predictions for cues that could augment preference for these products.

This potential extension was also interesting from a practical standpoint in that consumers' aversion to imperfect foods is a major contributor to food waste (Aschemann-Witzel et al. 2017; Buzby et al. 2011; Buzby and Hyman 2012). Aside from issues related to world hunger, the fact that food production accounts for nearly a third of all greenhouse gas emissions further highlights the significant negative impact of food waste (Garnett 2011). Thus, establishing a better understanding of the psychological basis for the aversion to atypical produce could offer both theoretical insights as well as practical implications for marketers and policy makers.

While prior work has dominantly investigated how physical features such as ripeness (Symmank et al. 2018) and blemishes (Bunn et al. 1990) impact preference, much less is known about why consumers respond negatively to produce with an atypical form. This also seemed more interesting given that it is quite intuitive that consumers would dislike food that appears as though it may be rotting or is overly ripe. In sum, I wanted to investigate whether I could reduce or even erase the negative response to form violations in produce. Drawing on a line of reasoning similar to what I have applied to GMOs, I predicted that adopting cues that would suggest either an intact or novel essential structure would elicit a more positive response to produce that has an atypical form.

I reasoned that cueing consumers to infer an essence that was distinct from what they might automatically expect could increase preference for a misshaped fruit. For example, when confronted with an atypically shaped apple, learning that it is a "Caledonian apple" (a fictional label) might increase preference because it would cue the consumer to draw less heavily on their established schema for an apple and simply infer a different essence. While this cue did significantly increase preference for the apple, participants still liked the apple with an atypical form less than its typical counterpart. Thus, the cue was not able to completely eliminate the drop in preference. One explanation could be that people were still drawing on their broader schema for an apple, which would make sense given that they were told that the product was another kind of apple. It is possible that referring to the atypical fruit as something entirely novel (e.g., narm fruit) could completely erase the drop in evaluations. However, this would have limited applicability to marketing. Another approach could be to add an AN-label to atypical produce, given the well established preference for natural (Rozin 2005; Rozin et al. 2004). For example,

the Canadian grocer Loblaws sells “naturally imperfect” produce. This is an interesting strategy because my data suggests people perceive atypically shaped produce as less natural. Future research could explore what inferences consumers make when faced with imperfectly shaped produce that is positioned as being natural, and whether this is in fact an effective way to position these foods.

In the end, boosting preference for these products proved rather difficult and I did not find evidence to suggest that the aversion to misshapen produce could be entirely eliminated. One potential reason for this may be due to the innate disgust response people experience when confronted with potentially spoiled foods (Haidt et al. 1997; Rozin and Fallon 1987). Furthermore, even if people do not necessarily infer that the food is spoiled, the food may be avoided due to the magical belief that “you are what you eat” (Rozin and Fallon 1987). Thus, it could be that even if the product simply seems flawed in some respect, consumers may be averse to it due to the implicit notion that they too may become flawed if they were to consume it.

7.6 Concluding Remarks

The production and sale of GM foods remains a controversial matter (Leyser 2014; McWilliams 2015; Miller and Conko 2004; Saletan 2015). It is worth noting that although this dissertation does not argue for the safety, efficacy, or desirability of GM foods, it does draw on mounting evidence that the aversion and opposition to GM foods may be unwarranted (Koch et al. 2015; National Academies of Sciences 2016; Nicolia et al. 2014; Qaim and Kouser 2013). In particular, recent reviews of published studies from the past decade or more found that there is

no discernable difference in health outcomes between populations of humans or livestock based on whether they consume GM foods (National Academies of Sciences 2016; Nicolia et al. 2014). However, this does not account for the potential environmental implications of cultivating GM crops, including cross-pollination, for example. Furthermore, one can consider consumers' aversion to GM foods rational if consumers have adopted the view that these products are harmful in some way. That is, disliking GM foods would be a reasonable response to the premise that they are harmful (even if this premise is not supported by the extant research).

Given the nature of the findings reported here, one natural question that arises is: what if the negative response to genetic modification is warranted? While this is possible, perhaps more interesting is the fact that the negative response to genetic modification appears to be insensitive to evidence in the sense that many consumers oppose GMOs despite having very little knowledge about genetic modification (Gaskell et al. 1999; Hallman, Cuite, and Morin 2013). Furthermore, there is evidence that when educated about GMOs, consumers' attitudes remain unchanged and purchase intentions are actually reduced (Scholderer and Frewer 2003). The aversion to GMOs also seems rather arbitrary. As Rozin (2006) points out, if people feel that altering the DNA of natural objects is immoral, they should also be strongly opposed to domestication and selective breeding, which alters far more genetic material than genetic engineering does. However, selective breeding has been used for centuries and consumers appear to be entirely accepting of this practice. Thus, if the moral response to human intervention into natural objects is both insensitive to evidence and arbitrary, it could be argued that there is something to be gained by facilitating consumers' ability to consider all relevant information when evaluating GMOs.

The debate surrounding how GM foods are sold and the implications thereof are also undoubtedly complex. In fact, despite the intuitive notion that labeling policies increase consumers' ability to choose what they buy, it has been argued that GMO labeling policies ultimately impede consumer choice because firms subsequently avoid GMO ingredients (Scientific American 2013). Furthermore, mandatory GM food labeling could also impose severe costs on consumers, given that reverting to non-GM foods would increase food prices by 10 to 50% (Chassy and Jon Entine 2015). By adopting the strategies outlined in this work, marketers can more confidently offer consumers the opportunity to choose GM foods, whether they wish to do so for the more desirable price, the reduced need for pesticide use, or because the GM food is healthier.

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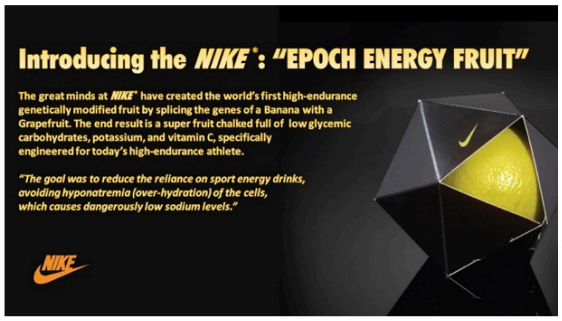
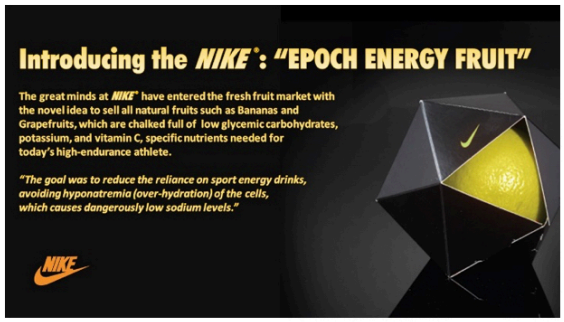
Appendix A: Study 1 Stimuli

GMO

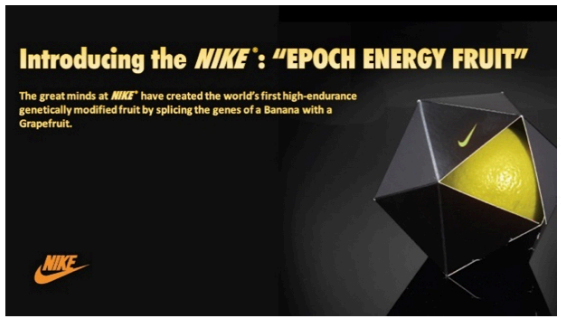
All Natural

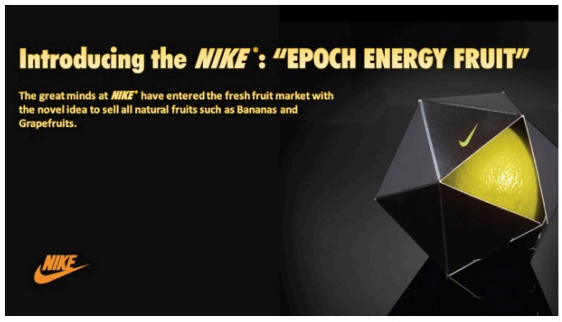
Manmade Cue + Intent



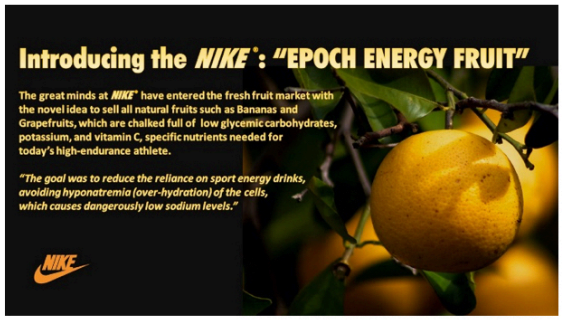


Manmade Cue – Intent





Natural Cue + Intent



Natural Cue – Intent

Appendix B: Study 1 Additional Analyses

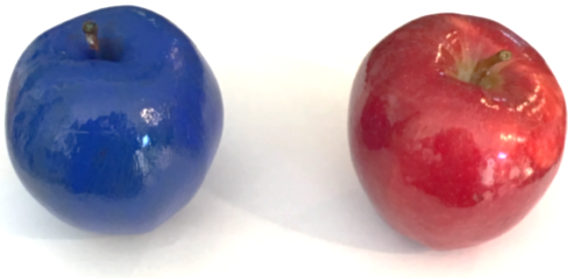
As previously mentioned, the Study 1 design combined cue (manmade vs. natural) and intent (present vs. absent) into a single four level variable given that these both converge to allow consumers to fully understand the product as being manmade or natural. However, from a substantive point of view, it may be considered useful to split the cue and a statement of intent into different independent variables, thus making it a 2 (Label: GM-labeled vs. AN-labeled) × 2 (Positioning: manmade cue vs. natural cue) × 2 (Intent: present vs. absent) between-subjects factorial design. For the sake of comprehensiveness, I also conducted this analysis.

A three-way ANOVA on purchase intent yielded an intuitive main effect of Label, such that purchase intent was higher for the AN-labeled product (M = 4.49) compared to the GM-labeled product (M = 3.86; $F(1, 343) = 20.62$, $p < .001$). This main effect was qualified by a significant Label × Positioning interaction ($F(1, 343) = 20.45$, $p < .001$). In support of H_1, pairwise comparisons revealed that purchase intent was higher for the GM-labeled product when it was viewed with a manmade cue (M = 4.13) than when it was viewed with a natural cue (M = 3.59; $F(1, 343) = 7.58$, $p < .01$). Conversely, purchase intent was higher for the AN-labeled product when it was viewed with a natural cue (M = 4.85) than when it was viewed with a manmade cue (M = 4.13; $F(1, 343) = 13.26$, $p < .001$).

The three-way interaction was not significant ($p = .67$). This seemingly supports the notion that a manmade cue can increase preference for a GM-labeled food even if intent is not conveyed. Although this could be interpreted as evidence that marketers may be able to utilize manmade cues in lieu of transparent statements, I would caution against this interpretation.

Closer examination revealed that preference for a GM-labeled food with a manmade cue only statistically differed from the natural cue when intent was present ($M_{Manmade\ Cue} = 4.54$ vs. $M_{Natural\ Cue} = 3.93$; $F(1, 343) = 4.81$, $p < .05$). The effect fell to marginal when intent was absent ($M_{Manmade\ Cue} = 3.72$; $M_{Natural\ Cue} = 3.25$; $p = .09$).

Appendix C: Study 2 Stimuli



Manmade Cue Control

Appendix D: Study 2 "No Intent" Pilot

This pilot study was conducted to test whether altering the physical appearance of a GMO would enhance preference for it in the absence of a statement of intent. Participants (N = 80; 53.8% female; M_{age} = 35.93) were randomly assigned to a 2(Positioning: Natural Cue vs. Manmade Cue) between-subjects main effect design. The guise and instructions were identical to Study 2. Participants viewed an image of a pair of apples and consistent with Study 2, the apple on the left was always an ordinary red apple. In the Natural Cue (Manmade Cue) condition, the apple on the right was red (blue). I held the GMO label constant, thus the apple on the right was always a GMO. Purchase intent was captured using the same scale as in the manuscript: a three item, 7-point scale ("*unlikely*/*likely*," "*improbable*/*probable*," and "*impossible*/*possible*"; Chattopadhyay and Basu 1990). Results revealed that purchase intent for the blue GMO apple (M = 2.10) was significantly lower than the red GMO apple (M = 4.12; $t(78) = 5.10$, $p < .001$). Thus, consistent with our theorizing, the manmade cue did not enhance preference for a GMO when the statement of intent was not present. In fact, the manmade cue alone lowered preference for a GMO in this case, highlighting the conservative nature of this cue.

Appendix E: Study 3 Stimuli

Energy Drink Aisle

Produce Aisle

Appendix F: Study 3 "No Intent" Pilot

This pilot study was conducted to test whether positioning a GMO amongst manmade products would enhance preference for it in the absence of a statement of intent. Participants (N = 80; 47.5% female; M_{age} = 33.0) were randomly assigned to a 2(Positioning: Natural Cue vs. Manmade Cue) between-subjects main effect design. The products, procedures, stimuli, and guise were identical to Study 3. The only difference was that the target product stimuli (General Mills' APEX cereal) had the statement of intent removed and was a GMO across both conditions. Purchase intent for the target product was captured using the same scale as in the study (and stated above in the Study 2 "No Intent" Pilot). Consistent with my theorizing, the manmade cue did not enhance preference for the GMO cereal when it was not accompanied by a statement of intent ($M_{Manmade\ Cue}$ = 2.50, $M_{Natural\ Cue}$ = 2.70; p = .57).

Appendix G: Study 4 Pilot Study

Method

Participants and design. Three hundred and seventy-four consumers (54.3% female; M_{age} = 35.5) were recruited from MTurk. Participants were randomly assigned to one of four conditions in a 2 (Label: GMO vs. Naturally Grown) × 2 (Order: Manmade Cue First vs. Label First) between-subjects factorial design.

Stimuli. The stimuli adopted for this pilot study was a photograph of the exact product that was used in the field experiment (see Appendix H).

Procedures and dependent measures. This study adopted the cover story that a company is launching a new plum product and was interested in consumers' opinions of the product. Following the cover story, participants in the Manmade Cue First condition viewed an image of the product then read a brief description of the product. Conversely, participants in the Label First condition read a brief description of the product then viewed an image of the product. Embedded in the product description was the Label manipulation, which entailed the explicit statement that the product was either grown naturally or genetically modified to contain a high concentration of vitamins and minerals. Then, purchase intent, moral opposition, utilitarian benefits, and perceived naturalness were captured using the same items outlined in Study 3. The survey concluded with basic demographic questions.

Results

Purchase intent. A two-way ANOVA on purchase intent ($\alpha = .94$) yielded a main effect of Label such that participants were more likely to purchase the GMO plum (M = 3.06) than the naturally grown plum (M = 2.71; $F(1, 370) = 4.32$, $p < .05$, $\eta^2 = .01$). Critically, this was qualified by a Label × Product Cue interaction ($F(1, 370) = 5.85$, $p < .05$, $\eta^2 = .02$). As predicted, simple effects revealed that participants were more likely to purchase the GMO plum when the manmade cue was presented before the GMO label (M = 3.33) compared to when the GMO label was presented before the manmade cue (M = 2.81; $F(1, 370) = 4.21$, $p < .05$, $\eta^2 = .01$). Purchase intent for the natural plum did not differ between the Manmade Cue First condition (M = 2.53) and the Label First condition (M = 2.87; $p = .18$).

Moral opposition. A two-way ANOVA on moral opposition (r = .89) yielded a main effect of Label such that participants were more morally opposed to the GMO plum (M = 2.78) than the naturally grown plum (M = 2.45; $F(1, 370) = 3.53$, $p = .06$, $\eta^2 = .01$). Critically, this was qualified by a Label × Product Cue interaction ($F(1, 370) = 6.31$, $p < .05$, $\eta^2 = .02$). Simple effects revealed that participants were less morally opposed to the GMO plum when the manmade cue was presented before the GMO label (M = 2.52) compared to when the GMO label was presented before the manmade cue (M = 3.01; $F(1, 370) = 4.15$, $p < .05$, $\eta^2 = .01$). Moral opposition to the natural plum did not differ between the manmade cue first condition (M = 2.63) and the label first condition (M = 2.28; $p = .13$).

Utilitarian benefits. A two-way ANOVA on utilitarian benefits (α = .91) yielded a main effect of Label such that participants perceived greater utilitarian benefits for the GMO plum (M = 3.81) than the naturally grown plum (M = 3.55; F(1, 370) = 4.00, $p < .05$, $\eta^2 = .01$). Unlike Study 3, the results did not indicate that utilitarian benefits were higher for the natural product. This may have occurred because the product was presented with a manmade cue and a statement of intent in all conditions, potentially reducing the perceived utilitarian benefits of the natural product. Critically, this was qualified by a Label × Product Cue interaction (F(1, 370) = 5.59, $p < .05$, $\eta^2 = .01$). Simple effects revealed that participants perceived the GMO plum to have greater utilitarian benefits when the manmade cue was presented before the GMO label (M = 4.00) compared to when the GMO label was presented before the manmade cue (M = 3.63; F(1, 370) = 3.68, $p = .06$, $\eta^2 = .01$). Perceived utilitarian benefits of the natural plum did not differ between the manmade cue first condition (M = 3.41) and the label first condition (M = 3.68; $p = .16$).

To determine whether a decrease in moral opposition enhanced the GMO's perceived utilitarian benefits, a mediated moderation analysis was conducted (Hayes 2013; Model 8; bootstrapped with 20,000 draws). As predicted, the results revealed a significant conditional indirect effect of Order on utilitarian benefits through moral opposition when the cereal contained genetically modified corn (95% CI: .008; .37) but not when it contained corn that was naturally grown (95% CI: −.31; .03). To conduct a test of H_3, a conditional serial mediation analysis was conducted (Hayes 2012; Model 6 split on Label; bootstrapped with 20,000 draws). As predicted, looking exclusively at the participants who viewed the GMO plum, the results revealed that moral opposition and perceived utilitarian benefits serially mediated the effect of Order on purchase intent (95% CI: .01; .43). Additional analyses indicated that the model was

nonsignificant when the order of the mediators was reversed (95% CI: −.10; .004). Conversely, when looking at participants who viewed the naturally grown plum, moral judgments and perceived utilitarian benefits did not serially mediate the effect of Order on purchase intent (95% CI: −.26; .02).

Confound check: Perceived naturalness. A two-way ANOVA on perceived naturalness once again revealed the expected main effect of Label, such that participants perceived the GMO plum to less natural (M = 43.63) than the naturally grown plum (M = 52.37; $F(1, 369) = 7.98$, $p < .01$, $\eta^2 = .02$). There was also a main effect of Order such that participants perceived the plum to be less natural when they read the product description first (M = 44.77) than when they viewed the product first (M = 51.65; $F(1, 369) = 4.88$, $p < .05$, $\eta^2 = .01$). The Label × Order interaction was not significant ($p = .82$).

Appendix H: Study 4 Stimuli

Appendix I: Study 4 "No Intent" Pilot

This pilot study was conducted to test whether presenting a manmade cue before the GMO label would enhance preference for the GMO in the absence of a statement of intent. Participants (N = 80; 55.0% female; M_{age} = 35.96) were randomly assigned to a 2(Order: Manmade Cue First vs. Label First) between-subjects main effect design. The procedure, stimuli, and guise were identical to Study 4. The only difference from the field study being that the target product was presented as an image and the GMO label was presented textually (as opposed to verbally). Purchase intent for the target product was captured using the same scale as in the study (and the other "No Intent" pilots). Consistent with my theorizing, viewing the manmade cue before the GMO label did not enhance preference for the GMO when it was not accompanied by a statement of intent ($M_{Manmade\ Cue\ First}$ = 2.76, $M_{Label\ First}$ = 2.73; p = .94).

Appendix J: Additional Study

The primary goal of this study was to explore the question of whether GMOs are more acceptable as ingredients in manmade products as opposed to being sold as whole entities (e.g., apples). Although the previous studies demonstrated the effect of a manmade cue on the acceptance of a GM-labeled food for whole entities (e.g., apples in Study 2) and foods with GM ingredients (e.g., cereal in Study 3), the relative strength of the manmade cue for each of these kinds of products had not been tested in a single study. One possibility was that a GMO would be more acceptable as an ingredient because the product it is included in is ultimately manmade. Conversely, I predicted that a GMO positioned as being manmade would be equally acceptable as an ingredient and as a whole entity based on the notion that people ultimately reason about the GMO regardless of its form. Indeed, consumers appear to dislike GMOs both as whole entities and ingredients (Chassy and Jon Entine 2015; Frewer et al. 1996). This prediction was also consistent with the results of Study 3, which showed that even when a GMO is used as an ingredient in a manmade product (e.g., cereal), consumers still think about the modified ingredient itself (e.g., oats) in terms of being natural. Specifically, in Study 3, consumers exhibited a substantial drop in preference for the cereal containing a GMO when it was positioned amongst natural products. This suggested that the product was evaluated negatively because participants were reasoning about the oats as though they were natural despite having been incorporated into a manmade product. Thus, if consumers are equally averse to genetically modified ingredients and whole entities, then the Label × Positioning × Product interaction should not be significant. However, if the established effect of positioning a GM-labeled food as

manmade replicates, the Label × Positioning interaction (for the full design, not broken out by Product) should be significant.

Similar to Study 3, I sought to adopt an indirect means of cuing consumers to reason about the product as either natural or manmade. Prior work has demonstrated that adjacent products can influence how consumers process a target (Meyers-Levy and Malaviya 1999; Nam and Sternthal 2008; Noseworthy, Cotte, and Lee 2011). For example, researchers have shown that viewing ads for similar products (as opposed to unrelated products) can lead consumers to see a new product as more closely resembling the products in the adjacent ads (Noseworthy et al. 2011). This suggested that viewing consecutive natural (manmade) products might increase the likelihood that a subsequent product would be evaluated as though it is natural (manmade). Therefore, if a product's positioning indeed serves as a cue for how it should be understood and evaluated, then it was expected that similar effects as in Studies 1 and 2 would again emerge without manipulating the product itself.

Method

Participants and design. Consumers (N = 316; 54.7% female; M_{age} = 37.2) were recruited from MTurk and randomly assigned to one of eight conditions in a 2 (Label: GM-labeled vs. AN-labeled) × 2 (Positioning: Manmade Cue vs. Natural Cue) × 2 (Product: Corn vs. Corn Flakes) between-subjects factorial design. The goal was to manipulate whether the target product was positioned amongst either natural or manmade objects. Thus, the stimuli consisted of two sets of two products that were either manmade (bike lock, fan) or natural (flowers, carrots; see Appendix K).

Pretest

Participants from MTurk (N = 79; 49.4% female; M_{age} = 40.2) were randomly assigned to view either a manmade product (i.e., a fan or a bike lock) or a natural product (i.e., carrots or flowers) and subsequently rate it using the same pretest items as in Study 1. As anticipated, those who viewed a manmade product reported that it was indeed more comparable to a manmade object (M = 8.72) than to a natural object (M = 1.15; F(1, 77) = 304.88, $p < .001$). Conversely, those who viewed a natural product reported that it was more comparable to a natural object (M = 7.25) than to a manmade object (M = 3.73; F(1, 77) = 67.91, $p < .001$). Thus, this manipulation was adopted as a means of cueing participants to reason about the target product as if it were either a manmade or natural product.

Procedures and dependent measures. Participants were first presented with the cover story that the study was commissioned by a large American retailer. They were told that they would be viewing several products and would then be randomly asked questions about one of the products (a guise). Participants then viewed either two manmade products or two natural products. The products were conveyed independently and in randomized order. The third product in both series was either Harvest Bounty corn flakes breakfast cereal or Harvest Bounty corn. In the naturally grown condition, it was stated that the corn had been grown using natural farming practices. Conversely, in the GMO condition it was stated that the corn was developed using gene splicing technology. All participants read that the corn consequently contains more vitamin B6 and produces high yields without needing fertilizer. After participants viewed the final

product, they filled out an electronic questionnaire that consisted of the same purchase intent, moral opposition, and utilitarian benefits as in Study 3. The survey concluded with basic demographic questions.

Results

Purchase intent. A three-way ANOVA on purchase intent (α = .96) yielded a marginally significant Label × Positioning × Product interaction ($F(1, 308) = 3.31$, $p = .07$, $\eta^2 = .01$). Subsequent analyses revealed that the Label × Positioning interaction was not significant for either the corn ($p = .32$) or the breakfast cereal ($p = .12$). Finally, the Label × Positioning for the full design was not significant ($p = .70$).

Moral opposition. A three-way ANOVA on moral opposition (r = .94) yielded a significant Label × Positioning × Product interaction ($F(1, 308) = 7.16$, $p < .01$, $\eta^2 = .02$). The nature of the interaction was such that when the product was breakfast cereal, there was a significant Label × Positioning interaction ($F(1, 308) = 5.58$, $p < .05$, $\eta^2 = .01$). Consistent with Study 3, simple effects revealed that participants were less morally opposed to the GM-labeled cereal when it was positioned amongst manmade products (M = 2.21) compared to natural products (M = 3.23; $F(1, 308) = 12.59$, $p < .001$, $\eta^2 = .04$). Also in line with Study 3, moral opposition toward the AN-labeled cereal was not impacted by Positioning ($M_{\text{Manmade Cue}} = 1.35$; $M_{\text{Natural Cue}} = 1.41$, $p = .83$). When the product was corn, the Label × Positioning interaction was not significant ($p = .16$). Finally, the Label × Positioning for the full design was not significant ($p = .51$).

Utilitarian benefits. A three-way ANOVA on utilitarian benefits (α = .91) yielded a significant Label × Positioning × Product interaction ($F(1, 308) = 6.58$, $p < .05$, $\eta^2 = .02$). The nature of the interaction was such that when the product was breakfast cereal, there was a significant Label × Positioning interaction ($F(1, 308) = 5.89$, $p < .05$, $\eta^2 = .01$). As predicted, simple effects revealed that participants perceived greater utilitarian benefits when the GM-labeled cereal was positioned amongst manmade products (M = 4.67) compared to natural products (M = 3.74; $F(1, 308) = 16.96$, $p < .001$, $\eta^2 = .04$). Utilitarian benefits for the AN-labeled cereal was not impacted by Positioning ($M_{\text{Manmade Cue}} = 5.32$; $M_{\text{Natural Cue}} = 5.25$, $p = .76$). When the product was corn, the Label × Positioning interaction was not significant ($p = .23$). Finally, the Label × Positioning for the full design was not significant ($p = .39$).

To determine whether a decrease in moral opposition allowed consumers to perceive the GMO cereal's utilitarian benefits, a mediated moderation analysis was conducted (Hayes 2013; Model 8; bootstrapped with 20,000 draws). As predicted, the results revealed a significant conditional indirect effect of Positioning on utilitarian benefits through moral opposition when the cereal contained genetically modified corn (95% CI: .11; 1.00) but not when it contained corn that was naturally grown (95% CI: −.15; .21).

Confound Check: Perceived naturalness. As expected, a three-way ANOVA on perceived naturalness yielded a significant main effect of Label such that the GM-labeled product was perceived to be less natural (M = 50.13) than the AN-labeled product (M = 77.06; $F(1, 308) = 99.38$, $p < .001$, $\eta^2 = .24$; see Table 4). There was also a significant main effect of

Product such that the breakfast cereal was perceived to be less natural (M = 60.88) than the corn on the cob (M = 66.69; F(1, 308) = 4.45, $p < .05$, $\eta^2 = .01$). No other effects, including the Positioning × Label interaction within the cereal condition, were significant (*ps* > .14).

Table 4: Treatment Means and Cell Counts for Additional Study

	Corn				Cereal			
	GM-Labeled		AN-Labeled		GM-Labeled		AN-Labeled	
	Natural Cue	Manmade Cue	Natural Cue	Manmade Cue	Natural Cue	Manmade Cue	Natural Cue	Manmade Cue
Purchase Intent	4.58 (1.84)	4.26 (1.94)	5.36 (1.25)	5.60 (1.40)	2.96 (1.70)	3.38 (1.90)	4.58 (1.62)	4.14 (2.00)
Moral Opposition	2.26 (1.37)	2.48 (1.43)	1.75 (1.06)	1.39 (0.94)	3.23[a] (2.10)	2.01[a] (1.46)	1.41 (0.92)	1.35 (0.71)
Utilitarian Benefits	5.06 (1.10)	4.85 (1.89)	5.49 (.93)	5.71 (1.00)	3.74[b] (1.40)	4.67[b] (1.20)	5.25 (.88)	5.32 (1.06)
Naturalness	56.46 (30.42)	50.75 (26.26)	80.00 (17.62)	78.78 (21.99)	42.23 (28.69)	51.59 (28.83)	74.98 (14.76)	74.50 (20.70)
Cell Size	37	40	40	40	40	39	40	40

Note—Standard deviations are reported in parentheses. Means with matching superscripts represent simple effects of at least $p < .05$.

Discussion

Although these results did not entirely conform to my predictions, they were informative in a number of ways. First, the two-way results for the corn product suggest that merely

positioning a GM-labeled food amongst manmade products in an advertising context may be insufficient to overcome the moral opposition to genetic modification when the product still looks like a natural entity.[4] Indeed, research suggests that the surface level properties of natural objects are particularly strong cues of that object's category membership (Hampton et al. 2009). Thus, it is not surprising that the physical form of the natural object would serve as a more prominent cue that it is natural compared to adjacent advertisements (which are a relatively subtle cue) suggesting that it is manmade. Although one should be cautious about interpreting a null effect, there does seem to be a theoretical explanation for why ad context did not alter consumers' response to the GM corn. In hindsight, it seems that designing the study this way was too conservative and biased too strongly against the predicted effect of ad context. A better approach may have been to adopt a more controlled means of altering the product category. Given the strength of a natural object's physical form in categorization, perhaps it would be best not to display the target products at all. Instead, the ad copy could merely describe the products as either corn flakes or corn on the cobb, offering a cleaner product category manipulation.

Second, when the product was breakfast cereal, the established effect for two out of three dependent variables (moral opposition and utilitarian benefits) emerged as predicted.

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[4] Subsequent analyses confirmed that there was a significant main effect of Label on moral opposition for the GM-labeled corn such that participants were more morally opposed to the GM-labeled corn (M = 2.37) compared to the AN-labeled corn (M = 1.57; $F(1, 153) = 19.39$, $p < .001$). Thus, it seems that moral opposition indeed activated in response to genetic modification, but the manmade cue was insufficient to circumvent this.

Specifically, positioning the GM-labeled cereal amongst manmade products reduced moral opposition, and this led to an increase in perceived utilitarian benefits. However, it is unclear why this did not translate into purchase intentions, as it did in the other studies. In the end, these results could simply be due to statistical variation and/or noise. Another possibility is that while prior work has typically presented participants with three advertisements as part of the manipulation (Noseworthy et al. 2011, 2012), this study only presented participants with two advertisements. Thus, it is possible that increasing the strength of the positioning manipulation by adding additional advertisements would have enhanced the downstream effects. Another way to strengthen this manipulation could be to explicitly state that the group of products have been bundled together. This could increase the extent to which the preceding advertisements influence how participants reason about the target ad.

Appendix K: Additional Study Stimuli

Manmade Cue

Natural Cue