The Artificial Divide: How Food Additives Perpetuate Cultural and Socioeconomic Stereotypes in the United States

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Overwhelming arrays of colorful products line the aisles of modern American grocery stores. Corporate branding, appealing images, and health-related claims plastered across food packages inundate shoppers and overshadow un-processed foods. A study examining data from the 2000-2012 Homescan Panel[1] reveals seventy-six percent of foods and beverages consumed by US households to be moderately or highly processed (Poti et al., 2015). These results suggest food altered by processing is widely accepted, as shown by purchasing behavior of the average American household for over a decade. However, this behavior is easily manipulated by the media's influence on public perception. An ABC World News story on processed ground beef from March of 2012 used language like "pink slime" to frame the chemically treated meat as risky to consume. As a result of this broadcast, consumers' opinion and purchase of this product plummeted (Runge et al., 2018). A single news story and social construction of technology, especially when framed to echo current public concerns, has the power to produce actual shifts in consumer behavior, and on a national scale, so one can image the remarkable influence on societal beliefs and attitudes—and stereotypes.

In recent years, TV news and online media have expanded their nutrition inquisition to additives in food production. Stories portray these ingredients and the foods containing them as unhealthy and inferior ("Toxic Food Ingredients," 2012; Fox, 2019; Gunnars, 2017; UNC Health Talk, 2018). Complex interactions among corporate and consumer stakeholders and other sociomaterial actors govern the public understanding of food processing and additive technology. Consequently, this research analyzes the relationships among food additives, the food industry,

[1] The 2000-2012 Homescan Panel longitudinally tracked all foods consumed by US households.

and consumer groups of various social factors through a mixed methods approach. The methodology combines the lenses of Social Construction of Technology (SCOT) and Actor-Network Theory (ANT) to address the interactions between actors and to identify network relations perpetuating racial-ethnic and socioeconomic minority group stereotypes (Michael, 2017; Pinch & Bijker, 1984).

Sociomaterial Case Studies for Investigating Ingredient Constructions and Stereotypes

This project seeks to answer how sweetening additive technology in processed foods perpetuate racial-ethnic and socioeconomic stereotypes in the United States. The research methodology employs analysis of three empirical case studies: a historical case study on the flavoring additive monosodium glutamate (MSG), a modern case study comparing sweetening additives high-fructose corn syrup (HFCS) and brown rice syrup, and a case study of various media actants and their role in food additive social construction. Archival and published accounts are gathered by historical analysis methods in the first case study, and by documentary research methods in the second and third case studies. With these methods, each case study thematically presents the central actors and key relationships that provide evidence of social constructions of food additives, categorization of food by healthfulness, and stereotype causes and reinforcers. Per the material semiotic perspective this work utilizes, human and non-human actors are considered as having equal agency (Latour, 1992). Discourse analysis is used to interpret digital or physical primary source consumer accounts, food packaging, or marketing materials containing dialogue about food additives or associated food products relevant to the case study. Recognizing the many actors at play in each case study, this work does not aim to address every actor or to detail complete actor-networks surrounding the social construction of food additives

and all relationships promoting stereotype perpetuation. Instead, the scope of this paper is limited to a small sample of selected actors and intermediaries central to the case study.

Food-Enhancing Technologies and Health

Food additives are defined by the Food and Drug Administration (FDA) as any addition or chemical modification to a directly harvested agricultural good that alters any characteristic of the food (FDA, 2010). Thus, the inclusion of a naturally derived ingredient, as well as a synthetically created one, is considered a food additive, for the added compound is not present in the food's original, raw composition (Monteiro et al., 2019). Artificial compounds and processing methods developed by food scientists and technologists alter the characteristics of fresh meat and produce, or may be used to build entirely synthetic products. These chemical, physical, and biological alterations benefit both the sellers and buyers. For example, including preservatives in the manufacturing process prolongs a product's freshness in taste and texture, and increases the time before spoilage. The extension to shelf life is advantageous for scaled up business models by allowing time for farther distribution, mass production, and waste reduction by increasing the places, number and selling duration, respectively. Additionally, this property is convenient and economical for consumers because perishable foods last longer (Institute of Food Technologists, 2019).

Food companies design processed foods for convenience, and many Americans find these products to be an irresistible alternative to labor-intensive homemade meals. In fact, studies demonstrate that customers in the United States purchase more "heat-to-eat" and "ready-to-eat" products, which require little or no additional work by the consumer, respectively, despite the greater price (Buss, 2019; Poti et al., 2015). Food brands sell products with taste and

convenience by preparing the food during the production process or by using artificial ingredients to circumvent cooking altogether. The food additives in processed foods are what allow frozen meals to withstand freeze-thaw cycles, sugar-free creamer to taste sweet and creamy, and low-fat yogurt to have a similar bulk and texture as full-fat but without raising calories (FDA & IFIC, 2010; IFT, 2019). An example of a processed product that consumers traditionally associate with food additives is boxed macaroni and cheese (Bearth et al., 2014). This product could have each of the additive types mentioned: cheese flavoring for taste, sodium benzoate for long-term shelf stability, Yellow #5 and Yellow #6 for appearance, corn syrup for sweetness, and xanthan gum for a creamy, rather than runny, sauce. However, food additives are present in many foods consumers do not associate with food additives and in foods considered healthy and in products labeled as "organic" (Bearth et al., 2014; Berenstein, 2018). For example, a product like frozen veggie burgers with labeling to indicate "organic" almost certainly contains an array of food additives (Smith, 2020).

A nationally representative survey and analysis report performed by the Pew Research Center discovers about half of the American public believe that food additives "pose a serious risk to their health" (Funk, 2018; Funk et al., 2018). Additionally, Deloitte Analysis's consumer Food Value Equation Survey (2015) shows that consumers' definition of food safety has shifted. Many consumers consider length of ingredient list, degree of processing, and presence of artificial ingredients to be important measures of product safety to them (Berenstein, 2018; Deloitte Analysis, 2015). Sensationalized media stories make claims from inaccurate interpretation and extrapolation of scientific study results and are partially to blame for the misconceptions held by American consumers. However, when a disconnect exists between physicians and scientists in medicine regarding study result interpretation and implications,

discerning what information to believe is an added challenge for the consumer. This disconnect is exemplified on the *Psychiatric Times* website in a physician-written article warning of the high potential for drug-like addiction of processed foods (Moawad, 2019). The article references data on the neurophysiological activation in the brain in response to ultra-processed food compared to that from illicit addictive-substance consumption. Analysis of the cited publications, however, reveals the *Psychiatric Times* article includes drastically different conclusions and interpretations than those stated by the authors in the cited studies (Gibney et al., 2017; Schulte et al., 2019). These study results find no or only mild psychological similarity; participants report craving sensations and subjective feelings of "loss of control," but the absence of an essential neurotransmitter-receptor interaction in the established addition pathways of the brain (Fortuna, 2012; Gibney et al., 2017; Schulte et al., 2019).

Framework for Examining Agency of Additives, Brands, Consumers, and Constructions

Actor network theory (ANT) is useful in describing how marketing trends and messages develop, how relevant constructions form, and the intermediaries connect each component (Cressman, 2009). While food companies and the conglomerate of consumers appear to be central actors enrolled in an interaction network, many other human, institutional, and material actors have important roles and agency as well. Therefore, ANT is used as a tool for discovering how the food additives themselves, packaging labels, influential figures in society, and the media are enrolled as actors in the network and contribute to a web of relationships that ultimately preserve harmful stereotypes in American culture (Latour, 1987). ANT ideas complement traditionally social constructionist concepts that delve into materialism. A constructionist viewpoint understands people to create objects and technologies to reinforce our social norms for

us, and those using ANT would agree that non-human technologies have agency over its users (Latour, 1992; Michael, 2017). Critics of ANT assert that the framework has a tendency to overlook abstract ideas, for it has trouble representing them. Intangible, non-material forces that govern subgroups of actors, like race and gender, can be hard to identify because the creation and analysis of networks focuses heavily on describing relations on the micro-scale. Additionally, many scholars take issue with ANT claiming that people are not the only entities able to have agency and ANT weighting all actors in the network, human and non-human, equally.

Social constructivism asks the question what is real and what is constructed by humans, and the Social Construction of Technology (SCOT) applies this philosophy to the field of "science and technology studies" (STS). SCOT is an important framework in answering this research question as well in order to cover some of the weaknesses of ANT. For instance, SCOT will aid in looking at society's beliefs about race, ethnicity, and socioeconomic status and in determining how these social factors influence construction and maintenance of biases, stereotypes, and cultural norms. The Klein and Kleinman (2002) interpretation of SCOT focuses on the influence of social structures on technology; social-structure construction of technology, herein referred to as "SSCOT." A criticism of SCOT is how it assumes society is composed of groups and the "relevant" social groups interact and reach consensus on an artifact. However, as Klein and Kleinman assert in their structural interpretation of SCOT, "this fails to adequately attend to power asymmetry between groups." This research, however, uses a combination of Klein and Kleinman's SSCOT and ANT frameworks to allow for structural and hierarchical analyses. The SSCOT-ANT integrated framework addresses group power asymmetry contributing to racial-ethnic and socioeconomic stereotypes stubbornly woven into actor networks. If food additive technologies are socially constructed, then studying the relationship

between these ingredients and consumers, and how the corporate food brands convey social information to consumers through their products is important and leaves a gap in the field of STS.

Case Study Results and Discussion

Social Constructions of MSG through History Convey American-Chinese Political and Cultural Relations

As history documents with the "Chinese restaurant syndrome" (CRS) phenomenon in the United States, prejudiced ideas of Chinese immigrants as "bizarre" and "dirty" were projected onto the compound MSG (Mosby, 2009). The chemical sound of *monosodium glutamate* triggered concern that the American public were unknowingly consuming a toxic, artificial ingredient. This fear derives from the revelations of the danger of pesticides and questions of the safety of the artificial sweetener saccharin, as well as American mistrust of Chinese immigrants (Sand, 2005). The seizure of China by Mao Zedong in 1949 marked China's conversion to a communist state and heightened panic during the Red Scare that communist spies would threaten national security and American democracy (History.com Editors, 2010). Although the Red Scare slowed by the late 1950s, stereotypes of Chinese Americans and immigrants to be duplicitous were rooted, as seen by articles in prominent newspapers like "In Hong Kong it's Dog or Snake at Lunch Now," which appeared in the *New York Times*, describing subversive serving of illegal meats in restaurants in China (Mosby, 2009). Thus, when the actor of the *New England Journal of Medicine* included a letter positing a Chinese restaurant syndrome, the journal's prestige and the letter's confirmation of pre-existing stereotypes of Chinese ethnicity and culture aided in the syndrome's successful translation to American readers. MSG was swiftly denounced as the perpetrator causing CRS and sworn off, despite the lack of scientific evidence of its harm (Kwok, 1968; Sand, 2005).

The archived JWT staff newsletter (shown in Appendix A) reveals positive and praiseworthy American attitudes, assessed through discourse analysis, towards MSG. The writer describes MSG as "remarkable," and that its "popularity. . . has grown steadily," (J. Walter Thompson, 1967). When compared to the condescending language of the *New England Journal of Medicine* article on MSG, a dramatic shift in technological framing to the public is highlighted. The contrasting discourse supports the argument that this flavoring agent underwent a paradigm shift. The shift to the new social construction of MSG is confirmed by discourse analysis of the newspaper article primary source, shown in Figure 1, which was written after the JWT newsletter account and the *New England Journal of Medicine* article. The *Chicago Tribune* writer begins the column with humor-infused descriptions of professionals experiencing the vague symptoms reported of CRS. Although this opening scene seems to suggest the ridiculousness of CRS, the author continues the discussion on the syndrome and blames solely Chinese use of MSG in food, without mention of the many American companies using MSG as an additive in their products (Mosby, 2009; Sand, 2005).

Du Jour

Chinese food make you crazy? MSG is No. 1 suspect

By Carol Kleiman

A business executive orders shrimp with lobster sauce at his favorite Chinese restaurant, eats it with gusto and chopsticks, and within 20 minutes gets dizzy, nauseous, feels the onset of a blinding headache, and fears he may be having a heart attack. A magazine editor sits down to an order of moo shu pork, takes a few delicate bites, and suddenly feels a "burning, a tightness, a numbness" in her upper arms, throat, neck, and face. She also has an irresistible urge to take off all her clothes, which she manages to resist.

For many people, the delights of sweet and sour pork and egg foo yung are offset by a malady called the Chinese Restaurant Syndrome, the Orient's answer to

Figure 1: *Image of MSG article newspaper clipping from the Chicago Tribune* (Kleinman, 1979).

The social construction of MSG heightened non-Chinese Americans' distrust and skepticism of the food served in Chinese establishments. In hopes of abating customers' concerns and avoiding declines in business, Chinese restaurants responded to this construction by publicly displaying anti-MSG signage on their front windows and in their menus (Moskin, 2008; Yeung, 2019). Claims of "no MSG" and similar phrases commonly seen on menus (shown in Figure 2) reinforce the constructions, resulting stereotypes, and biases against Chinese and Chinese American peoples.

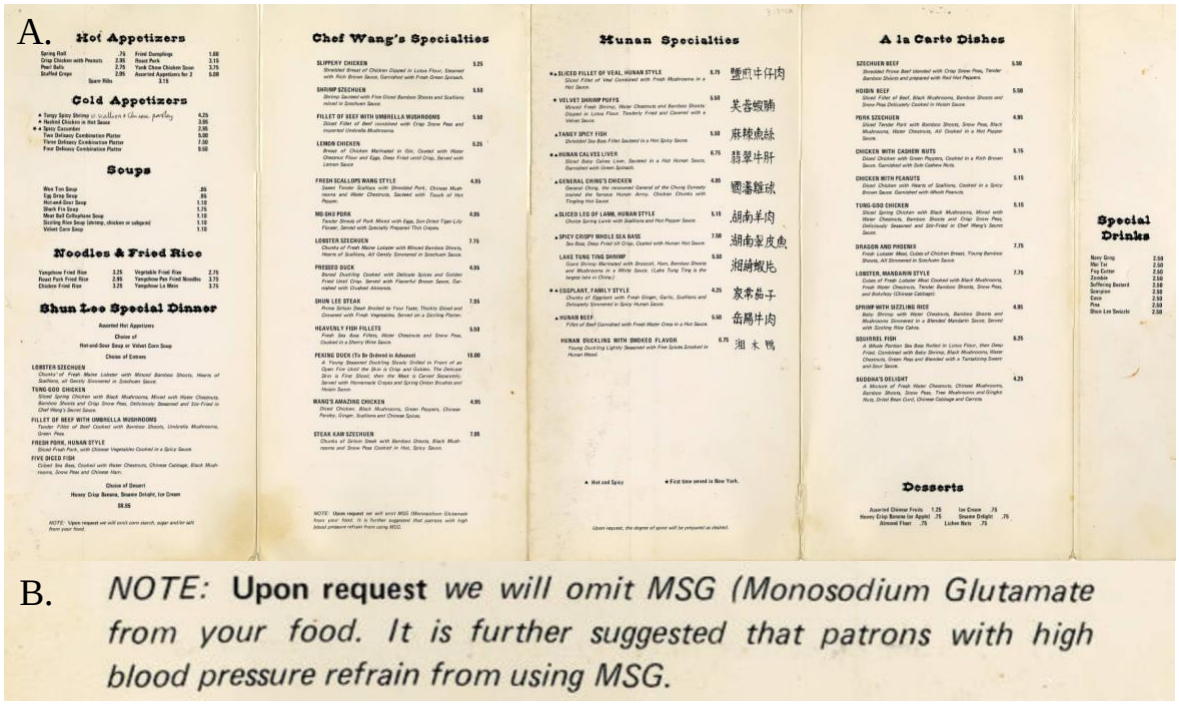


Figure 2: *Images of take-out menu with anti-MSG message from Chinese American restaurant in New York, NY* (*Shun Lee Palace, Menu*, 1978).

The print media quickly normalized CRS in the decade after the letter by Dr. Ho Man Kwok was published. The belief that MSG should be avoided was so widely accepted, and the practices for avoiding MSG were so established that the myth was prominently believed by many successive generations. The translation of MSG as a central actor to consumers is so strong that, today, many Americans still avoid MSG and many restaurants serving Chinese or Chinese American cuisine still advertise "no MSG added" on storefronts and in menus. These labels and

the social construction of MSG as exotic, causing undesirable bodily reactions, and a tool for covering up lower quality ingredients by enhancing flavor are all actors that perpetuate negative biases and stereotypes of Chinese Americans.

The Differential Construction of Modern Sweetening Additives as Healthy vs. Unhealthy

While the evolving social construction of MSG is shaped greatly by American immigration policy, its associated politics, and U.S. cultural reactions, like xenophobia and overt racial-ethnic prejudice, modern sweetener constructions see a new central actor emerge. Industrial food corporations, like the major MSG producer Ajinomoto, had weak translation in the case of MSG public rejection, but survive modern ingredient-targeted food scares by adopting new intermediary strategies with powerful translation on consumers.

The modern food scares, such as concern of HFCS health impact, derive from transitioning public perception of food additives as convenient and improving food health safety to shortcutting and threatening food health safety (IFT, n.d., 2019). The manufacturing of processed foods is technologically complex and non-transparent to people outside the industry: factors that contribute to consumer attitudes of suspicion towards corporate food producers. A history of contaminated food recalls and FDA removal of potential illness-causing products results in a loss of customer trust in both the processed products sold and the company selling them (Bearth et al., 2014; Funk et al., 2018; Runge et al., 2018). Intensifying distrust of corporations and the government to protect consumers from products unsafe to eat and the incessant news media coverage of processed food health risks culminated in the social construction of artificial ingredients as unhealthy. Similar to Chinese restaurants' response to the construction of MSG, food corporations respond to the rejection of artificial food additives by

working to remove public concern with their products, so as not to lose business, rather than addressing the constructions and pseudoscience. Companies accept the public's construction of *processed* to mean unhealthy, reinforcing it, and launch marketing campaigns and products to construct the converse relation as well: the word *natural* to mean healthy. Brands present themselves as progressive and concerned about individuals' wellbeing by renaming, removing, or replacing additive ingredients constructed as unhealthy with ones they are constructing to be natural (Berenstein, 2018). This marketing strategy takes advantage of the social construction of additives in processed food portraying moralistic brand reform and misleads buyers to believe the natural-sounding replacement ingredients are legitimately better for their health (Chen & Eriksson, 2019; Gracia-Arnaiz, 2001).

HFCS is a quintessential example of a processed food additive framed by the media as causing adverse health effects. This ingredient and the products to which it is added are labeled as unhealthy. On the contrary, many new artificial sweeteners introduced by food brands are not receiving this label, and, instead, the public focus is shifted to its framing as a natural alternative. This portrayal misleads consumers, for the ingredient manufacturing almost always requires processing levels and methods comparable to that of HFCS, regardless of its natural-sounding name. To elaborate, HFCS is produced by processing corn into corn starch and breaking the long-chained starches down into a syrup of small glucose chains. Then, an enzyme is added that converts glucose to fructose, which is a sweeter compound, and this conversion reaction is allowed to run until 55% (for HFCS-55), or the percentage for the specified HFCS formulation, of the sugars are converted to fructose (Parker et al., 2010).

The production of brown rice syrup is very similar to that of HFCS. Producing brown rice syrup for inclusion in organic food products or otherwise involves enzymatic digestion of cooked

brown rice followed by filtering to leave a sugar syrup. The processing method results in a mixed sugar composition of single, double-linked, and triple-linked glucose molecules, and no fructose (Gunnars, 2019). The glycemic index (GI), a measure of the blood glucose concentration following food consumption, of brown rice syrup is 98, which ranks third highest of all sweeteners, and is surpassed only by pure single or double-linked glucose (Glycemic Index Foundation, 2017). A GI as high as 98 means that eating a food product high in brown rice syrup spikes one's blood sugar rapidly, which is known to lead to insulin insensitivity over time, a cause of type 2 diabetes (Frost et al., 1994; Merino et al., 2019). Even though the GI of this sweetener would raise concern from the media and health experts if identical standards used to evaluate HFCS were applied, brown rice syrup continues to be portrayed as a healthy alternative to HFCS. that have no evidence that one causes any less harm to health from overconsumption than the other, yet these sweeteners have opposite social constructions.

To understand why and how the differential social construction of modern sweetening additives exists, a case example comparing Dum Dums lollipop candy from Spangler Candy to YumEarth organic pops from Whole Foods is conducted and shown in Figure 3. The packaging labeling, claims, and illustrations and nutrition label and ingredient list is analyzed as qualitative data on how the social construction changes between the two lollipop products. While the number of actors and their intermediaries involved in the social construction of even just two products is vast, this paper will highlight just a small sample of the central actors at play.

Figure 3: *Images of Food Packaging, Nutrition Labels, and Ingredient Lists* (*Dum Dums - 30 Lb Bulk Red Box*, n.d.; *Organic Pops, 8.5 Oz, YumEarth, Whole Foods Market*, n.d.). Dum Dums lollipop candies A) packaging and B) nutrition label and ingredient list. YumEarth Organic Pops C) packaging and D) nutrition label and ingredient list.

Central non-human, material actors of the food additive sweetener and food packaging labels are identical between the two products: both items use artificial sweetener and package labeling. The main differences between the products are the intermediaries and their translation connecting them to the central human actor, consumers, and the intersecting relations with the media. Dum Dums packaging uses sparse labeling compared to the YumEarth organic pops. Figure 1A shows the bright red Dum Dums box with images of smiling children, happily sucking on Dum Dums lollipops. The only labeling present on the Dum Dums box is the modest claim that the product is “free of major allergens” and a second claim not relating to food safety at all, but rather emphasizing the product’s value as it contains “over 2300 pops.” The YumEarth

organic pops, on the hand, labels extensively and uses language with healthy construction connotations including “organic,” “simple,” “flavored and colored with real fruit juice,” “non-GMO,” and “naturally flavored,” as seen in Figure 1C. The first two items in the ingredients list in Figure 1D, are the sweetener additives, “organic cane sugar,” and “organic brown rice syrup.” Brown rice syrup and organic cane sugar are constructed as “healthy” sweeteners because their names contain buzzwords, like “organic,” that are strongly associated with absent or reduced levels of processing, and therefore, with “naturalness.” Language that people perceive to mean natural or convey natural derivations are used in food additive naming and product descriptions, which gives consumers misleading impressions about the healthfulness of the ingredient and the product overall. “Brown rice” is seen as natural because it is recognized as a familiar agricultural commodity and as unrefined and retaining beneficial nutrients, like fiber, that processed white rice lacks (McDonell, 2016). These sweeteners are direct “healthy” alternatives to table sugar and corn syrup (another name for HFCS), which are constructed as “unhealthy” because they are viewed as processed and artificial additives, respectively. The consumption of HFCS and brown rice syrup sweeteners in amounts that contribute to diet-related diseases like type 2 diabetes and obesity are nutritionally indistinguishable (Dugan et al., 2019; Fitch & Keim, 2012; Jones, 2009; Merino et al., 2019). Therefore, the difference of labeling and advertising between the two products, only one product uses anti-artificial and health-suggesting claims and natural-sounding ingredients, as well as the media reporting and reinforcing the construction of *natural* as healthy contribute to the change in construction observed.

Corporate brands utilize framing and food additive technology and exploit pre-existing public belief to construct new categories of food, healthy and unhealthy, which they can manipulate to increase profits. When comparing the price per lollipop between Spangler Candy

and Whole Foods brands, it is revealed that the YumEarth organic pops cost nearly four times as much per lollipop of comparable dimension (*Dum Dums - 30 Lb Bulk Red Box*, n.d.; *Organic Pops, 8.5 Oz, YumEarth, Whole Foods Market*, n.d.). Therefore, the construction of recently introduced artificial sweetening additive actors as healthy is pronounced enough to effectively translate natural and health-promoting characteristics to consumers that are worth paying a higher price. Deceptive advertising turns into unethical business practices when companies charge a premium for products with different constructions but the same nutritional value and quality. Consumers that are targeted marketing for foods categorized as unhealthy are more likely to purchase these products and develop food habits around them (Fleming-Milici & Harris, 2018; Frazier & Harris, n.d.; Gracia-Arnaiz, 2001; Rudd Center for Food Policy & Obesity, 2015). The non-human actors of one's housing arrangement, income level, and food habits have a relationship of influence on an individual's access to foods constructed as healthy. Thus, when brands limit access to certain groups through differential pricing, the stratifying construction of foods as either healthy or unhealthy is unethical and is a route for perpetuating stereotypes.

Economic Interest of Media Actors and Implications on Social Constructions

Despite the prevalence of negative beliefs about artificial food additives, the scientific literature and reviews on this category of chemicals and chemical modifications to food from sources such as the FDA, the American Dietetic Association, and the Academy of Nutrition and Dietetics show no evidence that they pose a risk to human health (Albertson et al., 2011; Dugan et al., 2019; FDA & IFIC, 2010; Fitch & Keim, 2012; Miller & Perez, 2014). Various forms of the media are responsible for disseminating pseudoscience and selection of news stories based on what will most catch readers' attention rather than neutral coverage of all sides of issues.

Deciding selection and framing of news stories and pop-cultural content by intending to maximize anticipated viewer engagement can introduce sensationalism and bias into the information shared with mass audiences. In this way, media actors using intermediaries of sensationalism and persuasion influence consumers actors across the nation. The media-consumer actor connection in the network roots and perpetuates stereotypes when social constructions about ingredient and food healthfulness is distributed. The interest and agency of media platforms of all kinds, from TV and online news outlets to social media open forums, is ruled by the economics of its institution: the majority of media companies are profit-driven businesses at the end of the day (Anand, 2017). The advertisement-driven economic model of media businesses incentivizes content bred for viewer engagement and "clicks." Although non-profit organizations that are intended to provide a public service through sharing neutral, unbiased information do exist, such as C-SPAN, the neutral institutions interact with viewers in the same space as media businesses. The competitive nature of for-profit media companies creates an environment that tends to drown out the neutral parties, for viewers are continuously snatched by sensationalist, "click-bait" tactics (Anand, 2017). Sensationalist media frequently employs fear-mongering and emotion-evoking strategies in the information or headlines presented, for studies show that consumers are drawn to print and video content use these methods (Arbaoui et al., 2020; Klemm et al., 2019; Ng & Zhao, 2020).

A controversial topic the media covers often and using sensationalist techniques is food company use of HFCS in products. The print and televised corporate news media had abundant coverage of the HFCS health impacts debate as new studies unfolded in the scientific community from 2004-2013, however, a study out of George Mason University's Center for Media and Public Affairs (CMPA) discovered the reports disproportionately share one side of the argument

(CMPA, 2014). Content analysis by the CMPA found news reports in televised, online, and print form consistently refer to a select handful of published research that confirm their negative view of HFCS and frequently to the study by Bray *et al*. that initially posited a connection of HFCS with metabolic syndrome and obesity (Bray et al., 2004). Therefore, traditional media sources of news outlets' paper and digital print and televised and online video reporting are a conglomerate of actors with wide reaching influence on food technology social constructions, and, consequently, stereotype perpetuation.

Large corporate actors in the food industry have a symbiotic relationship with media actors in production of advertisements. Food brands benefit from media actors' extensive intermediaries of influence with effective translations to consumers, which will encourage sales to the targeted consumers, and media platforms benefit financially in this exchange from the food brands. Companies use print, televised, and digital media to spread the information about their brand and products, however, studies have found their methods involve targeted and deceptive advertising that reinforces the social constructions of health around food additives (Center for Science in the Public Interest, 2016; Gracia-Arnaiz, 2001; Rudd Center for Food Policy & Obesity, 2015). When groups have unequal, socially determined access to foods of high or low processing, the construction of food additives as "healthy" or "unhealthy" becomes a social problem of class delineation and equity and perpetuates harmful group stereotypes.

New forms of digital media now exist in addition to the traditional sources. Modern developments of social and entertainment media platforms have exploded in popularity and use, and their impact on the public opinion occurs through new intermediaries. The most notable modern media entities include entertainment media platforms, like Netflix and Amazon Prime Video, and social media platforms, like Facebook and Twitter. There are 60 million Netflix

subscribers in the United States alone (Clark, 2020). A media platform with this vast of a viewership has the agency to influence consumer opinions, especially through documentary mediums. There have been over a dozen of documentaries on processed foods (see example images in Figure 4), all of which frame artificial additives and industrially processed foods as detrimental to human health. The provocative imagery used in the documentary film posters and previews serves to shock and catch the attention of subscribers and immediately frames the documentary producers as public servant watchdogs for health-related danger, which enhances viewer-perceived trustworthiness and the persuasive message of the film.

Figure 4: *Collection of Posters from Documentary Films about nutrition and the Modern American Diet* (*Killer at Large*, 2009; Salotto, 2020c).

Modern and traditional media form interesting intersections with bidirectional influences. For instance, a public figure actor in the food nutrition sphere like Michael Pollan started with producing traditional media in the form of print books. When Pollan's book *The Omnivore's Dilemma* became a *New York Times* bestseller, media crossover occurred as digital news outlets

publicized and reported on Pollan's criticisms of the processed food industry. The crossover among the different forms of media on the same sources and the same topics results in social amplification, where the prevalence and availability of the information on a topic, like HFCS health harm, leads consumers to evaluate the information's importance and veracity as high. Media crossover and amplification is also seen when high status public figures publicly reference and unofficially endorse a media source, such as when Pollan and his book were referenced by President Obama in a 2008 interview with the media giant *Time* (Obama, 2008). A presidential candidate is an influential figure on the public regardless of consumers' political affiliations, simply because the media amplify and analyze the public relations of these figures. Further, the public regards individuals who make it to socially respected positions with esteem and have expectations of prominent figures that hold the accuracy and importance of what they say to a higher standard. To continue the case example of Pollan's journalism on the harms of processed food diets, the social clout generated around these ideas only fuels further media crossover and amplification. Pollan's ideas are translated to modern entertainment streaming media and used in the Netflix documentary film *Food, Inc*.

The amplification of one-sided ideas and topics continues through individual consumer discussions and media-consumer interactions on social media platforms, like Facebook. Social media platforms including Facebook run off of consumer-generated content and interactions, to which consumers view and contribute. These platforms allow consumers to directly share their opinions on topics relevant, or trending, in the public. Facebook profiles, called pages, exist for entities and actors other than individual consumers as well, and it is a subtle way for media and other corporations to further amplify their content. For example, the Facebook page on *Food, Inc.* shares content and initiates discussion aligning with the messages expressed in their film.

The *Food, Inc*. page has over two million "likes" by other Facebook users, which serves as evidence of the media source's importance and legitimacy to other users who have yet to form their opinion (*Food Inc - Home,* 2008). Business and corporate actors run pages so that they promote and influence translation of dialogue that shapes company and product reputation and consumer opinions on related topics, all while appearing to be entirely consumer generated.

Pages with one-sided discussions are common on Facebook and do not always have corporate puppet masters operating them. Consumers and viewers of media often exhibit confirmation bias, where one only seeks out and accepts information sources that confirm their pre-existing beliefs, and a Facebook page or group has the perfect conditions for this to occur. Confirmation bias is a major drawback to the open, uncensored discussion that social media platforms offer, for it is an intermediary for perpetuating social constructions with negative implications like stereotypes. For example, consumer reactions to media coverage of HFCS consumption risks to health lead to the rise of a one-sided Facebook group demanding government action to ban HFCS from products (see Figure 5) (*THE BAN OF HIGH FRUCTOSE CORN SYRUP IN THE U.S - Home*, 2010). Posts in this Facebook group often contain propaganda-like messages, professional quality infographics and links to scientific articles that purportedly support their anti-HFCS position. The posts sharing infographics from sources that appear official and unbiased contain detailed pseudoscience and is particularly convincing for users viewing it.

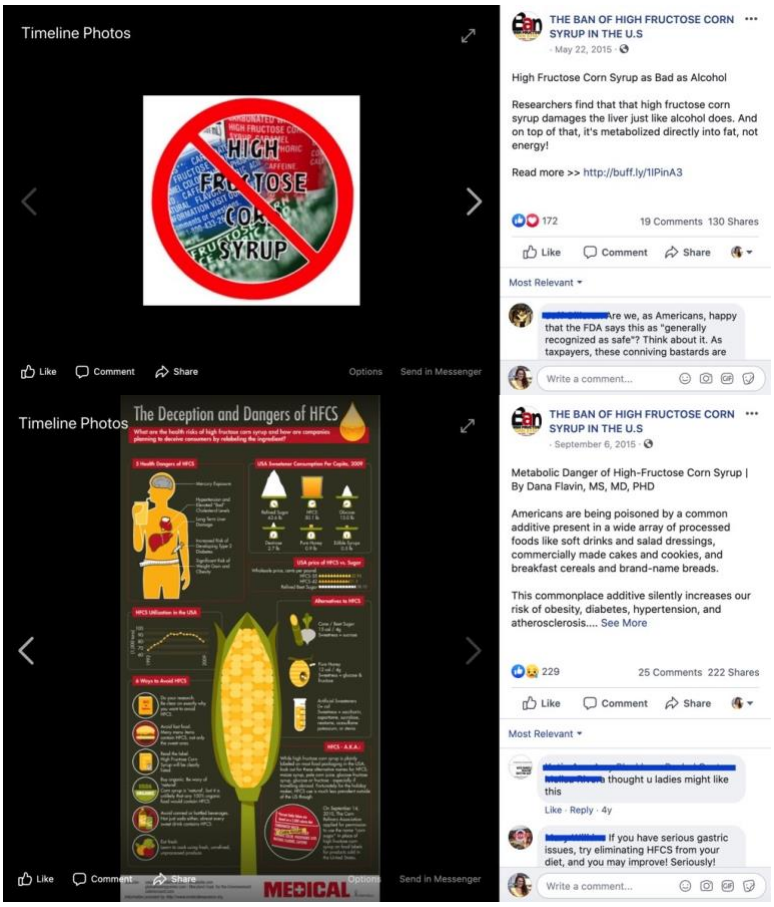


Figure 5: *Selected posts by The Ban of HFCS Facebook Group (Salotto, 2020a).*

While the central actors of this case study have much in common with that of the network (in different adapted forms) in the historical and modern case studies on MSG and HFCS-brown rice syrup artificial sweetener comparison, the intermediaries and, therefore, the overall interaction network is different. The media institutional actors are ultimately businesses with profit-driven economic models, which shapes the interest and decision behind every intermediary connection. The media's conflict of interest is not disclosed nor obvious to the public, which is a disregard of corporate social responsibility. Not only does the media frame information in the way they want consumers to perceive it, but they lead consumers to believe that they are informed based off of the information and interpretations the media shares, which is a social

issue that needs to be addressed, considering their agency to influence mass audiences of consumers.

The Media as a Stable Actor with Dynamic Intermediaries in Food Additive Constructions of the Past, Present, and Future

All three cases studies share the central actors of consumers, food additives, and public perception of additive ingredients. The actor-network described in the MSG historical case study that developed in the 1960s has persisted since the coining of "Chinese restaurant syndrome" until today as a very similar but adapted form of the actor-network described in the modern sweetening additives case study. Material semiotics explains this adaptability of an actor-network to be the source of its durability (Law, 2019). The actor-networks that transpire around food additives adapt through the form that the media takes and their framing of new material objects. However, the media maintains the same underlying intentions to shape consumer thoughts and behavior in ways that ultimately lead to greater consumer engagement and, thus, profit growth. Therefore, application of actor-networks as a tool reveals that structural order is maintained through a constant process of intermediary updating to prevent actants from recognizing the inconsistencies, manipulation, and biases a social construction carries. Appendix B shows a merging of the adapted historical-modern case study actor-network with the different but overlapping network discussed in the media and marketing case study.

The limitations of this work include a lack of quantitative study analysis that would allow for statistical analysis to be implemented, as well as the limited scope in actor and actant analysis of the relevant case study actor-networks. Future work will include a quantitative discourse-network analysis to supplement the manual process performed in this project.

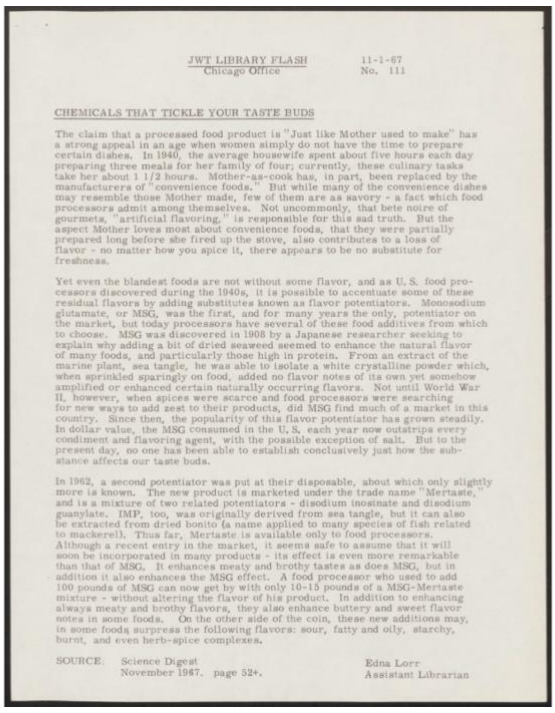
Conclusion

Overall, this paper demonstrates through small samplings of actors that when consumers are overly trusting or complacent in their gathering and interpretation of information, especially about technologies, they are blind to the hidden agendas that all actors have. As a result, the agency of consumers is stripped, and social constructions that perpetuate group stereotypes are believed and reinforced by consumers. The first case study presents how the socio-cultural relationships that develop into tensions and initiate the enrollment of racial-ethnic prejudice and stereotypes into the network. The central actors of the media and White Americans social construction of the food additive MSG as a chemical with public health risks. The second case study demonstrates similar, but adapted cultural tensions in modern society and common central actors as the first case study, but with the addition of the new major actant, food corporations, who perform in manipulative and unethical ways to benefit their financial interests. The modern case study demonstrates how these relations and varied actor interests perpetuate health and food choice stereotypes affecting people of color, economically marginalized groups, and persons who have attained a high-school degree or equivalent level of education. Stereotypes about health and the resulting implicit biases can cause targeted groups to be stigmatized. Implicit bias and stigma can lead to blaming the individual for their health problems, which can affect quality of healthcare received.

Awareness of this topic must be brought to the fields of STS and healthcare, so bias and stigma can be addressed head-on. American consumers must not only be made aware of this issue but also implored to conduct their own research and to think critically about the information presented on food additive technology, so they can shed any biased influences. Food corporations should be confronted for their negligence of corporate social responsibility. Finally,

this research illuminates the need for consumers to exert their agency back on unchecked actors of the media and food corporations through purchasing behaviors, challenging of social constructions, expecting companies to prove claims, and investigating claims themselves.

Appendix A



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CHEMICALS THAT TICKLE YOUR TASTE BUDS

The claim that a processed food product is "Just like Mother used to make" has a strong appeal in an age when women simply do not have the time to prepare certain dishes. In 1940, the average housewife spent about five hours each day preparing three meals for her family of four; currently, these culinary tasks take her about 1 1/2 hours. Mother-as-cook has, in part, been replaced by the manufacturers of "convenience foods." But while many of the convenience dishes may resemble those Mother made, few of them are as savory - a fact which food processors admit among themselves. Not uncommonly, that bete noire of gourmets, "artificial flavoring," is responsible for this sad truth. But the aspect Mother loves most about convenience foods, that they were partially prepared long before she fired up the stove, also contributes to a loss of flavor - no matter how you spice it, there appears to be no substitute for freshness.

Yet even the blandest foods are not without some flavor, and as U. S. food processors discovered during the 1940s, it is possible to accentuate some of these residual flavors by adding substitutes known as flavor potentiators. Monosodium glutamate, or MSG, was the first, and for many years the only, potentiator on the market, but today processors have several of these food additives from which to choose. MSG was discovered in 1908 by a Japanese researcher seeking to explain why adding a bit of dried seaweed seemed to enhance the natural flavor of many foods, and particularly those high in protein. From an extract of the marine plant, sea tangle, he was able to isolate a white crystalline powder which, when sprinkled sparingly on food, added no flavor notes of its own yet somehow amplified or enhanced certain naturally occurring flavors. Not until World War II, however, when spices were scarce and food processors were searching for new ways to add zest to their products, did MSG find much of a market in this country. Since then, the popularity of this flavor potentiator has grown steadily. In dollar value, the MSG consumed in the U. S. each year now outstrips every condiment and flavoring agent, with the possible exception of salt. But to the present day, no one has been able to establish conclusively just how the substance affects our taste buds.

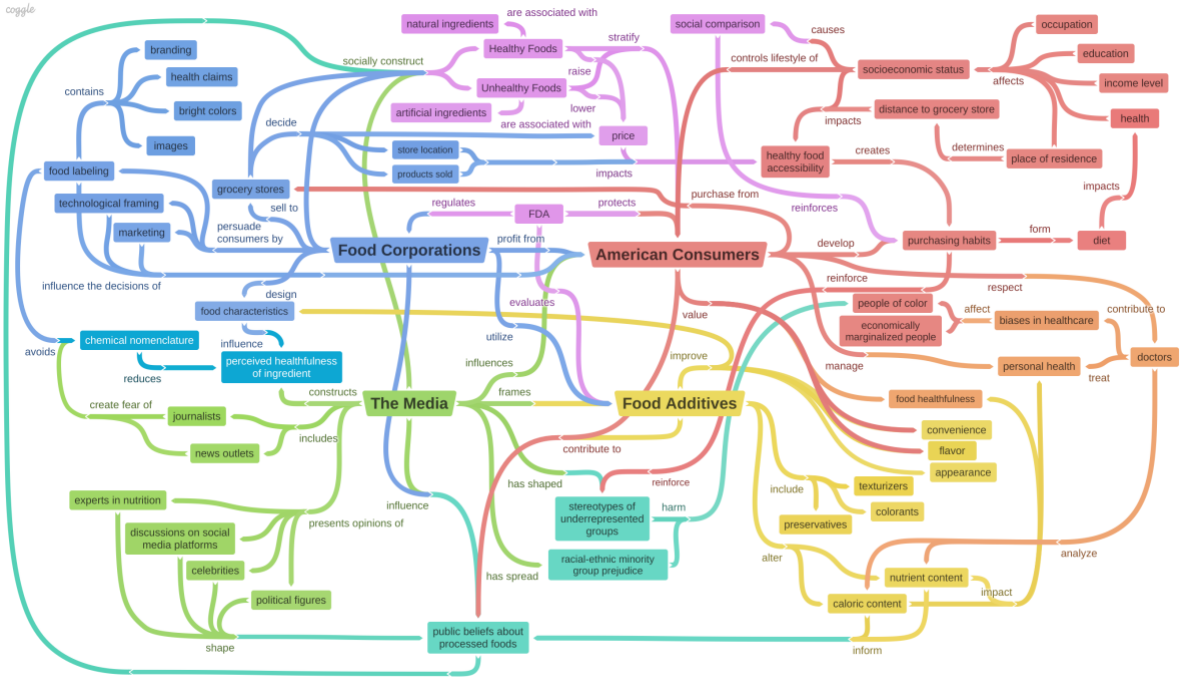
In 1962, a second potentiator was put at their disposable, about which only slightly more is known. The new product is marketed under the trade name "Mertaste," and is a mixture of two related potentiators - disodium inosinate and disodium guanylate. IMP, too, was originally derived from sea tangle, but it can also be extracted from dried bonito (a name applied to many species of fish related to mackerel). Thus far, Mertaste is available only to food processors. Although a recent entry in the market, it seems safe to assume that it will soon be incorporated in many products - its effect is even more remarkable than that of MSG. It enhances meaty and brothy tastes as does MSG, but in addition it also enhances the MSG effect. A food processor who used to add 100 pounds of MSG can now get by with only 10-15 pounds of a MSG-Mertaste mixture - without altering the flavor of his product. In addition to enhancing always meaty and brothy flavors, they also enhance buttery and sweet flavor notes in some foods. On the other side of the coin, these new additions may, in some foods, suppress the following flavors: sour, fatty and oily, starchy, burnt, and even herb-spice complexes.

SOURCE: Science Digest
November 1967, page 52+.

Edna Lorr
Assistant Librarian

JWT Library Flash staff newsletter of the Chicago Office (J. Walter Thompson, 1967).

Appendix B



Actor Network Theory Cumulative Model (Salotto, 2020b).

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