Consumer Attitudes Towards Genetically Modified Foods: A Comparison between Sweden and San Francisco

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Abstract In comparison to European Union markets, where bans and protests have limited availability, genetically modified (GM) foods have entered United States supermarkets with little public opposition. This study compared attitudes towards GM foods in San Francisco versus Swedish consumers to determine if a difference exists. Previous studies have concluded that a difference exists although no study has directly and comprehensively compared the US with European attitudes. A short survey, modified from a questionnaire-based study conducted by Magnusson and Hursti (2002) in Sweden was administered to 112 people between January and April outside grocery stores in San Francisco. The results indicated similar trends in attitudes in San Francisco and Swedish consumers, although there were important distinctions in issues of health, control over consumption, and profit. Similar to Magnusson and Hursti's study, men had more positive feelings towards GM products than women. San Francisco consumers had less moral doubt about eating GM foods than Swedish consumers although both were equally willing to purchase GM foods if they were healthier, better for the environment, cheaper, and better tasting. San Francisco participants scored considerably lower than their Swedish counterparts in the knowledge about biology and genetics. Within San Francisco, age and education seemed to have no effect on consumer attitudes. Additionally, a consumer's belief in the percent of "GM foods" in a supermarket had no bearing on their attitudes. Gender was the only indicator that had an effect on consumer attitudes as women were more negative towards GM foods than men.

Introduction

The integration and prevalence of genetically modified (GM) products within the American food supply (i.e., supermarkets) has gone largely unimpeded, unlike within the European Union, where resistance to GM products is high (Gibbs 2000). It has been reported that 70 % to 85 % of processed foods on supermarket shelves in the US potentially contain one or more ingredients derived from GM crops (Harlander 2002). The large availability foods with GM ingredients on the US market is at least partly contributed to the Food and Drug Administration (FDA), one of three government agencies to regulate genetically modified foods. The FDA states that GM foods are "generally regarded as safe (GRAS) and substantially equivalent to its non-GM counterparts" (Uzogara 2000: 187). Furthermore, at present the FDA does not require that foods containing GM products be labeled as such. This contrasts with the European Union, which permits only four types of GM foods and requires mandatory labeling of GM foods and ingredients (Moseley 2002). Study have documented that there is less concern about genetically modified foods in the US than in Europe (Moseley 1999). These conclusions have not been comprehensive nor have they employed the same survey design to compare data with the US and Europe. This begs to wonder, are consumer attitudes towards GM foods between the US and Europe significantly different?

My research directly compares consumer attitudes towards genetically modified foods in Sweden and San Francisco respectively. Sweden was chosen as a result of the thorough study by Magnusson and Hursti (2002) regarding consumer attitudes towards genetically modified foods. Additionally, San Francisco was chosen as a specific group of individuals that can be studied given the context and time frame of this thesis. San Francisco data were collected using the same methods as Magnusson and Hursti.

Sweden and San Francisco are both considered progressive, meaning that they are highly informed individuals who are known to be more green friendly than their conservative counterparts. Given these traits it can be assumed that they are more likely to oppose GM foods, an unnatural product. Because of San Francisco's "progressive mentality" I hypothesize that individuals in San Francisco have remarkably similar attitudes to Sweden. Further, I hypothesize that young people and men will be more positive towards GM foods, whereas older individuals and females will have more negative attitudes as found by Magnusson and Hursti (2002). More specifically however, I hypothesize that consumer attitudes towards GM foods in San Francisco

are driven less by these classifications (age, gender, education, etc.) and more by the consumer's perception of the percentage of "GM foods" in their supermarket. Knowledge about either GM products or genetic modification is expected to be highly correlated with lack of trust in GM foods (Bredahl 1999). Specifically, if an individual recognizes that their yogurt or tortilla chips contain GM ingredients, they are also more likely to be informed about GM foods, particularly their regulation and hence be more negative towards GM foods. Because of this, I hypothesize that individuals that rank a high percentage of "GM foods" in their supermarket will be more negative towards GM foods while individuals that rank a low percentage in their supermarkets will be more positive towards GM foods.

This study also compared attitudes towards the use of genetic engineering in a) two food applications (genetically modified salmon vs. genetically modified rice), b) attitudes towards GM foods with and without tangible benefits, and c) knowledge about biology and genetics. Part b refers to giving GM foods with positive characteristics like tasting better, cheaper, and better for the environment. These data provided a further insight into consumer attitudes as well as specific examples to which data sets from Sweden and San Francisco were compared. Because I hypothesized that Sweden and San Francisco would have similar attitudes, it is expected that the two will have similar attitudes towards GM foods with and without tangible benefits and similar knowledge about biology and genetics. Furthermore, possible gender, ethnicity, age, economic, and educational differences will be investigated in attempt to ascertain nuances both within the San Francisco data set and Sweden data set.

Methods

Data was collected at nine different grocery store sites within San Francisco (Table 1 and Fig. 1). Stores were chosen based on an attempt to represent as many San Francisco neighborhoods as possible. Five out of nine Safeway stores within the city limits were chosen. A grocery store site would be rejected if it overlapped similar neighborhoods. Under the assumption that Albertson's and Safeway stores are roughly interchangeable, two Albertson's stores were chosen to represent neighborhoods that Safeway failed to cover. Finally, both Trader Joe's stores in San Francisco were selected to try to capture individuals who either do not shop at the aforementioned stores because of possible concerns regarding GM foods and/or are more educated than Safeway and Albertson's patrons.

Table 1: Location of Data Collection Sites

Location	Grocery Store	Address
A	Safeway #1	2020 Market St.
B	Safeway #2	2300 16th St.
C	Safeway #3	1335 Webster St.
D	Safeway #4	5290 Diamond Heights Blvd
E	Safeway #5	735 7th Ave
F	Albertson's #1	3132 Clement St.
G	Albertson's #2	1515 Sloat Blvd
H	Trader Joe's #1	555 9th St.
I	Trader Joe's #2	3 Masonic Ave

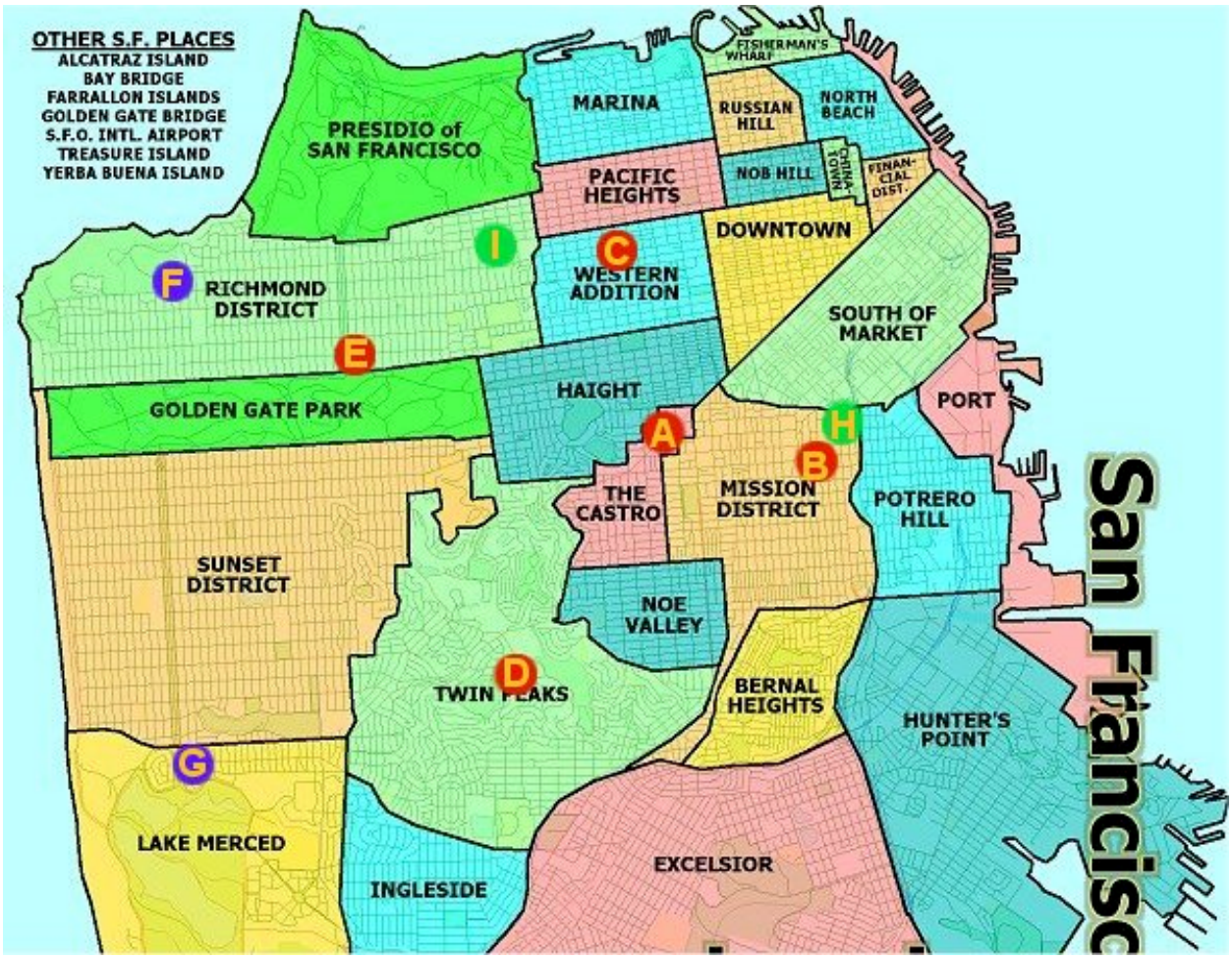

Figure 1: San Francisco Map of Data Collection Sites

Survey A modified version of the mail-in surveys in Sweden (Magnusson and Hursti 2002), were given in person to San Francisco consumers. The one modification was only two food

applications of genetic engineering (out of a possible thirteen), salmon and rice, were tested. These were deemed the most negative and most positive applications of genetic engineering in the Magnusson and Hursti study. Furthermore, to ensure brevity, only one food application appeared per person on a given survey. Surveys were administered in an alternating fashion between "salmon surveys" and "rice surveys."

This one-page survey was solicited to every fifth shopper entering the aforementioned grocery stores (Appendix A). Because of low willingness to participate candy was offered as an incentive for participation. Sampling times and days were determined by an initial survey assessment of the frequency of shoppers entering the stores (I assumed proportion was consistent regardless of individual grocery stores). This assessment occurred in the morning (8 AM - 12 PM), afternoon (12 PM - 4 PM), and evening (4 PM - 8 PM) for one weekday and one weekend (assuming all weekdays and weekends are roughly the same). During these periods, the number of consumers entering the supermarket was counted in random five and ten minute intervals. Based on these proportions, the distribution of data collection times was derived (Table 2).

Table 2: Proportion of Shoppers per Interval

Time Interval	Percentage of Shoppers
Weekday 8 AM – 12 PM	5
Weekday 12 PM – 4 PM	9
Weekday 4 PM – 8 PM	16
Weekend 8 AM – 12 PM	12
Weekend 12 PM – 4 PM	21
Weekend 4 PM – 8 PM	37

Respondents Below, the most recent data available for the entire San Francisco population (Bay Area Census, 2000) are given after the abbreviation Pop. The total number of surveys collected was 112, and of those were 61 % women (Pop 49 %) and 39 % men (Pop 51%). The majority of the respondents were Caucasians, making up 59 % (Pop 50 %). African Americans were overrepresented, consisting of 11 % (Pop 8 %) of the sample size. Both Asian Americans and Hispanic/Latino were underrepresented with 20 % (Pop 31 %) and 10% (Pop 14 %) respectively.

The age groups of the respondents were concentrated in the 26 – 55 age range, composing of 87 % of the sample size (Fig. 2). The majority, 89 % of the respondents were college graduates.

Individuals with advanced graduate degrees and some college completed the sample size with 6 % and 5 % respectively. Household income groups were distributed as followed: less than $24,999 (2 %), $25,000 - $49,999 (25 %), $50,000 - $74,999 (59 %), $75,000 - $99,999 (12 %), and more than $100,000 (2 %).

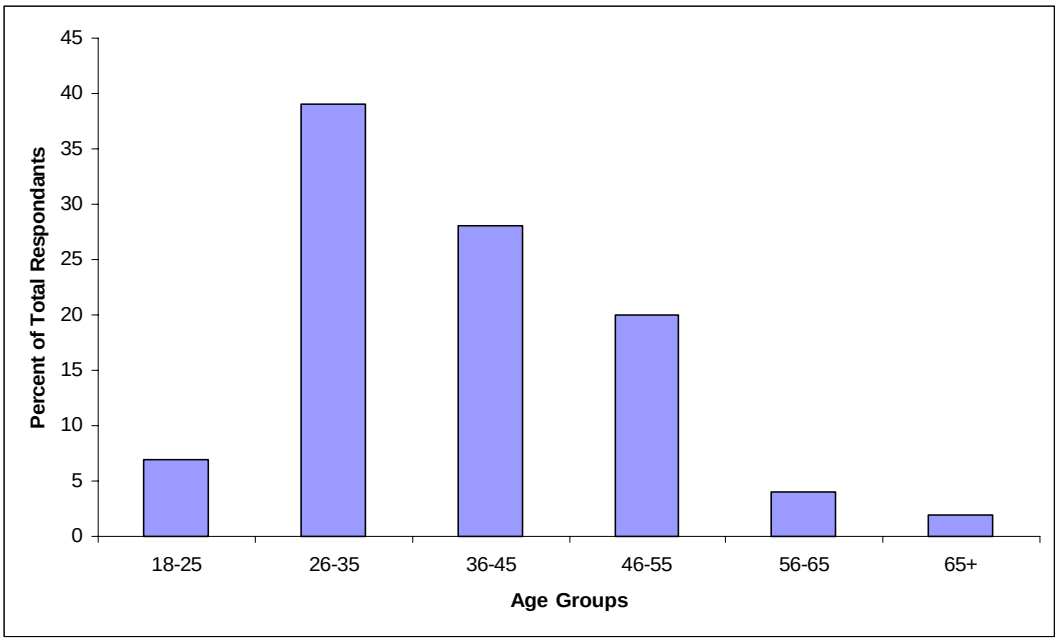

Figure 2: Distribution of Age Groups

Methods of Analysis The statistical methods to be employed are descriptive statistics for the trends between Sweden and San Francisco and two-tailed t-test (unpaired) to detect significant differences within the data collected in San Francisco . Data for San Francisco will be analyzed as a whole, and then through different classifications (age, gender, education, and perception of percentage of GM "food" integration in supermarkets). All data will then be compared for significance with the data collected from Magnusson and Hursti.

Results

Attitudes towards the use of GM salmon and rice In general, most subjects were negative towards the use of genetic engineering in food production (Appendix B). For the most part, the data collected from San Francisco matched the trends discovered in Magnusson and Hursti (2002). Out of the thirteen constructs, ten constructs followed the same trends in the

Sweden data set. The GM rice application was perceived to be the more positive (highest benefit, least unethical, least tampering etc.; Appendix B). The GM salmon was associated as more negative (least benefit, most concern, highest risk etc.; Appendix B). San Francisco consumers also demonstrated highly interesting deviations from Swedish trends; for instance San Francisco consumers considered GM salmon healthier than the GM rice (Fig. 3). A higher percentage of San Francisco participants deemed the salmon application "very healthy/healthy" than their Swedish counterparts, while a lower percentage of San Francisco participants thought that rice was "very healthy/healthy." Overall, the Swedish respondents thought rice was healthier than salmon.

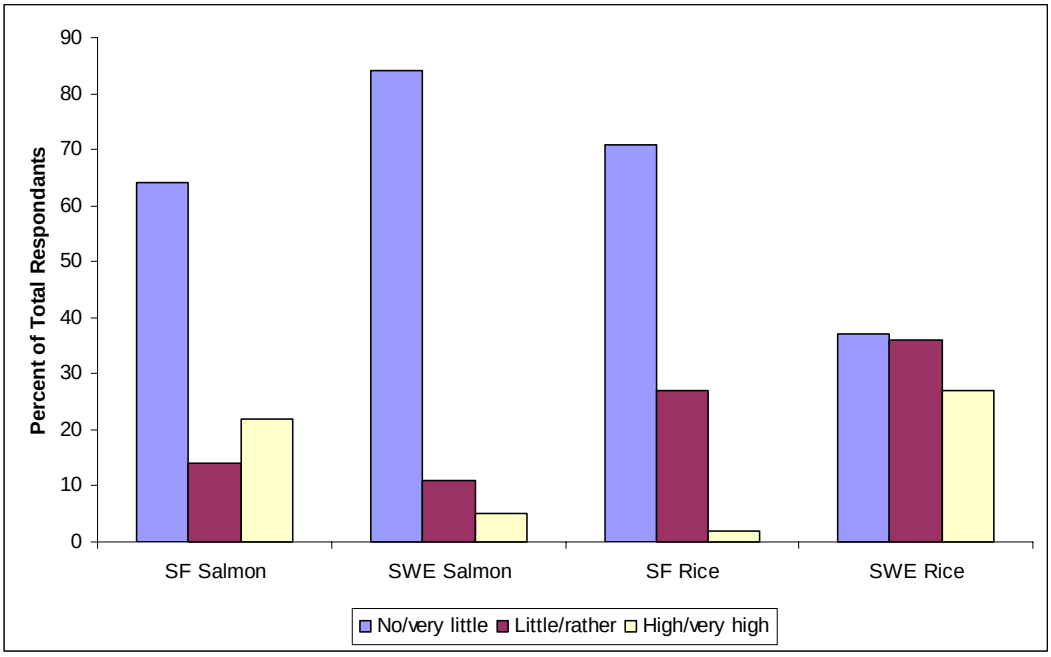

Figure 3: Percentage of consumers rating "How healthy do you think it is to eat…?"

Additionally, San Francisco consumers judged that they had more control over the consumption of GM salmon than rice, while the Swedish consumers ranked an approximately equal ability of controlling their consumption of both the GM rice and salmon (Fig. 4). Almost all of the individuals in San Francisco who took the "salmon survey" reported they had "very much control/much control," while a very low percentage of individuals answered with this same response for rice. San Francisco consumers also differed from Swedish consumers in that they

thought that rice was used for profit more than the salmon (Fig. 5). San Francisco respondents thought salmon was used less for profit than Swedish respondents based on the percentage of

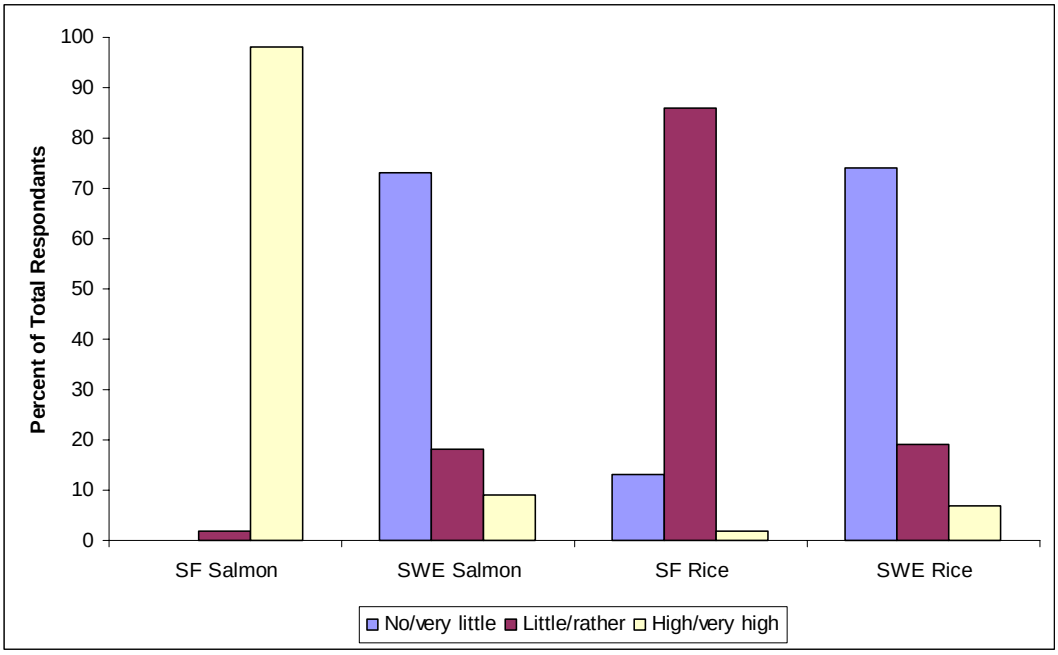

Figure 4: Percentage of consumers rating "How much control do you have over whether or not you will consume….?"

Figure 5: Percentage of consumers rating "To what extent do you perceive that the use of…is used for profit alone?"

individuals who ranked high/very high for use of profit. San Francisco data ranked rice as used more for profit than the Swedish data. Overall, the Swedes believed salmon was used more for profit than rice.

Attitudes towards GM foods with and without tangible benefits The attitudes of San Francisco consumers towards GM foods with and without tangible benefits (ie. healthier) were quite different from their Swedish counterparts (Fig. 6). While a majority (62 %) of subjects in Sweden stated that it would be against their principles to consume GM foods, only 30 % of San Franciscans agreed. In Sweden, 58 % said that it would be morally wrong for them to eat GM foods in comparison to 33 % in San Francisco. More than half of the subjects in the Swedish study felt they would feel guilt if they ate GM foods (53 %), and again the San Francisco study was considerably lower with only 20 % feeling guilty. Consumers from both study sites were strikingly similar in their willingness to buy GM foods if they were healthier and better for the environment as well as lower interest in GM foods with a lower price and tasted better.

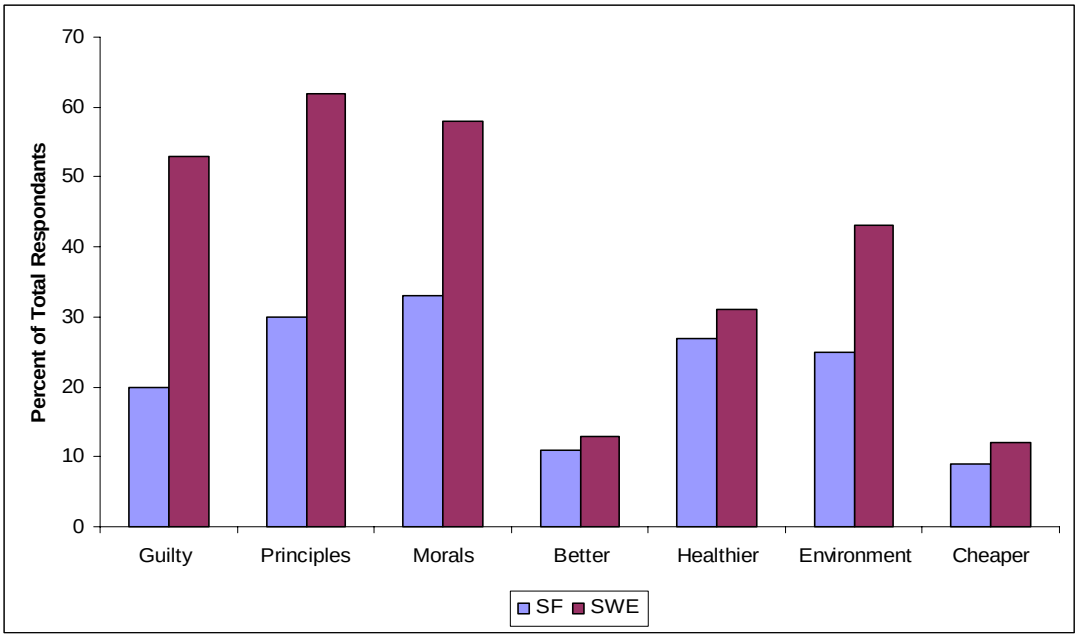

Figure 6: Percentage of consumers who rated “agreed or strongly agreed” to these statements

Knowledge about genetics and biology In the Swedish study, most of the subjects demonstrated good knowledge about biology and genetics with somewhere between 52 % and 94% answering all five questions correctly (Table 3). An exact percentage for Sweden was not

provided in the Magnusson and Hursti study. This was significantly higher than the San Francisco study where only 12% of the study sample answered all five questions correctly. Despite this large difference, both groups struggled with the statement "GM animals are always bigger than 'conventional' animals." While 29 % stated this was true, 64 % of San Francisco consumers also marked it true. Swedish consumers marked more often "do not know" than San Francisco consumers.

Table 3: Percentage of respondents who declared that the given statements were true or false or who did not know (A = San Francisco, B = Sweden, * = correct answer)

Statement	A/B True	A/B False	A/B Do Not Know
Conventional foods do not contain any genes	8/10	91/67*	1/23
Yeast used for brewing beer contains living organisms	63/84*	37/2	0/14
Genetically modified animals are always bigger than "conventional animals"	64/29	35/52*	1/19
More than half of the genes are identical for man and the chimpanzee	36/66*	43/6	21/28
All human cells contain DNA	92/94*	8/1	0/5

Gender differences in San Francisco There were no statistically significant differences between men's and women's consumer attitudes towards the rice application nor towards the salmon application. Although, there were statistical differences between women's consumer attitudes towards rice and salmon as well as between men's consumer attitudes towards rice and salmon (Table 4). Women were more negative towards GM foods than men as women reported a greater negativity toward salmon, and therefore had more constructs which had significant differences (Table 4).

Even though, women were more negative towards GM foods, no difference was found between men and women in their attitudes towards GM foods with and without tangible benefits. While 92 % of the women were college graduates, only 7 % answered all five questions of the knowledge about biology and genetics section. Moreover, only 25 % of the women correctly guessed the percentage of "GM foods" in a supermarket. This contrasted with 84 % of men who were college graduates, with 12 % who answered all five questions correctly and 30 % who correctly guessed the percentage of "GM foods" in a supermarket.

Table 4: Means and S.D.s of ratings by gender (only variables with significant differences; $\alpha = 0.05$)

		Men		Women	
		M	S.D.	M	S.D.
Benefit	Rice	4.7	0.9	4.6	1.0
	Salmon	1.9	1.3	2.1	1.2
Control					
	Rice	2.9	0.7	3.1	0.7
	Salmon	5.5	0.6	5.4	0.5
Reluctant					
	Rice	2.8	1.3	2.8	1.2
	Salmon	5.0	1.5	4.8	1.5
Concern					
	Rice	3.6	1.0	3.6	1.0
	Salmon	5.0	1.4	4.8	1.5
Risk					
	Rice	3.5	0.9	3.5	1.0
	Salmon	5.0	1.4	4.7	1.5
Unethical					
	Rice			3.6	0.9
	Salmon			4.6	1.5
Misuse					
	Rice			3.5	0.9
	Salmon			4.6	1.7

Education differences in San Francisco Differences in education levels were limited to analyzing variation within the "college graduates" group as they made up 89 % of the total sample size. There were statistically significant differences between consumer attitudes towards rice and salmon. Differences were seen in the same seven constructs as analysis of the women data: benefit, control, reluctant, concern, risk, unethical, and misuse. There were no statistical differences in the attitudes towards GM foods with and without tangible benefits. The gender breakdown of the "college graduates" was 63 % women and 37 % men. Only 12 % of individuals of this group answered all five questions correctly while 23 % correctly guessed the percentage of "GM foods" in a supermarket.

Age differences in San Francisco Differences in age groups were limited to analyzing differences among the 26 – 35, 36 – 45, and 46 – 55 age groups. There appeared to be no trend between education level, correctly answering all five questions correctly, and correctly guessing the percentage of "GM foods" in a supermarket (Table 5).

Table 5: Break down of the 26 – 35, 36 – 45, 46 – 55 age groups

	Age Groups		
	26 – 35	36 - 45	46 - 55
% college graduate	91	84	95
% correctly answered all five questions	11	0	27
% correctly guessed percent of "GM foods"	32	25	13

Percentage of "GM foods" differences Twenty-seven percent of the total sample size correctly guessed the percentage of "GM foods" in a supermarket (Fig. 7). There was no noticeable trend between a high percentage of "GM foods" in a supermarket and correctly answering all five questions of the knowledge about biology and genetics. The 60 – 69 % "GM foods" in a supermarket group scored the highest percentage of individuals with all five questions correct at 35 %. No noticeable trend was detected in the percentage of "GM foods" in a supermarket and negative attitudes towards GM foods, although the 80 – 89 % group had the highest percentage of individuals who were the most guilty, most against their principles, and most against their morals in consuming GM foods (Table 6).

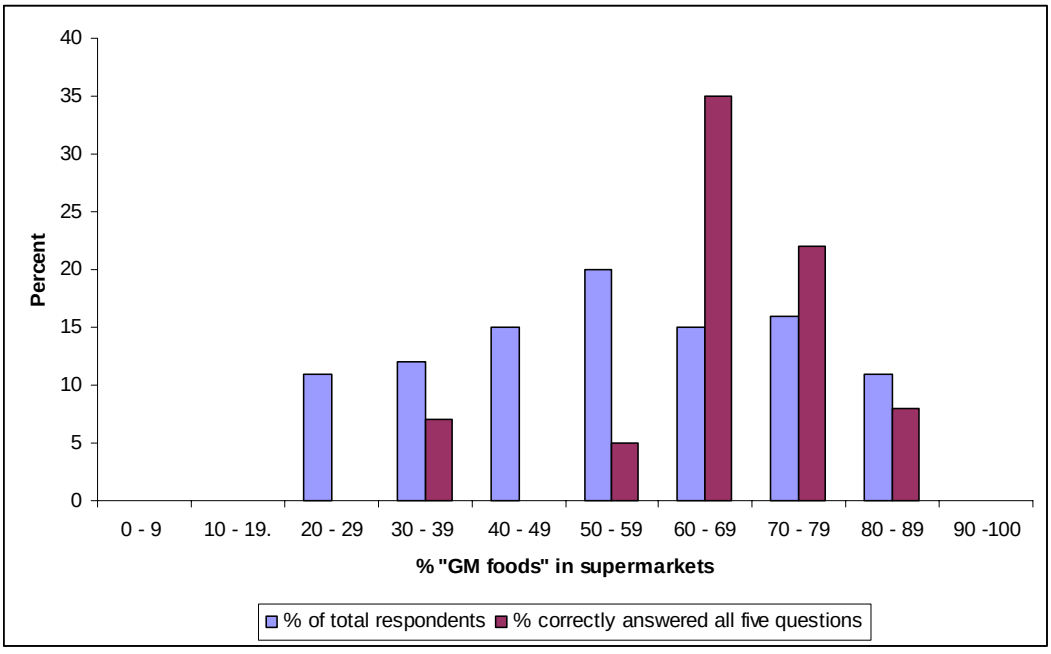

Figure 7: Distribution of percentage of "GM foods" in supermarkets and the percent withint each group who correctly answered all five questions

Furthermore, this group had the lowest percentage of accepting GM foods given positive benefits like healthier, better for the environment, and cheaper. These percentages reflect the proportion of subjects who agreed or strongly agreed with the statements.

Table 6: Break down of the percentage of "GM foods" in a supermarket and the highest and lowest percentage who answered with "agreed or strongly agreed"

% "GM foods"	Guilty	Principles	Morals	Better	Healthier	Environment	Cheaper
20-29				Highest			Highest
30-39							
40-49	Lowest		Lowest		Highest	Highest	
50-59				Lowest			Lowest
60-69		Lowest					
70-79							
80-89	Highest	Highest	Highest		Lowest	Lowest	Lowest

Discussion

The data analysis suggests that there are differences in the attitudes towards genetically modified foods between Sweden and San Francisco. Although both study groups demonstrated similar trends in their attitudes towards GM rice and salmon, there were three major points in which they differed: (1) In terms of the health benefits, 22% of San Francisco consumers thought the GM salmon was healthy/very healthy as opposed to only 2% in the GM rice application. This would seem like an anomaly considering that the GM rice has been defined to the consumers as "rice with a higher iron and beta-carotene content which could help people in developing countries to meet their daily nutritional needs." A possible explanation refers to the wording as originated by Magnusson and Hursti. The definition refers to the developing country and hints at the benefits of such a rice product, yet the objective of the study is consumer attitudes. One would have to question how the lives of other people (in another country) affect consumer attitudes. As a result individuals may have been detached from this question.

(2) San Francisco consumers also deviated from Swedish consumers in that they believed that they had greater personal control over the consumption of GM salmon than rice, which can most likely be attributed to the fact that the GM salmon is negatively viewed. The Swedish consumers demonstrated a roughly equal control over consumption. Further causes for this discrepancy could be associated with the fact that salmon is often connotated as a luxury food.

Hence for many of the San Francisco consumers, salmon might be out of the economic reach of some individuals, which would make it easier to say that they have control over whether or not they would purchase or consume the product. While the application of salmon in San Francisco might be questioned, it was implemented because salmon and pork were the only applications of genetic engineering in the Magnusson and Hursti study that were clearly and significantly negative. Furthermore, these were the only two "meat" applications as neither the more popular and cheaper beef nor chicken were offered as applications. This may have resulted because of the common dietary patterns in Sweden. Pork in my opinion is not any better than salmon given its associated cultural issues, particularly in the US. Moreover, salmon was chosen because the objective of this study is to compare the attitudes more than actual purchasing behavior.

(3) The third point of departure between the two countries was the issue of profit. The trend in Magnusson and Hursti was Swedish consumers believed that the GM salmon was used more for profit than the GM rice. San Francisco consumers thought the opposite and again could have been attributed to the fact that the definition of GM rice linked itself with developing countries. This could have touched upon concepts of unequal terms of trade and the economic superiority of developed countries.

The glaring difference between the Swedish and San Francisco consumers was their knowledge about biology and genetics and their attitudes about GM foods with and without tangible benefits. The lack of "do not know" responses in relationship to the Swedish study could imply that the San Francisco consumers were unwilling or uncomfortable with marking "do not know." This has huge ramifications as individuals may have guessed correctly or incorrectly instead of marking "do not know," which might explain for the huge differences in knowledge levels. Regardless based on the data, San Francisco consumers appeared to have less qualms about GM foods (less guilt, less against their principles, less against their morals) than their Swedish counterparts. This seems to confirm the conclusions of previous studies that the United States is more positive towards GM products than the European Union. It is interesting to note that when GM foods are given tangible benefits, Sweden and San Francisco had similar acceptance rates. The low "test" scores of San Francisco residents regarding biology and genetics could imply that San Francisco consumers appear to be less knowledgeable about genetic modification and thus more open to consuming these products. This can be extrapolated because of Sweden's high scores and more negative attitudes towards GM goods. Statistically

significant differences between Sweden and San Francisco could not be conducted as Magnusson and Hursti did not provide their complete data set.

Detection of statistically significant differences within the San Francisco data set was possible. Women were more negative than men toward GM foods, based on the number of constructs in the food application with statistically significant differences. This conclusion can be drawn because differences between the salmon and rice applications mean that one application was deemed more positive or more negative than the other. Women had seven constructs which were statistically significant while men had five constructs. Explanation for this trend could be attributed to the fact that more women than men are the primary shoppers of the family and hence could possibly be more GM food savvy than their counterparts. The more negative attitudes of women than men towards GM foods was the same trend found in Magnusson and Hursti.

Trends in different education levels were not conducted because of the very small size of non-college graduates. Reporting these small numbers would not describe trends of that particular demographic but rather the individuals who took the survey. Instead variation within "college graduates" was investigated. Statistical difference was found in the same seven constructs of consumer attitudes between the rice and salmon applications as women. Within the Sweden data set, there were nine constructs which were different. These were benefit, unethical, healthy, reluctance, concern, tampering with nature, risk, risk for misuse, and necessary. The constructs which the women and college graduates had in common with Sweden were benefit, unethical, reluctance, concern, risk, and risk for misuse. Education seemed to have no effect on either correctly answering all five questions (12 %) or correctly guessing the percentage of "GM foods" in a supermarket. Education level is not the greatest indicator of GM foods knowledge as it does not discern between individuals who have science degrees and humanities degrees. It would be assumed that science degrees would be more knowledgeable about GM foods than non-science degrees. The low scoring of San Francisco individuals may have been the result of an over sampling of non-science degrees.

Like education levels, trends in age were restricted because of small sizes. Trends were investigated in the 26 – 35, 36 – 45, and 46 – 55 age groups. These groups were not tested for statistically significant differences because breaking these categories into salmon and rice would further decrease the size of these age groups. Unlike, Magnusson and Hursti which found that

higher levels of education correlated with more positive attitudes towards GM foods and lower levels of education correlated with more negative attitudes towards GM foods, this was not found in the San Francisco data. Age seemed to have no bearing as the 46 – 55 group scored the highest on the knowledge about genetics and biology but scored the lowest on percent of "GM foods" in a supermarket. Interestingly, there was a downward trend of percent of "GM foods" as one when up the age groups. This could possibly relate to the trend in Magnusson and Hursti. Perhaps most clear is that correctly answering all five questions on the knowledge about biology and genetics does not correlate with consumer attitudes.

My hypothesis that a consumer's belief in a high percentage of "GM foods" in a supermarket would result in more negative attitudes towards GM foods and a lower percentage would result in more positive attitudes was disproved. Based on this hypothesis, the 20 – 29 % "GM foods" group was expected to be the lowest in guilt, against their principles, and against their morals. Out of these three categories, the 20 – 29 % group never scored the lowest. Despite this the 80 – 89 % group did exhibit some characteristics of the hypothesis. Like expected the 80 – 89 % group was the highest in guilty, against their principles, and against their morals. Out of the four tangible benefits constructs, the 80 – 89 % group was the least likely to consume such products. This suggests that individuals who believe there are 80 – 89 % of "GM foods" in a supermarket are indeed the most negative towards GM foods.

Even though previous studies of consumer attitudes towards GM foods have used different methods, it appears that the US is indeed more positive towards genetically modified foods than the European Union. While there appears to be a difference in attitudes towards genetically modified foods between Sweden and San Francisco, it can be argued that this may be a superficial difference as there was a noticeable difference in education and knowledge about genetics and biology.

There were several weaknesses within this study that could have likely skewed results. According to census data, the data from San Francisco was heavily biased toward women, college graduates, Caucasians, and the 26 – 55 age range. The sample size was also very small in relation to the total population of San Francisco. All of these factors contributed to a sample population that was not representative of San Francisco. Along these lines, the "every fifth person" rule in soliciting interviews was also biased. Parents with children, groups or pairs of friends, and individuals talking on their cell phone were very difficult groups to solicit and thus a

small representation of the sample. Even though adherence to the rule was strictly enforced, it was difficult to maintain, particularly because of these groups. Another weakness in terms of the sample population was the lack of representation of small corner stores, liquor stores, and ethnic markets. Surveys also were not conducted in any other language besides English. This is an important omission, considering the large population of Asians in San Francisco and their tendency to shop at Asian markets over grocery stores like Safeway and Albertson's.

Other areas of weaknesses were within the original survey. Interestingly, in the definition of the rice application there was no use of the phrase "genetically modified" while the salmon application had this phrase. This was a huge oversight by Magnusson and Hursti and could contribute to the reason why the rice application was seen as more positive than the salmon application. Wording and translation issues were a possible problem as Magnusson and Hursti conducted their study in Swedish but translated their survey into English for their paper. While the San Francisco data used the same wording as given in the paper, the phrasing of questions may have been more difficult to understand than if they had been originally written in English.

Although San Francisco is often labeled as a progressive city with many food advocacy non-governmental organizations and a large organic movement, the data collected within this study suggests that in spite of this, their attitudes towards genetically modified foods are still much less cautious then in Sweden. Gender trends within San Francisco data and the almost equal willingness of Sweden and San Francisco in their attitudes towards tangible benefits of GM foods hint at similarities and beckon for more extensive research of San Francisco. Furthermore, it would be highly interesting to see how the attitudes in a more "traditional" and "conservative" city would compare in relation to both Sweden and San Francisco. Furthermore, if we accept that there is a difference in consumer attitudes, the next logical step is why.

Acknowledgments

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Background Information *Please mark all categories that apply, all responses will remain anonymous.*

Age: ____

Sex: ❑ Male ❑ Female

Race: ❑ Caucasian ❑ African American ❑ Hispanic or Latino ❑ Asian American ❑ Native American ❑ Other

Household Income: ❑ Less than $24,999 ❑ $25,000 - $49,999 ❑ $50,000 - $74,999 ❑ $75,000 - $99,999 ❑ $100,000 +

Education: ❑ Elementary/Middle School ❑ Some High School ❑ High School Diploma ❑ Some College ❑ College Graduate ❑ Graduate Studies and Beyond

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Please read the following definition of genetic modification:

Genetic modification of plants and animals is done by means of genetic engineering by cutting a piece of DNA from one organism and transferring it into another in order to change its properties. For animals, this is often done by injecting genes into cells. For plants, genes are usually shot or transferred by means of special bacteria. Classical breeding (e.g. crossing plants of inseminating animals) is not considered to be genetic modification even if this technique also aims at choosing superior genetic traits.

What percent of processed foods on supermarket shelves do you think potentially contain one or more ingredients derived from genetically modified crops?

❑ 0% - 9% ❑ 10% - 19% ❑ 20% - 29% ❑ 30% - 39% ❑ 40% - 49% ❑ 50% - 59% ❑ 60% - 69% ❑ 70% - 79% ❑ 80% - 89% ❑ 90% - 100%

Please carefully read the following and then answer the questions below:

Genetically Engineered Salmon:
Salmon that has been genetically modified to grow ten times faster than normal salmon.

1. How much benefit do you think that we can have from genetically engineered salmon?
❑ No benefit at all ❑ Very little benefit ❑ Little benefit ❑ Moderate benefit ❑ High benefit ❑ Very high benefit

2. Do you perceive the use of genetically engineered salmon to be unethical?
❑ No at all unethical ❑ Very little unethical ❑ Little unethical ❑ Rather unethical ❑ Unethical ❑ Very unethical

3. How healthy do you think it is to eat genetically engineered salmon?
❑ No at all healthy ❑ Very little healthy ❑ Little healthy ❑ Moderately healthy ❑ Healthy ❑ Very healthy

4. How much control do you have over whether or not you will consume genetically engineered salmon?
❑ No control ❑ Very little control ❑ Little control ❑ Moderate control ❑ Much control ❑ Very much control

5. How reluctant do you feel about the use of genetically engineered salmon?

❑ No reluctance ❑ Very little reluctance ❑ Little reluctance ❑ Rather strong reluctance ❑ Strong reluctance ❑ Very strong reluctance

6. How concerned are you regarding the use of genetically engineered salmon?
❑ No concern ❑ Very little concern ❑ Little concern ❑ Moderately concern ❑ Strong concern ❑ Very strong concern *(Continued)*

7. To what extent do you think that we tamper with nature when salmon is genetically engineered?
❑ No tampering ❑ Very little tampering ❑ Little tampering ❑ Moderate tampering ❑ Great tampering ❑ Very great tampering

8. How great a risk do you perceive genetically engineered salmon to be?
❑ No risk ❑ Very little risk ❑ Little risk ❑ Rather high risk ❑ High risk ❑ Very high risk

9. How great a risk for misuse do you think there is with genetically engineered salmon?
❑ No misuse ❑ Very little misuse ❑ Little misuse ❑ Rather large misuse ❑ Large misuse ❑ Great misuse

10. To what extent do you perceive that the use of genetically engineered salmon is for profit alone?
❑ Not at all ❑ Very small extent ❑ Small extent ❑ Moderate extent ❑ Great extent ❑ Very great extent

11. To what extent do you think genetically engineered salmon serves a good purpose?
❑ Not at all ❑ Very small extent ❑ Small extent ❑ Moderate extent ❑ Great extent ❑ Very great extent

12. How necessary do you think genetically engineered salmon is?
❑ Not necessary ❑ Very little necessary ❑ Little necessary ❑ Moderately necessary ❑ Necessary ❑ Very necessary

13. How much knowledge do you think we have about the consequences of genetically engineered salmon?
❑ No knowledge ❑ Very little knowledge ❑ Little knowledge ❑ Moderate amount of knowledge ❑ Much knowledge ❑ Very much knowledge

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Please answer the following, using the following scale:

Disagree Strongly	Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Agree	Agree Strongly
1	2	3	4	5	6	7

_____ 1. I would feel guilty if I consumed foods derived from genetic engineering.
_____ 2. Consuming foods derived from genetic engineering goes against my principles.
_____ 3. It would be morally wrong for me to consume foods derived from genetic engineering.
_____ 4. I would purchase genetically modified foods if they tasted better.
_____ 5. I would purchase genetically modified foods if they were healthier than conventional foods.
_____ 6. I would purchase genetically modified foods if they helped to improve the general state of the environment.
_____ 7. I would purchase genetically modified foods if they were cheaper.

*Please answer the following statements with **T for true, F for false, or D for do not know**:*

_____ 1. Conventional foods do not contain any genes.
_____ 2. Yeast used for brewing beer consists of living organisms.
_____ 3. Genetically modified animals are always bigger than ordinary ones.
_____ 4. More than half of human genes are identical to those of chimpanzees
_____ 5. All human cells contain DNA.

Appendix B: Percentage of consumers' ratings for the application of GM salmon and rice

Constructs (abbreviated)	Salmon	Rice
1. Benefit		
No/very little	78	2
Little/rather high	13	50
High/very high	9	48
2. Unethical		
Not at all/very little	18	9
Little/rather	5	70
Unethical/very unethical	77	21
3. Healthy		
No/very little	64	71
Little/rather high	14	27
High/very healthy	22	2
4. Control over consumption		
No/very little	0	13
Little/rather much	2	86
Much/very much	98	2
5. Reluctance		
No/very little	18	54
Little/rather strong	0	34
Much/very strong	82	13
6. Concern		
No/very little	18	11
Little/rather strong	0	68
Much/very strong	82	21
7. Tampering with nature		
No/to a very little extent	18	0
To a little/rather great extent	4	57
To a high/very high extent	78	43
8. Risk		
No/very little	18	10
Little/rather high	0	70
High/very high	82	20
9. Risk for misuse		
No/very little risk	18	11
Little/rather large	5	66
Very large/great	77	23
10. Used for profit alone		
Not used/to a very little extent	9	2

To a little/rather great extent	20	9
To a high/very high extent	71	89
11. Serves a good purpose		
No/to a very little extent	82	41
To a little/rather great extent	0	59
To a high/very high extent	18	0
12. Necessary		
Not at all/very little	82	41
A little/rather	0	59
Necessary/very necessary	18	0
13. Knowledge about consequences		
No/very little	82	82
Little/rather much	0	18
Much/very much	18	0