

Information Framing and Consumer Choices of Genetically Modified Food

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This study focuses on the effects of framing information on perceptions and choices of genetically modified food. Information that is presented in a neutral, positive, or negative framing provokes different reactions and may change perceptions and choices. The effect of framing on judgment and choices is stronger when consumers are less knowledgeable, and their beliefs are not very strong. This study aims to show that even subtle manipulation of the information, which is done by the wording of a statement, can change the willingness to accept genetically modified food (GMF). Using experimental survey design, we studied the effects of subtle framing of information on perceptions and choices of GMFs that are not commercial and do not exist in the markets.

Consumers vary in their perception and attitude towards genetically modified foods (GMFs). While a majority have strong preferences for conventional food over GMFs, about one-third of consumers support biotechnology and some are willing to pay more for GMFs. The aversion to GMFs is reflected by significant discounts (in the range of 10%-50%) that were revealed by studies on willingness to accept (WTA) replacing regular food with GMFs and by their willingness to pay (WTP) a premium price for food labeled "GM-free" or "organic." However, the method that is used to elicit (WTA) affects the amount demanded by consumers.

Consumers demand a higher discount for GMFs when researchers employed the contingent valuation method (where consumers state their preferences) relative to the WTA elicited in experiments and experimental surveys. Moreover, some consumers with the highest WTP for pesticide-free

food will not vote to ban GMFs while consumers with low WTP for pesticide-free food will vote to ban it. The heterogeneity in WTA between those who oppose GMFs versus its supporters—and inconsistency between WTA, WTP, and in the voting—does not change the fact that the high discounts, which reflect the trade-off between perceived risk and price, threaten the introduction and economic viability of GMF varieties.

The preference for traditionally grown agricultural products is striking given that, in terms of food safety, products labeled as GM-free have not been proven to be safer for the consumers or the environment. Furthermore, concern about the application of pesticides in conventional farming should have driven consumers to prefer GMFs.

There is a growing body of literature that suggests that consumer objection to the application of biotechnology in the production of food is partially attributed to predispositions. These tendencies have been created by negative publicity on one hand, without being presented with any tangible benefits on the other hand, except the promise of a price reduction. Consumers are aware of the claim that GMFs increase the efficiency of production, which may result in lower prices of food.

The exposure to unfavorable information and the concern about risks has created a negative predisposition toward GMF products. If these dispositions are not strongly grounded and if the risk is not very high, then a moderate price discount will convince some consumers to choose GMF products over traditional food products. Thus, evaluation of the potential profitability of GMFs depends on the correct assessment of the perceptions of risk and the strength of negative prior perceptions. Economists and marketing experts have

been challenged to find methodologies to quantify the predispositions to GMFs and the factors that affect them.

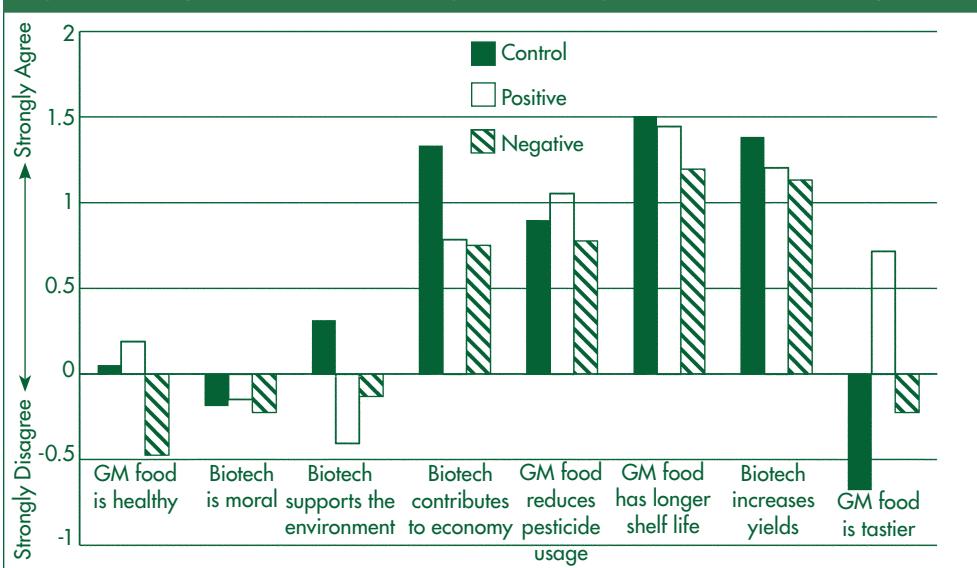
Studies have found that the negative dispositions are not strongly correlated with education and knowledge, but are related to gender. Specifically, females tend to oppose GMFs more strongly than males.

As the ratio of GM ingredients to traditional ingredients is increased, so does the discount required by consumers in order to choose GMFs. On the other hand, the introduction of GM vegetables and fruits with enhanced nutritional benefits reverse consumer resistance and increase the likelihood of acceptance of GMFs.

In studies where consumers had a choice between a traditionally grown agricultural product and a GM product with enhanced nutritional value, consumers preferred the GM product and were willing to pay a price premium. Thus, it seems that consumers' perceptions and choices might be influenced by the framing of benefit (and risk), where positive framing is supposed to increase support while negative framing is expected to increase fear and resistance to GMF.

In this paper, we explore the effect of subtle information framing, namely wording of statements, on perceptions and choices of GMF products. In two experiments, consumers were exposed to either positive or negative statements about GMFs. Next, they were asked to indicate the extent to which they agreed with the statement, and then to choose between GM and conventionally grown vegetables. Perceptions and choices were compared to those of a control group. We show that, despite more than a decade without significant evidence of GM health risks or environmental hazards, consumers are easily swayed by negative or positive framing.

Figure 1. Perceptual Differences Among Positive, Negative, and Control Groups



Previous literature has suggested that framing affects overall perception and judgment. Positive framing triggers favorable perceptions while negatively framed statements trigger unfavorable judgments. This phenomenon has been explained by information models in which consumers use the negative or positive characterization of the framing as a new piece of information, and the notion of availability heuristic. This notion is part of a behavioral theory that people's attitude is affected by available information.

Consumer behavior is frequently explained by the availability heuristic because consumers make little effort to systematically collect information. Consumers estimate the likelihood of risk by relating it to the ease with which risky or hazardous events come to mind. Negative framing of information about health risks and environmental hazards is supposed to provoke fear, which, in turn, decreases certainty, reduces a sense of control, and increases the accessibility of risk. Therefore, judgments and choices are affected.

The effect of framing is stronger when consumers have little knowledge about the judgment task or when they are uncertain about the product (technology). Consumer choices are affected by their perception of benefits, costs,

and risks, as well as the weights that are assigned to each of these. Higher accessibility to risk (or specific benefit) is likely to increase the weight that consumers assign to the manipulated attribute in the choice process and accelerate (counterbalance) the effect of information framing on choices.

We conducted an experiment in Israel with 399 student consumers who were randomly allocated to either the control or the two treatment groups, i.e., positive and negative framing. The survey sample consisted of 216 females and 183 males (54% and 46%, respectively). Out of 399 respondents, 58% had a scientific background (23% majored in life science and medicine and 35.6% majored in agricultural economics or engineering). The remaining 42% had social science and humanities backgrounds.

Our experiment is hypothetical, which has advantages in eliciting consumers' WTA. We framed information on seven attributes of GM bell peppers, which, of course, do not exist. Each respondent read seven statements regarding GM bell peppers and indicated on a seven-point scale the level of agreement. The seven statements were framed either positively or negatively.

The manipulation was pretested in a class of 40 undergraduates, who were

randomly assigned to two classrooms wherein the questions were read aloud and followed by an open discussion on biotechnology and genetic modification. The subsequent atmosphere and discussion indicated that the manipulation succeeded in increasing or decreasing support for biotechnology.

Each of the interviewers received a mixed package of questionnaires (negative and positive), knowing neither the order nor the framing, and distributed them during a lunch break on predetermined days (chosen by a random process). Out of 399 respondents, 99 were assigned to the control group, 148 received positively framed questionnaires, and 152 received negatively framed questionnaires.

Respondents were asked to report their perceptions using a seven-point scale of bipolar questions. For example, "Genetically modified vegetables are more (less) tasty than traditionally grown vegetables: 2: Strongly agree; 0: Neither agree or disagree; -2: Strongly disagree."

Consumers were asked about their perceptions of GM bell peppers in regard to health and taste, biotechnology's effect on the environment, their views on biotechnology's moral aspects, reduction in pesticide use, GMF's increased shelf life, contribution to the economy, and potential to increase yields.

Following the questions about perceptions, respondents were asked to choose between GMF and traditionally grown vegetables when the GMF price reflected discounts of 5% and 30%. In addition to perceptions and choices, respondents indicated their genders and their majors, specifically science, social sciences, or humanities.

Figure 1 presents the perceptions of GMF attributes and consumer attitude on the issue of gene-exchange morality and possible negative effects on the environment under the negative and positive framing conditions compared to the control.

Framing significantly affected respondents' perceptions of healthiness and tastiness of GMFs. The direction of the framing did not affect the perceptions that GMFs are hazardous in general. However, it increased the magnitude of perceptual differences that consumption of GMFs is risky.

Without exposure to information, consumers do not perceive that the consumption of GMFs is risky. Negative framing increases uncertainty, and positive framing is not trusted. Although consumers positively relate the consumption of GMFs with higher risk to health, the degree of statistical significance of this relationship is weak—suggesting that their fear level is not very high.

Consumers believe that GMFs have the potential to be tastier relative to traditionally grown food in both manipulation groups, while the control group tends to reject this idea. Framing had little effect on the perception that biotechnology will reduce pesticide usage in agriculture, increase yields, and contribute to the economy.

Framing did not affect the perception of whether or not gene exchange is moral. However, framing did increase the perception that GMFs would negatively affect the environment. Finally, consumers do believe that biotechnology has the capability to improve product taste.

In general, negative framing resulted in stronger resistance to biotechnology. While consumers were not very fearful about health hazards, framing increased fear and uncertainty. We found that individuals with knowledge and educational background were less affected by the framing. In a negatively framed questionnaire, knowledge increased the perception that GMFs are healthier, whereas in a positively framed questionnaire, knowledge did not affect perceptions.

Estimating the choice process of GMFs versus traditionally grown bell peppers when GM bell peppers are sold

at a 30% discount revealed that the perceptions that biotechnology contributes to health and reduces pesticide use were the only salient attributes in the decision process. Positive framing did have a statistically significant effect on the weights given to health and taste in the decision process. While negative framing decreased the weight attributed to the health benefits of GMF consumption and increased the weight of taste in the choice process, there is also significant joint effect.

Moral considerations increased support at low statistical significance while gender and knowledge did not make a difference at all. This is in contradiction to other studies where females have more negative perceptions about GMFs than men.

The predictive power of socio-economic factors is rather low. Summarizing the aforementioned findings suggests that if the information is negatively framed, then the weight assigned to health increases and that of taste decreases. Since perceptions of healthiness and tastiness decline with negative framing, the increase in the weight assigned to health amplifies the effect of negative framing.

Education (i.e., background in social science, science, and engineering) did not make a difference in the preference of GMFs in cases with 30% and 5% discounts. These results did not change much when GMFs were offered at a 5% discount, and motivation for acceptance of GMFs was altered to better taste, longer shelf life, and less pesticide use.

Conclusions

Consumers were affected by the magnitude of discount more than by framing. While only 40.7% showed willingness to purchase GM bell peppers given a 5% discount, when the discount was 30%, the proportion of consumers who chose GMFs increased to 69%.

Negative framing decreased the proportion of respondents who chose

GMFs sold at a 30% discount to 67%, and insignificantly increased the proportion of respondents who chose GMFs (41%) when they were sold at a 5% discount.

Our findings indicate that there is a trade-off between price and risk, and most consumers are willing to purchase GMFs given a deep discount while the majority declined the GMFs when the discount was only 5%. Our findings suggest that since the majority of consumers are willing to purchase GMFs at a 30% discount, while positive framing has an insignificant effect, it would be reasonable to cut prices in order to induce adoption. After consumers get used to GMFs, producers can reduce the discount.

Future research may test whether our findings hold in other continents and for other crop varieties. An alternative strategy may rely on our finding that consumers more readily agree with the statements that imply that biotechnology may enhance tastiness and extend shelf life while they find it harder to agree with the statements that biotechnology will reduce personal and environmental risk, i.e., produce healthier food and help to protect the environment. Improved taste may be the road to GMF adoption.

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