Consumer Behavior and Regulation Biases: An Analysis of the Effect of Information on Food Consumption

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Abstract

Opposite to what is assumed by legislators and regulators, not all the information provided is properly absorbed, processed and used by consumers. Such ideas seem acceptable, but they are in conflict with two self-evident truths assumed by the economy and the consumer's rights. The first refers to the assumption that people act rationally when making choices based on their preferences. The second deals with the singular importance of balanced information in consumer relations. In this article, using empirical methodology based on sensorial analysis of food, the authors rise up against these truths. When evaluating the preferences of students regarding the consumption of chocolates and the effect of the information "diet" in relation to these choices, important results were obtained. They may indicate the need for regulation changes and provide evidence that food preference does not always respect the basic postulates of rationality.

Keywords: consumer, behaviour, limited rationality, chocolate, legislation

1. Introduction

The requirement of nutritional information on food products originates from a regulatory strategy that reflects the relationship between economic studies and legal instruments. From the economic studies, it has been used the concept of asymmetric information (Akerlof, 1970), i.e., the finding that there is a disparity of knowledge on the product, between suppliers and consumers. As a result of such asymmetry, the dishonest supplier, in order to sell more, can renounce to explain important information for consumers.

The legal instrument used to solve this problem, present in the Brazilian Consumer Code and regulatory legislation, is the provision of information to consumers to reduce asymmetry and facilitate good choices.

In our point of view, the problem is that to reach this solution the legislator and the regulator have assumed that consumers are rational and use available information to make consistent choices. Furthermore, there has also been assumed that the ways info is displayed to consumers are neutral, meaning it does not influence their choices.

We carried out a research on the difficulty of using such information, which led to an article called "Consumer's limited rationality and information asymmetry" (Flores Filho and Ribeiro, 2012). Now, our goal is to demonstrate that choices made by consumers are inconsistent, i.e., there is a preference regardless of context (or architecture, in technical language) of choice. This also demonstrates that the form used by regulators to inform may contribute to such inconsistency.

Assuming that consumers are rational people means that, in simple language, they have the capacity to differentiate and choose products that meet their primary interests.

In order to differentiate and choose, these consumers have to be able to compare two products and express their preference for one of them. Furthermore, since they are rational, these people should have had the ability to maintain the same order of preference when they came across the same set of products. By accepting the idea that they are able to compare pairs of products, one must accept as true the axiom of transitivity. On the other hand, by accepting the notion that consumers are always able to maintain the same order of preference, one must accept the axiom of completeness.

From this assumption, or rather, from the recognition of axioms about consumer behavior, jurists have conclude that people are fully capable of making good choices and that is usually enough to provide information to avoid errors or contradictory behavior in consumption acts.

To accomplish our goals, we contrast the traditional doctrinal view with a behavior we believe to be more consistent with the real world. We return to the use of interdisciplinary knowledge and methodologies to create an empirical research grounded on a rigorous sensorial analysis technique. This research, as the one conducted in 2012 using chocolate consumption as an object and food choice, is justified by the fact that it is a hedonic food. In this context, this paper analyzes a practical experiment on consumer behavior and, by indirect means, allows the discussion of the basic axioms of rationality. More specifically, our text deals with the regulation of information in the food sector and consumer behavior in the light of such regulation.

To discuss the regulation and the acts of food consumption, the legislation, in Brazil, of the sector is analyzed – specifically the National Agency for Sanitary Surveillance (ANVISA) standards – and it will be exposed the foundation of economic theory on consumer preference. After that, it will be described an experiment conducted to evaluate the effectiveness and the risks generated by encouraging the use of information on food packages. In that section, it is reported the result of an empirical research based on the principles of sensory analysis of foods and statistics.

This research had as its object the regulation of the use of the word diet on food packages. The choice of this theme, in addition to continuing previous work, allows one to join three relevant issues in the current context: economical regulation, the rationality of agents in the society consumption and the quest for a healthier life.

2. Theoretical Framework

2.1 On the Rationality of Consumers and the Axioms of Preference

To simplify reality and enable mathematical analysis of human behavior, economics applies the assumption that people act rationally. This means, as stated initially, they have the ability to compare any pair of options available (axiom of completeness), and that these comparisons shall result in consistent preference (axiom of transitivity).

These axioms exist to support the Expected Utility Theory, which was initially developed by Daniel Bernoulli in the eighteenth century, and had its formatting perfected by John von Neumann and Oskar Morgenstern in the work *Theory of games and economic behavior*, 1944. In the works by Neumann and Morgenstern (Neumann & Morgenstern, 2007), the axioms of completeness and transitivity were the guarantors that people could act completely rationally, since their choices could be ordered in a single chain without gaps and without circular preferences.

The axiom of completeness ensures that pairs of options – or consumption baskets or packages, in the correct theoretical formulation – can always be object of analysis and choice, resulting in a preference for either option, or a posture of indifference (Pindyck & Rubinfeld, 2010). The requirement that the choice of an individual is "completely binary" is important because it allows us to say that when facing with various goods (A, B and C, for example), a person can compare them in pairs (A and B, B and C, A and C) and establish which one he or she prefers, or maybe to express indifference. Thus, people can rank their preferences without gaps, i.e., for any set of options one can always get a full order of preference chained from the best to the worst.

The axiom of transitivity allows us to say that if A is better than B and B is better than C, A will always be better than C (Pindyck & Rubinfeld, 2010). This axiom prevents that a sequence of choices generates circular preferences, i.e., it puts away the finding that, in the above example, C could be better than A.

These and other axioms eventually mentioned in economic doctrine sustain the Expected Utility Theory, better known in other areas such as Rational Choice Theory.

Based on the above-mentioned axioms, economists have concluded that people are able to formulate a determined and ordered preference structure, and therefore they are aware of the result they want to get with their decisions or choices. Being aware of this, people can confront these results with probabilities of occurring (utility) and choose the option that is closest (maximize) to the expected utility. Given these circumstances, economic theory concludes that if people are able to act to maximize their expected utility, they are rational.

This theory, which has been for some time challenged by notable scholars, expresses a proposition which, in our view, is also present on the basis of legal theory and, as a consequence of Consumer Law andRegulatory Law: the proposition that the availability of information by itself can lead people to choose effectively and consistently.

2.2 Regulation of Food and Complementary and Special Nutrition Information in Brazil

In Brazil, the optional information contained on food packages refer to a group of complementary nutritional information regulated by ANVISA's Ordinance No. 27/1998 (Brasil, 1998a) and some types of foods for special purposes, as regulated by ANVISA's Ordinance No. 29/1998 (Brasil, 1998b). Additional information are the Portuguese terms such as "BAIXO", "LEVE", "FONTE DE", "RICO EM", "NÃO CONTÉM" and their English translations, the best known of them being "LIGHT" and "FREE". These terms can be used as supplementary information on food packages, since they do not lead to misinterpretation or misunderstanding on the part of the consumers and they respected the tables contained in the legislation mentioned above. The nutritional supplement other information that is linked to food for special purposes and the word "DIET" is perhaps the most common.

According to the ANVISA's guidelines, diet foods are those "specially formulated for population groups that have specific physiological conditions". ANVISA Ordinance No. 29/1998 (Brasil, 1998b) includes in this group food for diets with restricted nutrients, food for weight control, and food for controlled sugar diets. This means that any food product that meets these definitions, such as low-calorie products or food without sugar, can display the designation "diet" on the main panel of its package.

Given this legal framework, the regulator assumes that people, armed with the right information, can interpret exactly what is written on a given food pack and fully understanding in which situations it would be appropriate to choose the diet product.

Moreover, once stipulated the whole set of technical definitions, consumers prefer to use these concepts to deduce on their own or by influence of others, whatever "diet" is.
In summary, in Brazil there are technical standards that are available to consumers to make their food choices effectively clear and consistent.

2.3 Limited Rationality and Architecture of Choice

Specifically in respect of food intake, the regulatory agency, through the legislation briefly described above, assumes that consumers act rationally, properly using the information provided on packages. This assumption serves the logic of rational choices discussed in the first topic.

However, it does not seem a very realistic image the one of the consumer using the displayed nutritional information easily and with interest (Sunstein, 2013). In order for this to be achieved, diet products, for example, should always be related to specific concepts contained in legal norms. The legal standard of ANVISA on the subject would only have effectiveness if people, when consuming a diet product, knew what that word diet meant on the label.

Therefore, the first question of this paper arises: most people do not even know that there is an ANVISA norm on diet foods and they end up using misinformed concepts regarding this word. In fact, the "cost" to figure out what the word diet included in a package means may be too high to convince people seeking only momentary pleasure to know and understand the meaning of the term. Therefore, people put aside the correct concept and use simplifying strategies – mental shortcuts – to choose, for example, between regular chocolate and diet chocolate.

This course of action, which might even be considered rational in the sense that it is the one that leads to a lower cost option, is automatic (Kahneman, 2012). This is characterized precisely by inertia or a lack of reasoning by the consumer, who may end up choosing a product that does not meet his or her own criteria of choice.

In practical terms, in the case under review, legislation should know how popular culture interprets the word diet, should know that hedonic foods (chocolate, for example) are chosen differently from utilitarian food (Wansink *et al*.,2004) and it should know that choices for tastier food products are made fast and are usually based on the previous experience of the consumer (Andrade and Ariely, 2009). Ultimately, it is not enough to standardize and provide the information, but it is also necessary to know the context in which such are used.

From these questions regarding the limitation of rationality and the architecture of the choices, problems arose: will the consumer always decide rationally when provided with clear information? Does the information provided clearly interfere negatively on consumer choices?

Our hypotheses are: (1) consumers do not always decide rationally and (2) some types of information such as that represented by the word "diet" can lead to irrational choices.

To test these, we developed an experiment whose methodology is described next.

3. Methods

The empirical research described is an affective sensory analysis of chocolate, which followed the Meilgaard *et al*. (2007) methodology. The participants completed a questionnaire that addressed the frequency of their chocolate consumption. The main factors involved in the consumption of this product was how much more they would pay for chocolate they liked best and in what situation they would use diet chocolate. The participants were 50 law students, among which 30.0% (n = 15) were male and 70.0% (n = 35) were female, averagely aged 24 years (± 4 years). For 80.0% (n = 40) of the subjects, chocolate consumption was weekly, i.e., the habit of ingesting this product is present in the everyday lives of those individuals. The study was approved by the Ethics Committee meeting the requirements recommended by Resolution No. 196/96 of the Brazilian National Health Council.

The study was conducted in two stages. At the first stage, 50 tasters participated in the preference test and analyzed four samples of chocolates. At the second time, all the tasters that had participated in the acceptance test were organized in two groups (one with 24 individuals and the other with 26).

In the preference test, the samples were prepared in such a way that they did not indicate the brand of the product. They were coded with a three-digit random number and displayed on a tray with capacity for four samples. The chocolates were served at room temperature and the participants were instructed to ingest some water between assessments. The test site was organized so that the tasters keep equal distance to each other, which ensured their individuality. It was also considered the distribution of brightness in the environment to avoid interference in sensory evaluation.

The chocolate samples were balanced and presented all at once and the order of presentation followed a completely randomized design. Tasters were asked to evaluate each sample, from left to right, and to attribute number 1 for the most preferably sample, the number 2 for the second most preferred, and so forth. Finally, the results of the preference-ranking test were converted into scores (1 to 4) in order to obtain the ranking sum for each sample. The significant differences between the sums of each sample – a 5% probability – were analyzed according to of Newell and MacFarlane (1987) criteria.

After testing the preference, it was asked that each taster participated in the acceptance test. At this time, the sample scored as 1, more preferable, was called "diet chocolate" and the sample rated as 4, less preferable, was called "regular chocolate". As in the previous test, the samples were properly prepared and located so as not to compromise the evaluation.

For a part of the tasters (n = 24), the samples were presented in labeled cups with discrete information in small letters to indicate the chocolate type (Group I). For the other part of the tasters (n = 26), the cups were put above a paper where the information was evident in large letters, to indicate whether they were "diet chocolate" or "regular chocolate" (Group II). The chocolate samples were presented one at a time and the order of presentation was randomized and balanced.

Tasters were asked to evaluate each sample globally and to rank in a scale how much they liked it or not. It was used a facial hedonic scale of 5 points comprising the extreme 1 as "hated it"and 5 as "loved it".

The results of the acceptance test were converted into scores (1-5) and it was verified that tasters gave lower scores to the chocolate which was called diet, but before the preference test, the same chocolate was rated as best, as the one of choice.

The purpose of these tests was to assess whether the ordinance made in the first phase by classifying four samples of chocolates respected the axiom of transitivity and to analyze the influence of the word "diet". For this, it was carried out a preference test at the first time and at the second time, the very same chocolates ranked in first and fourth places were chosen.

To try to confirm the influence of the word "diet", we only acted on the acceptance test (the second phase) by making the information "regular chocolate" and "diet chocolate" more evident for Group II. Moreover, due to the research design as a whole, the criteria "taste" was removed when real diet chocolate was not used. In other words, it was offered to the participants their favorite chocolate with a false label. By doing so, it was proved that the main – or only – factor that could affect the choice of the best chocolate was the information that it was diet chocolate.

3. Results and Discussion

The taste for chocolate was the main factor that influenced their consumption of this delicacy, indicated by 76% of study participants (n = 38), and brand and price factors appeared in second and third place respectively. An interesting fact is that the aspects of the package were cited as a decisive factor for consumption by only 30.0% of the participants (n = 15) and the nutritional information was remembered only by 16.0% (n = 8).

The analysis of the preference sensory test revealed no significant difference between the preferences for the analyzed samples. In the total score obtained for each sample, the minimum difference to characterize a significant difference was 23 points and this value was not reached. As a result, it cannot be stated that a sample was preferred over the other. This fact is relevant and it makes the individual choices more subjective, for there is no sample that can be broadly classified as best.

In the acceptance test, in a quantitative analysis, it was observed that 41.7% of people in Group I (n = 10, from a universe of 24) have changed their preference as they gave a higher scored in the acceptance test for the chocolate classified in last place in the preference test, known at that stage as "regular chocolate". The so-called "diet chocolate", ranked as the most preferred sample in the preference test was chosen for a slightly larger number of tasters (n = 14). In this experiment, therefore, it is perceive evidence that the reference "diet" helped change the preference of some participants.

On the other hand, when the information on the type of chocolate was displayed for the Group II evidently, in large letters, the number of subjects who chose "regular chocolate" was much higher, 73.1% (n = 19, a universe of 26). This indicates that it is likely that the more visible the information is, the higher is the tendency of product rejection. This fact is extremely important because the rejected product is the same that had been rated as the most preferable minutes before.

In an overall analysis of the results of the acceptance test (n = 50), when asked if they would pay more for chocolate they liked, 68.0% (n = 34) responded that they would pay up to 15% over the price. In addition, this response perhaps demonstrates the most absurd result or the most unreasonable conduct of the participants, since 28 out of the 29 participants who chose the diet chocolate reported to pay more for chocolate that in the first phase they ranked as the worse.

By looking further, the results indicate that the behavior of the participants may have been irrational by not fitting in the axiom of transitivity, because it was found that there was not a clear preference in the acceptance test, through the chocolate ranked in first place in the preference test. In an analysis of the groups in the acceptance test, Group I showed that little less than half of its participants ignored their first choice; in Group II more than 70% of the participants did so.

Critics can be made to this statement, in the sense that there was a change in the info displayed in the samples in the preference test and in the acceptance test. However, against this argument, it has to be said that the participants made it clear that their main criteria of choice was taste. In addition, the package was only mentioned by 30.0% of individuals only as a third factor in the relevancy for chocolate consumption. Nutrition information was mentioned by only 16.0% of the tasters, the reason why the information "diet" should not be relevant to change radically the choice of participants.

If the change on the information of the sample was relevant, this happened because participants probably did not know well about their own selection criteria. In fact, this may be imperceptible or in a way automatic, which eludes rational analysis. In this sense, they may be using a mental process of automatic choice described by Kahneman (2012) as "System 1" and may have used what this same author classifies as heuristic or mental shortcut. In this hypothesis it could have been used the heuristics of availability, which uses references related to well-known events or facts to judge concrete situations. In this case, the general information that the diet chocolate had a bad taste may have been used in deciding the preference, instead of a rational analysis based on the actual taste of chocolate.

Another hypothesis, also in relation to the use of mental shortcuts can be the application of the heuristics of anchoring. Accordingly, participants may have used the information diet as a reference point and, from it, analyzed the chocolate flavor. If the term "diet" was a reference point (anchor) worse than the information "regular chocolate", evaluations should be inferior in relation to the other sample, even when positive. This possibility is relevant, not only for irrational conduct analyzed at this time, but also to the issue of possible negative effect of nutritional information which will be discussed below.

Given these data and arguments, one can state that there is compelling evidence that the hypothesis presented initially that "consumers do not always decide rationally" was proven. This is due to the fact that at the experimental level, the choice made by the participants was not only contradictory in relation to the preferences demonstrated in the first stage of the research but also inconsistent. That is, they were contrary to what is proposed by the transitivity axiom.

Regarding the second hypothesis of this study (some types of information such as that represented by the word "diet" can lead to irrational choices) is important to highlight the fact that apparently the information "diet chocolate" displayed on the sample was the most important factor to change consumer choice or, more specifically, to make that choice inconsistent or irrational. Therefore, there is evidence of negative influence of information.

On this theme, we must consider, initially, that the words of a package are not simply facts rationally absorbed by consumers without taking into account their feelings, desires and emotions. The consumer is not an abstract individual that receives information without tiring and absorbing all the data presented to it, even without knowing exactly why, and therefore they are necessary. There are some important parameters in this relationship as amount of information and the ways to present them (Kimura et al., 2008), religion (Just *et al*.,2007), concepts of health (Akbay *et al*. (2007), convenience, and mood (Prescott *et al*. 2002).

Furthermore, studies from Ângulo and Gil (2007), Soares *et al*. (2008) and Maestro and Salay (2008) found that when consumers were exposed to more detailed information about the food products that are objects of studies, there was a change of opinion and perception of the product. In addition, this was repeated between Groups I and II of the present research.

Still in the scope of information availability, Lee *et al*. (2006) noted the importance of the moment in which it is offered. In a study involving the supply of beer with drops of vinegar, these authors observed that "when the secret ingredient was released before consumption, participants may have focused more on the negative aspects of the multidimensional experience [taste] and falsely attributed all these negative elements to vinegar instead of the beer. In another direction, when the information was disclosed after tasting it seems not to have occurred. For the authors, "the malleability of tastes is probably influenced by the timing of information", i.e., the bad information presented before tasting – as occurred in our research – can change the perception of the taste of food or drink. The perception of taste, then, depends on what comes before, knowledge (information) or experience (the actual tasting).

On the other hand, Ares *et al*. (2008) concluded that the amount of information absorbed by consumers depended on the degree of product knowledge and issues related to it. An excessive amount of information on functional foods could in some cases impair a product's acquisition and consumption. Regarding chocolates specifically, Visschers and Siegrist (2009) found that the main reason that leads people to consume chocolate is the pleasure and satisfaction in consuming the product, but not the label info or health factors. In a similar sense, Williams *et al*. (2008) concluded that the type of food is most significant than the health claims on labels. This type of observation stems from the fact that some food products can be characterized as hedonic and other as utilitarian.

In the case of utilitarian food, the concern is expected to be closer to health related issues than in the case of hedonic foods, which expectations bind the pursuit of pleasure (Wansink *et al*., 2004). In this context, it may have been a rather irrational decision because there is no connection between what is expected of a given chocolate and the information that it is healthy or notably diet.

In this particular case, it should be asked even if the term "diet" may have been received negatively or even extremely negative by the tasters of this research. To examine this possibility is interesting to note that some of the participants, 34.0% (n = 17) responded that they consume diet chocolate only by prescription and 28% (n = 14) of the participants see no good reasons to consume this type of product because they do not have this habit. These facts are described in Table 1.

Table 1 - Reasons for Consumption of Chocolate diet

Response pattern	**%**	**n**
There is no reason, because there is no consumption	28.0	14
There is no reason, because I do not like the product	2.0	1
Yes, there are reasons, because I like the product	14.0	7
Yes, there are reasons, only by medical prescription	34.0	17
Yes, there are reasons, just to keep the body fit	22.0	11

A different analysis of the data in Table 1 found that for 56.0% (n = 28, the last two categories of responses) of the participants of this study, the consumption of diet chocolate involves health aspects. Moreover, the relationship to health may not be in harmony with the interest in the hedonistic taste of the product, as described above.

The influence of the term "diet" and information such as "low fat" on hedonic food has been discussed in the studies by Wansink *et al*. (2004); Wardle and Solomons (1994) and Bowen *et al*. (1992). Moreover, all these studies concluded that the information about fat and "diet" were received negatively in the case of these foods. The first study inclusive compared the influence of the term "diet" in desserts and the inputs of full meals stating that the negative influence was in the first case and could be positive in the latter.

Based on the obtained results and the mentioned studies one could even contemplate the hypothesis that the use of the word "diet" can provoke disgust or repulsion, feelings that have been studied by researchers such as Paul Rozin and Alvin Roth. Among other things, Rozin (1999) investigated food consumption and concluded that people are influenced by heuristics simplification (mental shortcuts), for example, that *the better the food, the less healthy it is*. Thinking like this, people might reject healthy foods and have true disgust for diet chocolate. This suggestion is similar to the issue discussed above on the anchoring of availability heuristics. Yet, we can go even further concluding that likes or dislikes like this according Rozin (1999) may be the result of "multiple forces that shape the attitudes culturally prominent or negligible in relation to foods" that are caused by the influence of others or even the media.

In a similar direction, though more generally, Roth (2007) stated: "repugnance can be a real constraint on markets". This statement is also relevant in this case because it makes us reflect on the possibility of regulatory measures authorizing the disclosure of optional information to generate a constraint that hinders the consumption of healthy products. According to the results obtained in our research there may be a feeling of disgust, as participants expressed rejection directly proportional to the visibility of the information summarized in the word "diet".

Therefore, the second hypothesis of this work also seems to have been proven. This is because the reaction of participants to the simple use of the term "diet chocolate" showed that the information provided to consumers could lead them to irrational choices.

4. Conclusion

The results of this research may indicate that rationality presumed by economists and lawyers is not always present when people express their preference for food products. This statement is important because there is evidence that not even the axiom of transitivity resists the unexplained emotions and reactions of the chocolate tasters in our experiments.

On the other hand, we noticed that the trigger for an irrational conduct, or at least for a momentary blockage of rationality, could be information that individuals receive negatively as seems to have occurred in relation to the term "diet".

These findings contribute to the improvement of regulatory law and consumer law because they suggest the need for the assumption of rationality is relativized, allowing lawmakers to accept that in certain situations the consumers act irrationally or at least have limited rationality. They contribute also to suggest improvements in the regulatory policies of food that can be made from larger investigations that prove certain revulsion for terms that are used today and allow consumers themselves know what the clearest and appropriate expressions would be.

Even with the limitations present in our study as the number of participants there are many possible suggestions. We can help consumers to act more coherently promoting changes in labeling and restricting the freedom to use expressions in a foreign language, and such suggestions canbe applied from pre-feasibility studies. However, before these changes regulators and legislators need to realize they cannot make rules for absolutely rational beings, who respect and always have predictable preference axioms.

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