
**A MODEL FOR SENSORY ANALYSIS OF FOODS AND BEVERAGES:
BOUNDED RATIONALITY, ATRIBUTES AND PERCEPTIONS IN
COFFEE AND MEAT**

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Abstract

The main goal of this research is to develop a SENSORY FOOD CHOICE MODEL (SFCM) based on the behavior and perception regarding one food and one beverage. According to the Institute of Food Science and Technology (IFT), sensory analysis is a discipline used to measure, analyze, and interpret the reactions produced by the attributes of foods and ingredients. It is the result from the perception based on smell, taste, touch and hearing, which are related to color, shape, size, visual texture and odor of foods. Psychologists refer to sensory perception as a process with three phases: reception stimulation, perception and information processing (Chen, 2014). Our "machine" of sensory analysis is structure by our sensory systems: olfactory, gustatory, tactile, auditory and visual. These systems measure the attributes of foods based on their sensory properties (Anzaldúa-Morales, 1994). According to the Associação Brasileira de Normas Técnicas (Abnt), odor is a sensory olfactory organ stimulated when certain volatile substances are inhaled (Abnt, 1993). This evaluation begins with a short introduction to the bottom of the food studies by oral processing followed by a detailed discussion of some important principles that underpin the food and sensory perception (Chen, 2009 & Foster, *et al.*, 2012). Food possesses characteristic that are

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recognized by previous experience of the consumer when they are eaten or prepared; mainly associated to food texture (Huy, 1992).

There is a need for an effort to review some important developments and achievements in this field. Many previous studies have explored and selected aspects of the choice of foods from a wide variety of disciplines and perspectives (Booth, 1994). Pioneering work of Lewin (1951) proposed that several specific reference frameworks are involved in choice of foods: taste, health, social status and cost. Later investigations have examined these and other values, with a focus on cognitive and motivational factors involved in choosing food (Rappoport *et al.*, 1993). Surveys of eating habits presented several models of prominent factors, influences and eating patterns to develop a comprehensive picture of the food choice process (Parraga, 1990). A constructionist approach allows a rich expression of how people get involved in the food choice process, through the incorporation of meanings and understandings that they create in their negotiations of choice, including elicitation of the reach and strength of the factors affecting the choice of food (Berger & Luckman, 1966).

To develop the SENSORY FOOD CHOICE MODEL (SFCM) the questionnaire was based on Furst, *et. al.* model proposed in 1996 (Furst, *et al.*, 1996). A documentary research and some interviews with specialists help to identify the main sensory attributes of coffee and meat. According to Furst *et al.* (1996) a basic and universal factor that provides the foundation for food choices is the life course, which includes influences from past personal and historical experiences, the current participation in trends and transitions and anticipations of future events. Life course provides guidance for food choices through past, present and future roles and experiences. Thus, it is the underlying source that many factors shape the choice of food. By in-depth interview with 20 consumers of coffee and 20 consumers of meat some improvements in the previous Furst *et. al.* model were proposed. The methodology was an experiment conducted in the Marketing Lab. Using different levels of sensory attributes both consumers of coffee and meat were separated in two groups of 8 consumers and interviewed based on focus group and individually. Results identify some differences and similarities between coffee and meat consumer behavior. The findings suggest that sensory analysis helps to explain some aspects of bounded rationality in food consumption, evaluation and perception and could improve the previous Furst *et. al.* model.

Key words: *Sensory Analysis; Food, Consumer, Perceptions, Attributes.*

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1. Introduction

The way people consider and select food and beverage affects the acquisition, preparation or consumption of food in many situations such as: supermarkets, restaurants, food machines, parties and social events, meals and snacks at home. The choice of food includes not only decisions based on conscious reflection, but also those that are automatic, habitual and subconscious.

Life experiences are the most important influences on food choices that include ideals, personal factors, resources, social and food contexts. These influences have triggered the development of personal systems to make food choices that incorporated negotiations of values and behavioral strategies.

In the food industry, sensory analysis is extremely important to evaluate marketing acceptance and quality of a product, which is an inherent part of the quality control plan of an industry. It is through the sensory organs that this assessment is carried out, and since it is performed by people it is important to have a careful preparation of the samples tested and a proper application of the test to avoid the influence of psychological factors such as color that can refer to pre-formed concepts.

The vision, for instance, is greatly attractive. People have already bought products attracted by beautiful visual pattern. Brands are increasingly seeking to explore beautiful images in their ads to get consumers' attention (Anzaldúa-Morales, 1994).

- Odor

According to ABNT, the odor is a perceptible sensory property by the olfactory organ when certain volatile substances are inhaled (Abnt, 1993). These substances, in different concentrations, stimulate different receptors according to their specific threshold values. Many substances have distinctive characteristics and food can be composed of several characteristics, for example, sweet and sour in apples. Experts in odors can easily identify these characteristics due to their olfactory memory (Anzaldúa-Morales, 1994).

Odors are extraordinarily powerful in evoking memories. It is also a sense that is directly connected to taste. It can not be denied that meals with delicious smells are tastier, and people start to taste certain food by its aroma. Together they can influence the consumption by impulse, primarily in the food industry. According to Lindstrom (2012) this is the reason why many cafés and bakeries direct their extractor hoods where there is a flow of people, using the natural smell of bread to attract customers.

- Taste

Oral treatment of food is the first phase of food digestion in which it is decomposed to small particles or smaller molecules as a result of chewing or enzymatic interactions. Oral treatment is also a process and the perception and appreciation of food is closely associated with it (Chen, 2014).

These are the parameters of sensoriality that were involved in the present work. It was analyzed the perception of consumers through advertising images of meat and coffee. Only for coffee it was also carried out the degustation of the product in which stimulus of taste and smell was used.

However, food choice remains an issue that is not clearly understood. The study of the complex food choice process is integrated and built upon the work of other authors in a variety of fields and disciplines who observed and described the factors and the relevant processes of food choice.

According to the Institute of Food Science and Technology (IFT), sensory analysis is a discipline used to measure, analyze, and interpret the reactions produced by the attributes of foods and ingredients. In other words, it is the result from the perception based on vision, smell, taste, touch and hearing, which are related to color, shape, size, visual texture and odor of foods.

Sensory and sensation perception are two different concepts but both are often used to complement each other, which is often not clear to consumers and even to the researchers of food. Feeling is an action response from a sensory receptor to external stimuli (chemoreceptors for taste and smell stimuli, mechanoreceptors of pressure, tension, vibration etc.). Thus the sensation is a physiological response that theoretically can be measured through analysis of appropriate methods. However, the perception is usually an opinion given by an individual based on information received through sensation. Therefore perception is influenced by physiological, psychological and cultural factors. Psychologists refer to sensory perception as a process with three phases: the stimulation of reception, information processing and perception (Chen, 2014).

Establishing a relationship between an instrumental measurement and human perception has been the main focus of many sensory studies. Technically, there is little difficulty nowadays to use an instrument for accurate measurements of many sensory stimuli. However, to quantify the scale of perception of the human being is still very intriguing and requires further research.

Besides this brief introduction, the paper is divided into heuristics and attributes, food choice from the point of view of a conceptual model, methodology, results and discussion and conclusion.

2. Heuristics and attributes

Bounded rationality is justified by mental shortcuts used to assess the attributes that involve heuristics and biases. In this approach, consumers may overvalue or undervalue the effect or consequence of certain attributes.

In the literature several authors defined rational thought as the absence of perceptual errors in decision making. However, people often deviate from a process of choice and free judgment of biases. In other words, purely rational decisions based on logical, statistical, mathematical and probabilistic thinking. Simon (1957) questioned the pure rational thought suggesting a sort of bounded rationality. In the individual field, the term rationality implies that consumers elect goals based on totally objective attributes such as size, weight, price or miles per gallon. Emotional motives imply the selection of goals according to personal or subjective criteria. Examples: the desire for individuality, pride, fear, affection and status (Schiffman, Kanuk, 2000).

To Bazerman (1994) people first determine their preference for a certain result from self-interest and then justify this preference by changing the importance of attributes. Even if individuals receive identical information, depending on the interest, the relationship with the attribute may vary and may be biased with respect to the attribute assessed (Diekmann,

Samuels, Ross, Bazerman, 1987). In addition to this self-interest, individuals can simplify their cognitive process to save time and resources in their decision making and judgment of value.

For a decision to occur, it is necessary to obtain data, information and then interpret them. Information is not always available in the format and appropriate time. By offering a certain set of attributes, an organization can emphasize in its communication one of them in particular as one being more positive over the other, which can affect perceived value. Moreover, it is possible to omit certain aspects of the attribute or even all of it. The seller may have this power by having more information than the buyer. Another concept that explains the flaws in the decision is the presence of information asymmetry (Akerlof, 1970).

To simplify decisions, individuals often set rules that allow them to use some dimensions as substitutes for others. Heuristics is therefore a shortcut (a result of life experience and memory, for example) that serves as an alternative in relation to the excessive amount of information and complex mental calculations required in the consumption decision and choice of attributes based on the three heuristics: (a) representativeness, (b) availability and (c) anchoring and adjustment. Changes in the way we communicate, the combination of attributes offered and the process that consumers use to decide are part of research on heuristics. Table 1 shows the biases and heuristics which were proposed and synthesized by several authors such as Kahneman and Tversky (1974 and 1981).

Bias	Description
Biases of Heuristics regarding availability in attributes	
Facility of remembrance	Individuals think that attributes which are more easily recalled in memory, based on their vividness or recent occurrence, are more numerous than those with equal frequency.
Resilience	Individuals are biased in their assessments of the frequency of importance and the presence of an attribute, for example: depending on how memory structures affect the search process.
Biases of Heuristics regarding representativeness in attributes	
Lack of sensitivity to the proportions of base	Individuals tend to ignore the proportions of base in the probability assessment of effects of an attribute. Even when they are given any other descriptive information, it will be irrelevant.
Insensitivity to sample size	Individuals are often unable to appreciate the role of sample size in assessing the reliability of information about an attribute.
Misconceptions about chance	Individuals expect a sequence of attributes generated by a process to be "random", even when it is too short for those expectations to be statistically valid.
Regression to the mean	Individuals tend to ignore the fact that extreme attributes tend to regress in subsequent attempts.
The conjunction fallacy	Individuals mistakenly believe that conjunctions (two attributes that occur together) are more likely than a more global set of events – from which the conjunction is a subset.

Biases of Heuristics regarding anchoring and adjustment	
Insufficient adjustment of the anchor	Individuals make estimates for values based on an initial value (derived from past events, random assignment or any other information that is available) and, in general, make insufficient adjustments of that anchor in relation to the establishment of a final value for the attribute.
Bias of set and disjunctive events	Individuals exhibit a bias tending to overestimate the probability of conjunctive effects of an attribute and the underestimation of the probability of disjunctive events.
Overconfidence	Individuals tend to be overconfident regarding the absence of failures of their judgments to answer questions from moderate to extreme difficulty.
Biases emanating from various Heuristics	
Trap of confirmation	Individuals tend to seek confirmatory information for what they consider to be true and neglect the search for evidence of non-confirmation.
Retrospect	After having found the occurrence or not of an attribute, individuals tend to overestimate the degree to which they would have foreseen the correct result.

Table 1 - Heuristics and Biases adapted to Attributes

Source: Adapted from Bazerman (1994) and Kahneman and Tversky (1974).

In many situations we ignore the laws of probability and statistics. Cognitive, emotional, functional and symbolic elements represent all tangible or intangible elements with direct or indirect influence on accumulated impressions. They will be generators of our perceptions. When measuring the quality of a product, we take attributes of easier observation and measurement such as size, color, expiration date and brand name. The perspective on this quality can be called objective. However, other attributes that involve a subjective perspective of quality are based on perceptions that may vary from individual to individual such as confidence, affection and taste. Mainly in this subjective perspective of quality, the heuristics and biases may appear more frequently in decision for attributes.

3. Food choice from the point of view of a conceptual model

Every time we eat we make several choices, including what, where, when, with whom, how long, how and how much to eat (Sobal; Bisogni, 2009). A survey estimated that most people make more than 220 decisions related to food per day (Wansink; Sobal, 2007).

To simplify them, people build strategies and also organize food and situations into categories that facilitate the process of choice (Furst et al., 2000). This process facilitates the decision, since if consumers needed to formulate a new strategy every time they picked a new food it would certainly take them a lot of time.

The conceptual model of food choice proposed by Furst et al. (1996) collected all the factors that consumers use in the process of choice for food, such as the life course, influence from family and friends, among others.

The model developed by the authors of the study and updated in 2009 by Sobal and Bisogni (2009) analyzes the factors involved in the choice of food and the process by which it

occurs. These factors were grouped into three main components, which are the basis of the model: (1) Life course; (2) Influences; (3) Personal Food System, as shown in Figure 1.

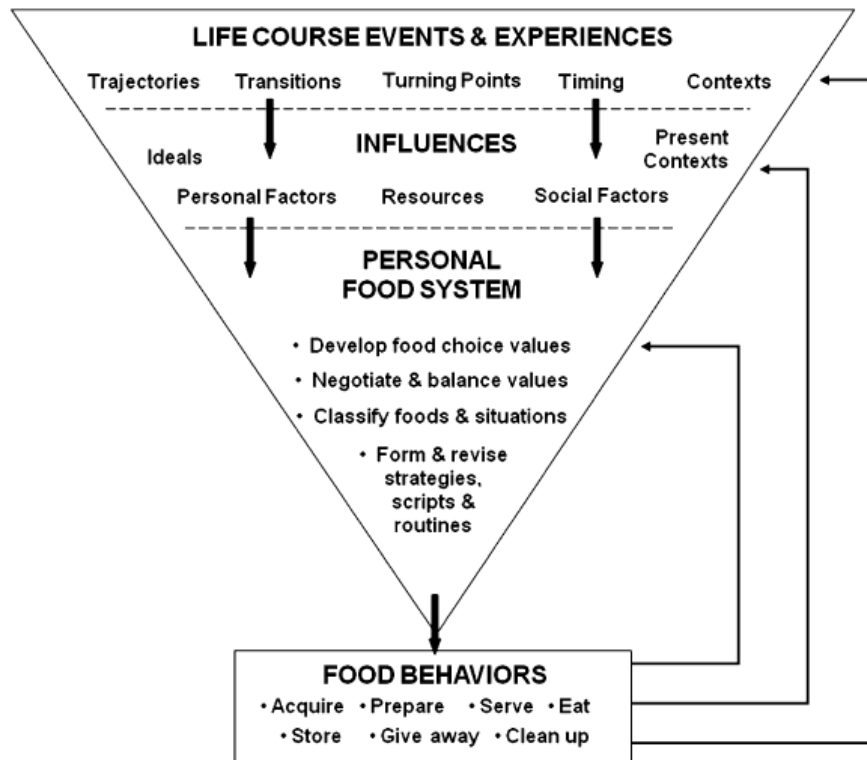


Figure 1. The Conceptual Model of Food Choice (latest version)
Source: Sobal, Bisogni, 2009.

Life course (1): It is the basis of the process and includes personal issues as well as social, cultural and physical environment to which the person was exposed. The trajectory and life course transitions of a person are essential in the development of his personal system which will influence the choices for food. This is due to the fact that the system is based on personal experiences with long-lasting effects although they may change over time with exposure to new environments. The authors also suggest that transitions in the life course are occasions in which the food choice system may be subjected to changes and provide opportunities for interventions (Devine *et al.*, 1998).

Influences (2): Five major influences that operate in the food choice process were observed (Furst *et al.*, 1996): Ideals, which are the beliefs and standards under which people analyze food; Personal Factors, which are the needs and preferences of people for certain foods, based on physiological and psychological characteristics; Resources, which includes tangible and intangibles factors involved in the selection process; Social Framework, which consists of interpersonal relationships and social functions associated with the context of food choice; and Context, which includes the physical surroundings and cultural environment of food choice (Falk; Bisogni; Sobal, 1996).

Personal System (3): The Personal System encompasses the cognitive process involved in the decision for food and it is closer to consumer behavior towards food when compared to

Influences or Life Course. It is in the Personal System that people build values to make choices, negotiate and consider these values, classify food and situations, form and revise strategies, scripts and routines (Sobal and Bisogni, 2009). It is a concept that represents the dynamic set of processes built by individuals to make decisions related to food (Falk; Bisogni; Sobal, 1996; Furst *et al.*, 1996). This system is divided into two parts: *Negotiation of Values and Strategies*.

The negotiation of values is a crucial element in food choice. This is due to the fact that it is very difficult that all values can be completely satisfied with a single food. Surveys have shown that the values compete with each other and the people negotiate and consider using heuristics and that they prioritize some over others since it is difficult to satisfy all the values in a single time (Falk; Bisogni; Sobal, 1996; Connors *et al.*, 2001).

This negotiation of values provides some limits that exclude certain choices and build dilemmas, for example the tradeoff between taste and health, cost and convenience or health and interpersonal relationships (Connors *et al.*, 2001).

On the other hand, strategies include regular patterns (food routines) that make certain food more usual than others (Falk; Bisogni; Sobal, 1996).

4. Methodology

Focus group is an interactive qualitative method that provides in-depth answers to complex problems. By using real cases as material in the focus group it is possible to define problems in a language that consumers can follow (O'Donnell, 1988).

The method consists in gathering a group of six to ten people in a central location where the researcher develops a discussion directing it to the topics he planned within a specified period, which usually takes one to two hours (Randle, Mackay & Dudley, 2014). For Morgan and Spanish (1984), focus group can be composed of four to ten participants who are put together to share their thoughts and experiences on topics selected by the researcher who can use audio recorders to assist in data collection.

Focus group provides access to certain types of qualitative phenomena that have been poorly studied by other methods (Morgan & Spanish, 1984). O'Donnell (1988) complements that discussions obtained by focus group seem to find answers that other techniques can miss, besides providing qualitatively responses different from individual interviews. In addition, group experience can encourage more spontaneity, less inhibitions, greater anonymity, security and even the honesty of the participants comparing to individual interaction (O'Donnell, 1988).

Among other benefits focus group can also enhance the vocabulary used in the research; anticipate problems; provide useful insights into the construction of the questionnaire; indicate the most important performance measures for the different participants and enable the integration of the main types of intervenor (Oliveira, Freitas, 2008). For Fern (1982), focus group can also be used to explore opinions, attitudes and attributes, evaluate commercials, identify and pre-test questionnaire items.

O'Donnell (1988) argues that focus group is not as simple as it seems and prior planning determines the quality and quantity of results. The planning of focus group should involve decisions related to how data will be collected. The first decision is who will participate in the groups, followed by how they will be structured including the level of involvement of the moderator, and the third consists in determining the number of groups and their size (Morgan,

1997). In the planning phase, the problem should be defined and it is necessary to conduct a guide for group discussion.

The planning of this study was detailed in Table 2.

PLANNING	CONSIDERATIONS
Team:	Responsibilities of each team member 2 Moderators - moderated the sections 3 Researchers - participated in all sections 2 Research assistants - dispatch of invitations, notes and transcripts of interviews
Timetable:	Planning - 3 weeks Conducting - 2 weeks - recruiting participants and conducting the sessions Analysis - 1 week - transcription, processing and analysis of data Report - 2 weeks - report writing and feedback to participants
Moderator:	Who - Researchers involved in the study Number of moderators – 2 Level of involvement – high, use of script with issues
Group:	Size: 20 people Composition: College students Quantity: 4 groups of 5 people Criteria for selection of participants: convenience
Content:	2 scripts for the interviews 4 computers with 8 saved advertising pieces 1 Nespresso coffee machine 16 Nespresso coffee capsules - (Types: decaf and Roma)
Selecting the place and data collection:	Room: MarketingLab Laboratory Recording/Filming: 1 portable recorder and 1 Camcorder. Checklist sheet: Questionnaires
Invitation:	List of possible participants - Survey of potential participants' profiles Who made the invitations - researchers and assistants Confirmation the day before - researchers and assistants Means/instrument - via email
Analysis:	Transcript - researcher Data processing - responsible: researcher Analysis - responsible: researcher; technique used: content analysis
Report:	Report - responsible: authors

Table 2. Summary of focus group planning.

Source: Authors, adapted from Oliveira & Freitas (1998).

The method used was content analysis, transcribed and analyzed after comparing responses. The sample used in the experiment was 20 young students between 18 and 33

years old at a public university in the state of São Paulo. They were divided into 4 groups, where one component from each group was in the placebo condition, which was randomly assigned.

The MarketingLab Laboratory was used for the experiment of focus group as well as computers, camcorder, recorder machine and Nespresso coffee machine to conduct the experiment. Figure 2 shows the MarketingLab and infrastructure used.



Figure 2: Location where the experiment was conducted, MarketingLab.

Meat and coffee were chosen as analysis products and thus each group participated in two phases of the experiment had to answer two types of questionnaires targeted for both products.

We separated the questionnaires and named as "black" the ones who initiated with the coffee experiment and finalized with the meat experiment, and "red" the ones who started with the meat experiment and finalized with the coffee experiment.

The coffee experiment was divided into 4 stages and the meat experiment in 3 because there was no degustation step. Table 3 describes the steps of the experiment.

Experiments:	
Coffee	Meat
1. Pre stimulus	1. Pre stimulus
2. Stimulus of images	2. Stimulus of images
3. Degustation	3. Focus Group
4. Focus Group	

Table 3. Description of the experiment steps.

Source: Authors.

The survey was performed on the campus of Esalq in Piracicaba to conduct the experiment. It started at 10:30 a.m. for preparation and at 11 a.m. we received the first of the four groups to run the experiment. In the first ten minutes, each group answered a quick questionnaire with questions of personal character to obtain consumers' profiles (available in Table 4), and also specific questions about the first product under review. These questions were prepared aiming to assess consumer perception about coffee before suffering the first stimulus, and then they were asked "What is your level of knowledge on the issue of coffee quality?", "What is coffee for you?", "Are you a coffee consumer?", "Imagine that you are going to buy coffee. What aspects or information do you consider in order to buy this product?", "What could coffee have that it does not nowadays?" and "What do you take into consideration to assess the quality of coffee?". At this moment we named randomly one member of the group to be the placebo component, the one that does not suffer stimuli during the experiment.

Name	Gender	Age	Were you an Exchange student?	Undergraduate course	Hobby
Q1	Male	23	No	Food Science	Sport/Traveling
Q2	Female	21	No	Food Science	Cooking
Q3	Female	22	Yes	Economics	Movies
Q4	Female	26	No	Food Science	Listening to Music
Q5	Female	24	No	Agricultural Engineering	Horses
Q6	Male	25	Yes	Agricultural Engineering	Blog of beer
Q7	Female	20	No	Management	Sport
Q8	Female	20	No	Economic Science	Reading
Q9	Female	20	Yes	Management	Riding a horse
Q10	Female	19	No	Management	Reading and watching videos
Q11	Male	20	No	Public Management	Gym, drawing, reading
Q12	Female	25	No	Management	Cooking and arts
Q13	Male	24	Yes	Agricultural Engineering	
Q14	Male	19	No	Management	Cooking
Q15	Female	19	No	Management	Watching TV, knowing what happens in the

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					world
Q16	Female	28	No	Journalism	Sport
Q17	Male	18	No	Management	Reading and playing video games
Q18	Male	33	Yes	Economics	Running
Q19	Male	22	No	Management	Playing soccer
Q20	Male	19	No	Management	Listening to music and watching videos

Table 4. Profile of participants.
Source: Authors.

After the first initial questionnaires, 4 of 5 consumers were directed to the computers previously numbered where they had the first stimuli with images of advertising pieces of coffee. The objective was to provoke the perception of geographical origin of the product using figures that illustrate coffee tree and coffee beans already roasted. For the same images, there were indications of different locations, indicating Brazilian coffee and Colombian coffee as illustrated in Figure 2.

At this moment they were given a second questionnaire with specific questions about the advertising pieces to analyze the influence of the product origin at purchase time. The questions were “What aspects did you like the most in this ad?”, “What aspects did you like the least in this ad?”, “Imagine that you are going to buy coffee. After observing the product images, which aspects or information would you consider when purchasing this product?”.



Figure 2. Advertising pieces used for coffee product stimulus.
Source: Authors

After completing the questionnaire on the 4 pictures of coffee, the group was directed to coffee degustation step. Two different types of capsules were selected (Roma and Decaf) and

each consumer received just one cup of coffee, however, they were not informed about the flavor. It was not allowed to sweeten the coffee in order not to mask the sample since it was important to describe their first perception of the drink. Two questions were asked about this step “Point the aspects that you liked the most regarding the perception of the coffee tasted”, “Point the aspects that you liked the least regarding the perception of the coffee tasted”. The fifth student in the group, as a placebo, did not participate in both perception stages: the advertising pieces and degustation.

After the end of the first half of the experiment, participants were directed to the second stage which was the pre stimulus of meat. The process was the same as used with the coffee. However, as indicated in Table 3, there was no degustation step. The questions of pre focus had the same intention to assess consumer perceptions before any stimulus, so the questions were the same “What is your level of knowledge on the issue of meat quality?”, “What is meat for you?”, “Are you a meat consumer?”, “Imagine that you are going to buy meat. What aspects or information do you consider in order to buy this product?”, “What could meat have that it does not nowadays?” and “What do you take into consideration to assess the quality of meat?”

After that, 4 of 5 consumers were directed to the computers previously numbered to receive the first stimuli related to meat. This time, the images referred consumers the physiological origin of the product with images illustrating the ox grazing and a steak prepared by a chef ready to be savored. For the same images there were nutritional meat and tasty meat indications as illustrated in Figure 3.

Another questionnaire was delivered to consumers, and just as happened with the coffee experiment, the questions were related to the perception that students had after being stimulated with the advertising pieces. “What aspects did you like the most in this ad?”, “What aspects did you like the least in this ad?”, “Imagine that you are going to buy meat. After observing the product images, which aspects or information would you consider when purchasing this product?”.

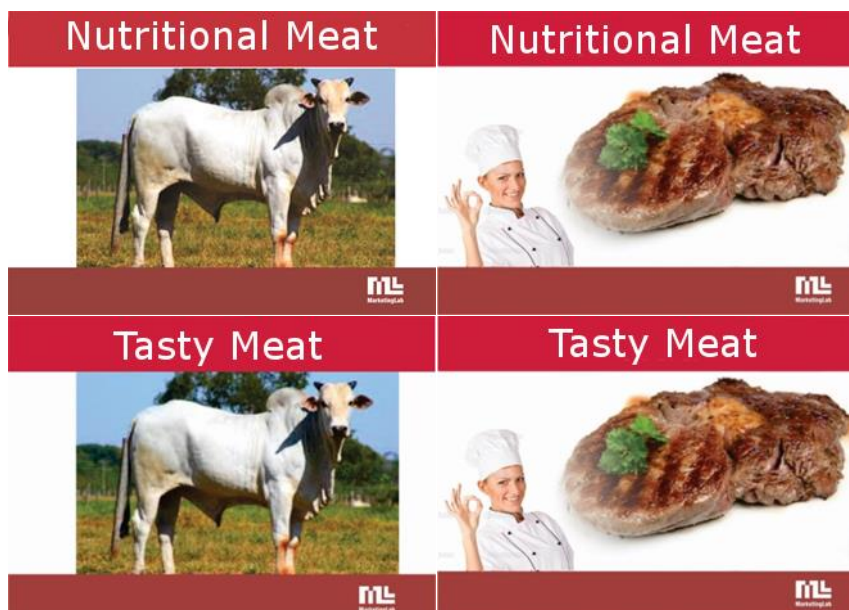


Figure 3. Advertising pieces used for meat product stimulus.

Source: Authors

At the end of the stimulation process with the figures of the meat product transmitted by computer most of the experiment had been completed. It was only needed to perform the focus group to complete the procedure with the first group. At this moment, all the 5 members were invited to start a conversation about all the stages through which they had passed. Some questions were prepared in order to provoke and understand what has changed regarding the initial perceptions of the participants about the coffee and meat products, and those that they had in mind about the products after the stimuli caused during the experiment, for example “What did not you like in the experiment?”, “What has not changed?”, “What has changed?”, “What do you value at the time of purchase?”, “What is meat for you?” and “What is coffee for you?”.

This procedure was repeated 4 times until it was done the same with the 20 students. All steps were properly recorded and filmed so data could be worked with accuracy at the time of the analysis execution. After the closure of the fourth and final focus group, the questionnaires were collected and organized by group number.

The results were discussed and related to the theory discussed earlier in the study, as can be followed in the next item.

5. Results and discussion

Coffee

The objective of this study was to understand what consumers think about coffee and meat before and after the stimuli that were planned.

Thus through these experiment stages it was able to gather participants' responses and make a comparison between before and after the experiment.

In the first stage, the pre stimulus started with the question “what is quality of a food product for you” and there were answers such as “conservation of quality for a certain period without impairing consumer's health”, “security, flavor, raw material submitted to sustainable procedures”, “origin of the product”. Only one student described his knowledge regarding coffee quality as high and most respondents claimed to have low knowledge and 3 of the 20 students claimed they do not consume the product. Most take into consideration the brand, the packaging and the price of the product at time of purchase and only one person mentioned the origin of the product as an important factor. There were those who said they cared about “the taste that the product promises”, blend, seal of quality, brand relevance, recommendation and expiration date.

The question regarding what coffee could have that it does not nowadays, answers were obtained such as “coffee packed with sugar”, “coffee with different flavors”, “better quality control”, “description of roasting on the packaging and other cultivation aspects”, “preparation kit”, among other suggestions given by the students.

In quality evaluation there were many factors that were cited such as granulometry, aroma, flavor, quantity of waste, purity, satisfaction, origin, color. And when they were asked what should be taken into consideration to assess the quality of the coffee, the answers were very distinctive such as flavor, aroma, granulometry, amount of waste, physical purity, brand recognition, satisfaction and appearance.

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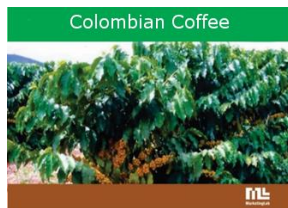
After the pre focus responses, the ones related to the stimulus step were analyzed. These students had many points in common, but since they have different habits and formations the perceptions and opinions were divergent about the product.



For this first image, consumers have made some statements related to valuation of coffee tree figure, a product of national origin, plantation safety, origin, healthy looking of the plant, natural product, plantation quality and coffee origin, and color of the image.



For this second image, consumers claimed to have the impression that the manufacturer guarantees that the grains will be the same way after they have been packed, comfortable feeling to see the person taking the drink, origin, satisfaction of the person with the product, national product, roasting quality, grain quality, and strengthening of the national bond.



For this third image, consumers answered they did not like the image of the plantation but included visual quality of the plant, vivid colors, imported product, advantage of the origin, reliability of the origin, natural product, sanitary quality of plant, stage of fruit maturation, price, and information that can prove the Colombian origin.



For this fourth image, consumers highlighted the fact that the product appears to be good due to the grain size, smoothness of the drink, quality appearance of the product from the aspect of the person, quality of origin, the illustration of the grain makes consumer closer to the product, advantage of Colombian coffee, grain and toasting quality, price, brand recognition, what the coffee has in special for being Colombian, origin, remembrance of a happy consumer stimulates purchasing.

When submitted to the degustation step, it could be noticed that those who do not have the habit of consuming coffee said the drink was too strong and bitter, especially because for effectiveness of the experiment they could not add sugar when sipping for the first time. Among the positive responses there was the aroma, creaminess, texture, slightly fruity, and intense flavor. However, regarding the issues that they liked the least we obtained answers such as very bitter, very strong, it tastes as if it were burned, leaves a strange feeling in the mouth, no sugar, and a little sour. Perceptions for each type of coffee are listed in Table 5.

Participants/Capsule	Point the aspects that you liked the most regarding the perception of the coffee tasted	Point the aspects that you liked the least regarding the perception of the coffee tasted
Roma	The fact it is espresso pleases me more	It tastes as if it were burned Not very pleasant odor

	With sugar it seemed to me a delicious espresso The strong smell Texture and density Strong taste Creaminess Aroma Intense flavor You feel less sleepy It tastes very good, different from coffee made in a percolator To feel and know the real taste of coffee Lightness Foam The tastes it leaves in your mouth Proper temperature	compared to the others I have already tasted Too bitter Lack of sugar It tastes weak Too creamy A little sour A little watery It leaves a strange feeling in the mouth Trace of powder in the cup Absence of additional flavors It does not have a remarkable aroma and flavor
Decaf	Warm Very good aroma Creamy Color Strong coffee Slightly fruity Intense Texture Lightness of flavor Foam The taste it leaves in your mouth Bitter Lasting flavor	Extremely bitter Very strong flavor Foam Aroma Consistency Roast of the coffee Absence of additional flavors It does not have a remarkable flavor and aroma Lack of sugar Flavor should be a little more enhanced In the first sip I could not identify the flavor well since it was very hot

Table 5. Answers of the degustation stage of coffee.
Source: Authors.

Meat

In the next step, the stimulus for meat, 4 of the 20 respondents had high knowledge about the quality the product either because they have already taken courses about it or because of internship experience abroad. The respondents who answered average knowledge claimed they did not know the subject in-depth, but they like to buy and taste new cuts and are interested in meat. However, those who said they had a low knowledge do not like to consume and usually ask for help when buying meat or they have someone to purchase for them.

Only one student is not a consumer of red meat and the majority of the others have the habit of consuming red meat two or more times a week. At time of purchase they stated they value the product's appearance, cutting, coloring, purpose of consumption, expiration date, hygiene of the place, fat content on the piece, packaging, price, marbling, indications of third parties, origin, appearance of the product and brand.

On the question of what meat could have nowadays but it does not, they responded addition of vitamins in the composition, softness in all cuts, lower fat content, information about management and production, basic tips of how to prepare, recipes, greater quality control and origin, recognized certifications in all locations of sales.

In the stimulus step, students' answers had many points in common but due to the fact consumers have many different habits and backgrounds the perceptions and opinions about the product were different, including:

Nutritional Meat



For this first image, consumers have made some statements such as: this meat is good, consumption of the animal, organic, quality, origin, traceability, supply chain, I would investigate whether the brand takes care of the animals in a safe and ecological way, animal that is well treated is equal to nutritious meat, health of the ox, the fact the animal is alive causes discomfort, advertisement discourages the purchase, I would not buy, cattle with profitable appearance, marbling, and it is not confined.

Nutritional Meat



For this second image consumers have answered: meat seems to do well but it seems to have a lot of fat, the presence of chef conveys confidence, meat quality, juiciness, freshness, nutritional quality, willingness to consume, approval of the chef, advertising does not seem to be concerned with demonstrating the quality of the product, but only its "flavor" and "appearance", cutting, preparation, nutritional value, consistency, hygiene, presentation, nutritional quality.

Tasty Meat



For this third image, consumers stressed that it lacks technology, meat without nutrition security, quality of origin, vigor of the ox, good treatment, origin of business, gaze of the ox, healthy appearance of the animal, the fact it is written "tasty", image of the ox discourages purchase, sanitary quality, carcass conformation, certification seal, quality of product, I would not buy the product with the premise "tasty" given to the advertisement presented, it makes you want to eat.

Tasty Meat



For this fourth image consumers claimed: the meat is really tasty, the chef ensures the product, taste, quality of origin, coloring, ready-to-eat meat, professional satisfaction, texture, guarantee of origin, product expiration date, guarantee that it is the same after cooking, appetizing image, representation of a professional of the sector, sanitary quality, how to cook this meat, quality certification, information on the packaging, price, consistency, hygiene, opinion of others, status of product.

Focus Group

During the focus group stage it was able to synthesize the information on the perception in a more relaxed and natural way. The students were comfortable in the chat to talk about what they thought about the experiment and to tell better about their respective consumption habits, as shown and summarized in Table 6.

Based on the responses it was possible to understand the perceptions and raise the following propositions:

Pr1: The price is the main element in the assessment of quality, which hinders the use of other differentiation strategies in food.

The question of purchase linked to price appears in coffee. It was raised the fact that coffee quality is directly related to price. “You know that the cheapest coffee has low quality”, “I worry about the quality and I pay more for a better coffee”. For meat, respondents associated the purpose of purchase. For special occasions and when they will cook something specific, they do not care about the price and value the quality of meat and specificity to eat a good product. When it comes to daily food, they are not used to spending much and do not care about the brand. “The purpose of use interferes in my purchase choice. It depends on what I want to cook”, “I associate the expense of the dish, and I buy the meat depending on what I will prepare to eat. A promotion would not interfere my choice. Meat of the day and meat for special occasions”, “Price is a factor to be considered when purchasing, on a daily basis it is a very important factor. I hardly eat a special meat for lunch. If sirloin steak is more expensive than other meat I only buy if I really want to eat”. This proposition is directly related to the bias of Heuristics "Insufficient anchoring-and-adjustment" and personal food system of Conceptual Model, proving that people have some resistance to changing their habits that have already been incorporated.

Pr2: Certain information about foods needs to be encouraged to be incorporated in the food decision making.

The informational content needs to be stimulated, otherwise, respondents are focused only on what is shown. The sustainability issue only appears when it is stimulated and few people have spoken about this topic. During the focus group the discussion on other topics not only the origin, taste and nutrition was encouraged. In this case, it can be said that the bias of Heuristics "ease of remembrance" is related to events and life experiences of the Conceptual Model because individuals judge by the number of memories. Having recipes is important. Students value the recipes indicated on meat packaging. One respondent claimed: “Companies should invest less in marketing and more in written information about the product, they should suggest recipes”. In this item, it can be related to the bias of Heuristics "Resilience with feeding habits of the Conceptual Model", since individuals are biased in their assessments of the frequency of importance and presence of an attribute.

Pr3. The rational and technical knowledge have important influence on the decision regarding food.

It is noticed that, especially for meat, professional knowledge about the issue interferes in the formation of opinions. Students who did not learn and do not know the chain of animal products felt sensitized to see the animal in the advertising pieces. They usually did not make

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the association of the final product to the animal food source. However, those having formation, Agronomy or even Food Science engineers, saw the advertising more naturally and were not sensitized to see the animal's image, on the contrary, they were able to assess the quality of the meat through it. "I value the image of the animal in the pasture contained in advertisements; it makes you want to eat". For this item, it can be said that the lack of sensitivity to the base proportions of the heuristic biases and experiences and life path of the Conceptual Model support this proposition.

Pr4. Certain stimuli do not change the decision about food when it is related to something cultural and present in the family environment.

Non-appreciation of advertising. People say that certain stimuli do not interfere in the need of product consumption and they would not stop buying due to the lack of advertising, besides the fact that for coffee, customers are most of the time loyal to a brand. "When we moved to Goiânia, my family took many packages of coffee from São Paulo because my parents thought coffee was quite different there.", "People are addicted to certain brands. My family always buys the same brand, but I would not know how to buy", "Even without advertising I would not stop consuming the product, they are types of essential products and advertisements do not interfere in the purchase". Overconfidence is the bias that sustains this proposition added to experiences and life path as proposed in the Conceptual Model.

Pr5. Origin is a relevant factor and facilitates food purchase decision process.

The source is an important factor. For consumers of meat origin and quality are factors also taken into consideration. Students care about the place of purchase and often ask for suggestion when buying a product. "I take into consideration origin and product certification". However, there were those who said they did not care about the brand "I never look the source, I always buy in the butcher and brand is irrelevant to me". This last proposition fits the bias Retrospect of Heuristics and Influences of the Conceptual Model pyramid, since after having observed the occurrence or not of an attribute, individuals tend to overestimate the degree to which they would have foreseen the correct result.

Coffee	Meat
I always appreciate the question of origin, giving preference to a domestic product. I like to look at the nutrition label to know what the product contains. I value the contact with the consumer in advertising, I feel like trying the product.	I do not value the product when I see the animal, it makes me afraid. I value the professional approving the product. Price is a factor to be considered when purchasing and on a daily basis it is a very important factor.
I was not encouraged by advertisements as when I saw the person drinking coffee. I prefer simpler advertisements. Not having refined taste does not distinguish one type of coffee from another. The fact of seeing the grain product changed after the stimuli. Emotional vision. I wanted to drink after the stimulus.	I value image of the animal in the pasture contained in the advertisements. It makes you want to eat. For meat, you should be willing to pay more for the type of cut; I take into account paying more for the quality of the product. It is the purpose of the use that interferes in my choice of purchase. It depends on what I want to cook.
It is a stimulating beverage.	When the animal is shown, I had a bad feeling.

<p>The price issue for coffee interferes much at the moment of purchase. When we moved to Goiânia, my family took many packages of coffee from São Paulo because my parents thought it was quite different there.</p>	<p>Even without advertising I would not stop consuming the product since it is an essential product and advertisements do not interfere in purchasing. It is the food I eat the most.</p>
<p>Considers packaging at the time of purchase, brand origin, curiosities. Values vacuum packaging and appearance of the product, but would not buy only because of the packaging. Origin is very important, it would not interfere purchase, but it gives more security at the time of purchase. The image of the production feels better by referring to the natural factor of the product.</p>	<p>I do not value the professional approving the product since the person was paid for it. I take into account source and product certification. I hardly I eat special meat at lunchtime. If the sirloin steak is more expensive than other meat I only buy if I really want to eat.</p>
<p>I worry about the quality and I pay more for better coffee. I buy coffee by the smell and flavor quality: Melita and Morro Grande. When I am in my parents' house, I do not like the coffee that Dad buys very much, and then I buy essences to put on the coffee and change the flavor a bit. (no changes) Dark packaging can cause bad impression; I value the valve on it. I did not have a formed concept. Seeing the image enriches the product and it is more accepted because it sharpens the desire.</p>	<p>I buy according to what my parents say. In small supermarkets I do not have the option to shop by the brand. Then I notice the color at the time of purchase. I associate expense of the dish; I buy meat depending on what I will prepare to eat. A promotion would not interfere my choice. Meat of the day and meat for special occasions. A famous person does not influence as much as a professional of the field, difference between nutritious and tasty. I worry about buying meat with good origin.</p>
<p>Consumer includes price aggregated to origin. Purchase attribute comes from family habit. Has trust in a particular brand of coffee, so he takes into consideration the brand at the time of purchase, if he does not like, he does not buy.</p>	<p>I check the appearance of meat and I usually examine it with my hands when there is no brand associated. If it were an ordinary ox I would stop buying.</p>
<p>It is important to conserve the product in the refrigerator. I like and appreciate the quality standard of product. I know coffee, I'm a producer, I appreciate the origin, family influence. People are addicted to certain brands. My family always buys the same; I would not know how to buy. The smell stimulates the purchase.</p>	<p>I observe the coloring. I have lived abroad and I know a little about meat. In the USA, packaging suggests what you can cook with that type of cut. I realized that the animal was out of confinement, animal welfare. I am meticulous, I check the cut and I usually do not worry about price. I check the quality.</p>
<p>The image of the production did not attract much attention, but the grain did. We associate the origin. I take into consideration the price and the packaging, "café Fazenda" must be worth. "Morro Grande" and "3 Corações". I felt the coffee was very strong.</p>	<p>I believe that a famous person helps a lot to publicize a product. The stimuli depend on who you want to sell to. My conception has changed a lot when I saw the ox. I had never imagined this kind of stimulation by looking at an ox and thinking about consuming it. I consider animal welfare.</p>
<p>I am attracted to the packaging, machines of "Morro Grande" and I consider the grinding when drinking. I take very seriously the nutritional issue. If I moved the city or state, I would take "Morro Grande" with me. I usually</p>	<p>It is not possible to know if it is tasty just by looking at the picture. I cherish healthy food and I do not like meat with fat as it was seen in the image. Appearance counts a lot more than the price. I already have</p>

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take into account the scent, texture, taste and packaging. I felt nationalism, the stimuli helped a lot, but I was not sure of the origin, if it was reliable.	not bought due to the appearance of the piece. I usually buy meat according to what I'm cooking. Companies should invest less on marketing and more on written information about the product and suggest recipes. I never look the origin of the product, I always buy in the butcher and brand is irrelevant to me.
I take into account the speed of preparation and practicality. The one my mother makes and can afford. It was strange that the pictures stressed the origin. Other things matter and those who do not know, they do not understand. I noticed that the foam and the creaminess make it lighter. Advertising does not change anything for me.	The fat of meat in the image does not please me; the brightness gives impression of greasy food. Who prepares has different perceptions from who consumes meat. I usually ask the clerk before buying meat and I choose by color and brightness. I check the price. The image of the chef caught my attention.
Packaging is very important since it calls the attention (Curaçu – I bought only because of the packaging, aesthetics, information and value). I took into account the origin. I did not understand why showing the plant.	The image of the ox is not tasty and apparently the meat gave me the impression of a good quality product but it is not possible to know if it is tasty.

Table 6. Answers of the focus group stage.
Source: Authors.

6. Final considerations

According to the development of the SENSORY FOOD CHOICE MODEL (SFCM) proposed in this study, it can be concluded that the objective was achieved. It was confirmed by the literature, sensoriality and physiology of the five senses, heuristics and attributes and the Conceptual Model of food choice that when consumers are stimulated, they can change their perceptions about a product based on their offers of flavors and nutrition and they suffer influences of the environment at the time of purchase.

There was a limitation related to the sample size, however, there is the possibility to develop this research in greater depth in the near future since all data collected generated insights for new and future researches.

Through the five propositions that were raised, it is possible to develop a quantitative experiment for each of them, relating to the various concepts of heuristics and proposing foundations for the proposed model that can incorporate new stimuli besides flavor and nutrition.

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