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COGNITIVE HEURISTICS IN CONSUMERS NEGATIVE PERCEPTIONS OF DAIRY PRODUCTS IN DIGITAL ENVIRONMENTS

Bruna Euzébio Alves Jacob Lopes (Federal University of Viçosa); bruna.a.lopes@ufv.br
Kennya Siqueira (Embrapa Dairy Cattle - Juiz de Fora); kennya.siqueira@embrapa.br
Karoline Mendes (Federal University of Juiz de Fora); karolline.mendes@estudante.ufjf.br
Thallys Nogueira (Federal University of Juiz de Fora); thallys.nogueira@estudante.ufjf.br
Laura Destro (Federal University of Viçosa); laura.d.rodrigues@ufv.br

Abstract

Social media has become a privileged space for the circulation of information on various topics, exerting a growing influence on individual and collective perceptions. In this environment, users often resort to cognitive heuristics, i.e., mental shortcuts that simplify judgments and decisions, but which can also induce systematic biases. This study sought to identify and classify cognitive heuristics in digital discourse related to dairy products on platform X (formerly Twitter), based on a corpus of more than 400,000 negative posts collected and processed using Voyant Tools software. The methodology involved three steps: (i) selection of the most frequent words in a lexical cloud, (ii) investigation of contexts of use, and (iii) categorization of occurrences into thematic subgroups of economics, affect, anchoring, loss aversion, and availability. The results showed that dairy consumption is often associated with outrage over prices, emotional ties, and value frustrations. Everyday language has cognitive and emotional patterns that, although spontaneous, can induce distorted or biased perceptions on the part of consumers, negatively influencing their evaluation of products

Keywords: behavioral economics; milk; artificial intelligence; consumer perceptions

Introduction

Cognitive heuristics are mental shortcuts that enable quick judgments in situations of uncertainty or information overload (Tversky & Kahneman, 1974). Although they function as adaptive resources, capable of reducing complexity in decision-making, these mechanisms can also induce biases that distort the assessment of reality (Gigerenzer & Gaissmaier, 2011). In

digital environments, characterized by high speed and strong emotional charge, heuristics become even more influential, guiding perceptions and choices based on simple signals such as price, familiarity, or affective impact (Meinert & Krämer, 2022).

In the context of food, these cognitive shortcuts can be especially relevant. The dairy sector, in particular, plays a central role in the population's diet, providing essential nutrients such as calcium, phosphorus, potassium, vitamins, and high-quality proteins (Timon et al., 2020), in addition to generating income and jobs in various links of the production chain (Fiorillo & Amico, 2024). Despite this, there has been an increase in negative discourse on social media associating milk and dairy products with economic, physiological, or ideological aspects, often inaccurate, contributing to the spread of unfounded perceptions (Paleologo et al., 2024).

It is clear in the literature that social media posts, often emotionally charged, can fuel misinformation and negatively influence consumer behavior (Wang et al., 2021). Although there are studies that link social media and food misinformation, there is still little research analyzing how cognitive heuristics shape negative perceptions about milk and dairy products. This gap hinders our understanding of how automatic judgments based on price, emotions, or consumption experiences influence the collective construction of food perceptions.

So, this study fills a gap in the literature on food perception and misinformation by applying the theoretical framework of cognitive heuristics to the analysis of negative discourse about milk and dairy products on social media, with an emphasis on posts on X (formerly Twitter). The analysis focused on posts addressing ethical, economic, physiological, and sensory aspects related to milk consumption, seeking to identify which heuristics are most common and how they contribute to the formation of food rejections. By adopting an interdisciplinary approach that combines artificial intelligence and behavioral economics, this work offers an original contribution by revealing the mental mechanisms that simplify judgments and shape misperceptions about nutritionally recommended foods.

Methods

This work was supported by Minas Gerais State Agency for Research and Development (FAPEMIG). For this research, a set of publications related to milk and dairy products was extracted from platform X, using a validated list of 293 keywords associated with the dairy universe. These posts were collected and processed through the Consumer Observatory (OC), a tool developed by EMBRAPA Dairy Cattle that applies natural language processing (NLP), data mining, and artificial intelligence techniques to monitor public perceptions about dairy products on social media. The OC automatically accesses tweets containing the selected terms and classifies them using a sentiment analysis model trained specifically for this context.

This approach allows for the identification of positive, negative, or neutral posts, as described in Nogueira, Siqueira & Goliatt (2024). In this study, only negative posts were used, seeking to capture expressions of rejection or dissatisfaction with milk and dairy products during the period analyzed (May 2020 to August 2023).

The initial filtering was conducted based on a set of keywords previously defined by the Voyant Tools platform, a free and open-source platform for analyzing large volumes of text (Sampsel, 2018), including: bad, lactose, pay, reais, paid, expensive, paid, taste, price, belly, spoiled, smell, skimmed, expired, paid, paying, feeling, feel, spoil, vomit, intolerant, stomach, and intolerance. After this stage, a total of 407,235 unique publications were obtained. Data processing included the removal of duplicates, considering that the same tweet could contain more than one keyword and, therefore, be counted twice.

Using Voyant tools, the main terms found in negative publications about dairy products were identified. All publications containing these words were then selected. In these publications, irrelevant words were removed to refine the analysis and prevent grammatical prepositions from interfering with the identification of terms of interest. Words that were used repeatedly but had no analytical relevance, such as “a, the, with, of, from, and, she, he,” among others, were eliminated.

Subsequently, based on the word cloud generated in Voyant (Figure 1), terms with higher recurrence were highlighted and served as a basis for identifying thematic subgroups, allowing the classification of occurrences into heuristic axes relating word frequency to cognitive patterns. The analysis was conducted based on the relative frequency of the terms and a qualitative reading of the excerpts in which they occur, seeking to understand how certain expressions are used to represent judgments, emotions, and perceptions about the consumption of milk and dairy products.

The analysis of negative posts about dairy products was carried out in two stages: identifying the most frequent words in the corpus and reading the contexts in which these words appear, in order to understand the meanings attributed to them by users. The interpretation was guided by the reference of cognitive heuristics, according to Tversky and Kahneman (1973), who define them as mental shortcuts used to simplify judgments in situations of uncertainty.

This perspective was expanded upon by Meinert & Krämer (2022), who highlight the role of heuristics in overloaded digital environments, and by Shah & Oppenheimer (2008), who understand them as mechanisms of cognitive economy. Based on this approach, linguistic and emotional patterns were identified in the posts that reveal the spontaneous use of these strategies, such as quick judgments about price, regret after consumption, comparisons with previous experiences, and emotional ties to products.

Results

During the period analyzed (May 2020 to August 2023), OC recorded 23,330,614 publications, of which 3,239,027 were classified as negative. After filtering by keywords, a total of 407,235 unique publications were obtained for further analysis.

Textual analysis of the posts revealed the recurring presence of linguistic and cognitive patterns related to rejection of dairy products. Figure 1 shows that the most frequent terms in negative posts were ice cream (6,257 occurrences), pay (5,457), milk (4,872), cheese (4,189), and expensive (3,791). These data were extracted from a corpus of 4,385,751 unique words, with a vocabulary density of 0.042 and an average of 30.7 words per sentence. The high frequency of these terms indicates the thematic focus of the posts and suggests that certain concepts are more cognitively available to users, being easily triggered in spontaneous judgments.

Figure 1. Distribution of the most frequent terms in posts about dairy products by Voyant tools.

Source: Results of the research.

Temporal analysis allows us to observe how these words are distributed across different segments of the document. This approach was inspired by the analysis described by Zaidi & Allahdad (2023) and helps to identify thematic variations and peaks of lexical intensity at specific moments in the corpus. Figure 2 shows this segmented distribution, highlighting the terms “ice cream,” “pay,” “milk,” “cheese,” and “expensive,” and revealing how their relative frequency fluctuates throughout the analyzed posts.

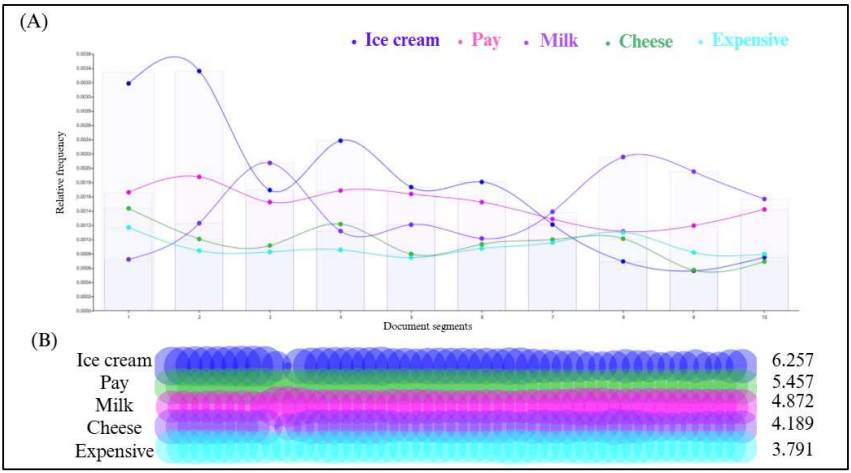

***Figure 2**. Segmented distribution of the relative frequency of terms related to dairy products generated by Voyant Tools.*
Source: Results of the research.

The analysis of negative posts about dairy products revealed the recurring presence of cognitive strategies that guide quick judgments and spontaneous perceptions. Based on lexical frequency and the discursive contexts identified, it was possible to group the findings into three heuristic categories: economic, affective, and availability.

Economic heuristics refers to the tendency to evaluate products based on simple indicators of cost or perceived value (Shah & Oppenheimer, 2008). In the corpus analyzed, this strategy appears prominently in posts expressing dissatisfaction with the price of dairy products, often without direct comparison with alternatives or nutritional justifications.

The word "expensive" had a relative frequency of 3,791, accompanied by terms such as "pay" and "price," which also appear in contexts of quick judgment. Figure 2 shows that these terms peak in specific segments of the corpus, suggesting that cost is a recurring trigger for rejection. In many cases, price is mentioned in isolation as sufficient justification for not accepting the product.

Affective heuristics involve decisions based on immediate emotional reactions (Slovic et al., 2007). In the corpus, this strategy manifests itself in posts that associate dairy products with negative experiences, unpleasant memories, or feelings of guilt after consumption, for example: "Every time I eat cheese, I feel sick, but I still insist on doing so. I feel guilty afterward." The presence of affective heuristics in posts indicates that individual experiences, even isolated ones, can gain collective strength on social media, contributing to the spread of unfavorable perceptions.

Availability heuristics refer to the tendency to judge the frequency or relevance of an event based on how easily examples come to mind (Tversky & Kahneman, 1973). In the corpus, this strategy appears in posts that make comparisons with past experiences or with third-party reports. Loss aversion heuristics, on the other hand, manifests itself when consumers express regret or frustration after a purchase decision that did not meet their expectations (Kahneman & Tversky, 1984). In the analyzed corpus, it appears in posts that report dissatisfaction with the cost-benefit ratio of dairy products, as in the example: “I paid a lot for the ice cream and didn’t even like it.”

Finally, the anchoring heuristic refers to the tendency to compare current values with previous references, influencing the present assessment (Tversky & Kahneman, 1974). In the corpus, this heuristic appears in sentences such as “I remember when milk was 2 reais, now it’s almost 8,” highlighting how past experiences shape current perceptions. Representative examples of these categories are described in Table 1.

Table 1. Classification of cognitive heuristics based on the discursive contexts found.

Cognitive Heuristics	Products Mentioned	Example of Posts Found	Keyword
Economical	Ice cream	“Jesus, who pays 63 reais for 600 grams of ice cream???”	pay
	Condensed milk	“Condensed milk is 8 reais, come on, guys!”	milk
	milk	“Milk is more expensive than meat.”	milk
	cheese	“The price of cheese is crazy, almost 50 reais per kilo.”	cheese
Loss Aversion	Ice cream	“Deeply regretting having spent the money on expensive ice cream...”	dear
	Condensed milk	“I bought expensive condensed milk and it wasn't even good, I regret it.”	condensed
	Ice cream	“I paid a lot for the ice cream and didn't even like it, how annoying!”	pay
Anchorage	Cheese bread	“I even miss paying three reais for a cheese bread.…”	pay
	milk	“I remember when milk used to cost 2 reais, now it's almost 8.”	milk
	cheese	“I miss when cheese was cheap”	cheese

Affection	Ice cream	“I'll buy her an ice cream. ❤️”	Ice cream
	Condensed milk	“Condensed milk is my childhood memory.”	condensed
	cheese	“Cheese reminds me of my grandmother, she always had it on her table.”	cheese
Availability	Condensed milk	“Condensed milk is too expensive, damn it.”	milk
	milk	“Milk, milk, milk... getting more expensive every day”	milk
	cheese	“Cheese is too expensive, everyone is complaining”	cheese

Source: Results of the research.

The examples presented in the table illustrate how different cognitive heuristics manifest themselves in negative posts about dairy products, revealing patterns of judgment that involve emotions, subjective comparisons, and past experiences. These elements reinforce the importance of understanding the role of heuristics in shaping perceptions related to consumption.

Conclusions

The analysis of negative posts about dairy products revealed that, even in digital environments marked by informality and speed, consumers mobilize cognitive strategies to express their perceptions. The presence of economic, affective, and availability heuristics demonstrates that discourse on consumption is permeated by quick judgments, emotional memories, and subjective associations that directly influence the image of products. By identifying these patterns, the study contributes to the understanding of how automatic mental processes shape food rejection on social media and paves the way for future research in other sectors sensitive to digital public opinion.

Although this study focused exclusively on negative perceptions given their relevance to understanding mechanisms of rejection and the spread of misinformation, the analysis of positive perceptions also represents a promising avenue. Favorable comments can reveal elements that strengthen consumer confidence and, therefore, offer important insights for building more effective communication strategies. Thus, we suggest that future studies also explore positive discourse in order to complement and expand the possibilities for intervention based on the dynamics observed. Understanding these dynamics is essential for developing more effective communication strategies that are less vulnerable to misinformation.

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