BEHAVIORAL BIASES AND FINANCIAL DECISION-MAKING IN COLLECTIBLE CARD GAMES

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ABSTRACT: The game Magic: The Gathering involves recurring financial decisions, where players aim to optimize their decks, often influenced by emotional factors and cognitive biases. This study investigates how these biases can affect player behavior, leading to decisions that are often not financially rational. The research reveals that the pursuit of acquiring new cards, whether for collection purposes or to increase competitiveness in the game, can result in overvaluation, influenced by heuristics such as anchoring and mental accounting. The analysis also explores the impact of overconfidence, particularly in the context of card valuation and devaluation. Moreover, the study contributes to raising players' awareness of behavioral biases, helping them make more balanced financial decisions, minimize losses, and optimize their performance in the game. By better understanding these behavioral patterns, the research offers insights for the collectible card game industry, suggesting more effective marketing strategies aligned with players' expectations.

KEY-WORDS: Behavioral finance; Cognitive biases; Trading card game.

RESUMO: O jogo "Magic: The Gathering" envolve decisões financeiras recorrentes, onde os jogadores buscam otimizar seus decks, frequentemente influenciados por fatores emocionais e vieses cognitivos. Este estudo investiga como esses vieses podem afetar o comportamento dos jogadores, levando a decisões que, muitas vezes, não são financeiramente racionais. A pesquisa revela que a busca por adquirir novas cartas, seja por colecionismo ou para aumentar a competitividade no jogo, pode resultar em superestimação de valor, influenciada por heurísticas como ancoragem e contabilidade mental. A análise também explora o impacto do excesso de confiança, especialmente no contexto da valorização e desvalorização das cartas. Além disso, o trabalho contribui para a conscientização dos jogadores sobre os vieses comportamentais, auxiliando-os a tomar decisões financeiras mais equilibradas, minimizando perdas e otimizando seu desempenho no jogo. Ao compreender melhor esses padrões de comportamento, a pesquisa oferece insights para a indústria de jogos de cartas colecionáveis, sugerindo estratégias de marketing mais eficazes e alinhadas às expectativas dos jogadores.

PALAVRAS-CHAVE: Finanças comportamentais; Vieses cognitivos; Trading card game.
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1. INTRODUCTION

Behavioral Finance represents an intersection between the fields of finance, economics, and cognitive psychology, providing a more detailed and realistic perspective on human behavior in financial markets (MACEDO JR., 2003). This field of study focuses on investors' choices, employing empirical evidence and psychological assumptions to explain and predict financial decision-making with greater accuracy (Franceschini, 2015).

Within the scope of behavioral economics, decision-making is often influenced by behavioral patterns, personal experiences, and simplified heuristic rules. Tversky and Kahneman (1996) demonstrated how heuristics and cognitive biases can shape human behavior when individuals are faced with risk and uncertainty.

"Trading Card Games" (TCGs) represent a classic example of this behavioral phenomenon. TCGs are collectible card games in which players build their own decks using a variety of cards with different abilities, characteristics, and strategies. During the game, players compete against each other, using cards from their decks to attack, defend, cast spells, or perform other actions with the objective of defeating their opponents. TCG cards generally carry collectible value, often determined by their condition and rarity. The behavioral analysis of TCG players reveals the influence of heuristics such as the Anchoring Theory, Mental Accounting, and the Availability Heuristic (Tversky & Kahneman, 1974) on their decision-making processes.

The numbers surrounding the game are significant, particularly when considering the secondary markets it stimulates. There is a whole ecosystem around the purchase, sale, and exchange of used cards, along with a large number of international tournaments held regularly. Each new edition, on average, four per year, introduces official storylines and exclusive illustrations. In addition, a variety of accessories and paraphernalia are available to players, adding value and enriching the overall gaming experience.

Understanding the behavioral biases of TCG players is essential to minimize the risks associated with such behaviors and to promote more effective management of the resources invested by players. Moreover, this research may provide useful insights for the TCG industry in developing more effective marketing strategies.

The findings of this study have the potential to contribute significantly to the understanding of decision-making among "Trading Card Game" (TCG) players and collectors—beyond "Magic: The Gathering." By helping to minimize the risks associated

with such behaviors and enabling better management of players' invested resources, this research can also provide relevant guidance for the collectible card game industry, supporting the development of more efficient marketing strategies.

2. THEORETICAL FRAMEWORK

The concept of the Anchoring Heuristic, introduced by Kahneman and Tversky (1974), refers to the tendency of individuals to be influenced by opinions and beliefs. In the context of TCGs, this heuristic manifests in several ways. For instance, when players are exposed to card evaluations provided by experienced players, experts, or even specialized websites, such evaluations function as mental anchors for the perceived value of the cards. Similar to investors who establish a mental anchor to buy or sell a stock based on initial information, TCG players may fix an anchor for specific cards grounded in external assessments. This anchor may be influenced by factors such as rarity, usefulness in popular game strategies, or even the reputation of the player or website that provided the evaluation. Once such an anchor is established, players tend to attribute less importance to new information that may arise during the game, even when it suggests a change in the card's strategic value.

Mental accounting refers to the human tendency to store events in mental compartments, often based on superficial and irrelevant attributes. In TCGs such as Magic: The Gathering, particularly in the face of frequent releases of new cards, players may acquire cards even without sufficient financial resources, guided by their perceived future value. Furthermore, situations of unexpected losses or gains, such as tournament prizes, may induce players to spend less prudently. Another issue related to "mental accounts" occurs when a sum of money is received unexpectedly. Many individuals treat this windfall differently from their regular income, often becoming more willing to take risks when investing it or spending it on superfluous goods. This situation was classified by Tversky and Thaler (1990) as the "house money effect," derived from a casino expression used when a gambler becomes more inclined to increase bets and risk after a substantial gain (PETERSON, 2008).

The Availability Heuristic suggests that events stored in an individual's memory constitute an important criterion for judging the likelihood of an event occurring. The most impactful events are not necessarily related to the actual frequency of occurrence but rather to those that people perceive as more likely to happen (BARBEDO; CAMILO-DA-

SILVA, 2008). In games, this heuristic may manifest when players assess the probability of certain events during play. For example, if a player has had a particularly memorable experience in which a specific strategy resulted in a decisive victory, they may overestimate the probability of that strategy's success in future matches, even if the strategy is not necessarily the most effective in all situations.

In many cases, the availability heuristic will lead to accurate judgments because, generally, examples of more frequent events are retrieved more quickly from memory than those of less frequent ones. However, the improper use of the availability heuristic may result in systematic errors, as the accessibility of information is influenced by factors not directly related to the actual frequency of the judged event (LIMA FILHO, 2010). In other words, this occurs because individuals tend to focus on particular facts that are most salient in their minds rather than on the complete situation.

3. METHODOLOGY

3.1 Methodological Classification

This research can be classified as descriptive and quantitative in nature. The descriptive approach was chosen because the objective is to identify and present the behavioral biases present in the decision-making processes of trading card game players, outlining their main characteristics and how they manifest in practice. According to Vergara (2000), descriptive research seeks to present the characteristics of a population or phenomenon, as well as to establish possible correlations between variables and define their nature. In this sense, the study does not aim to establish causal relationships but rather to provide a structured overview of the players' financial behavior, thereby contributing to the systematization of knowledge in this field.

In addition, the study adopts a survey strategy, which allows data to be collected directly from participants through a structured questionnaire, later analyzed using descriptive statistics. This methodological choice is consistent with the principles of behavioral finance research, which frequently employs surveys and experiments to capture the influence of cognitive biases on decision-making. By translating players' perceptions, judgments, and opinions into quantitative data, the study enables comparisons between groups, the identification of dominant patterns, and the assessment of the prevalence of specific heuristics, such as anchoring, mental accounting, and overconfidence.

Consequently, the methodological framework not only aligns with the research objectives but also ensures analytical rigor, providing reliability and validity to the results obtained.

3.2 Data Collection Procedures

Data collection was carried out through a structured questionnaire hosted on the Google Forms platform. The questionnaire employed a Likert scale to measure responses, with the aim of constructing constructs aligned with respondents' heuristics and cognitive biases. In addition, it included a consent and participation intention question, ensuring that only participants who agreed with the terms proceeded with completion.

A pre-test with 11 participants was conducted to validate the questionnaire, ensuring the clarity of the questions and the adequacy of the response options. Based on the feedback obtained, minor adjustments were made to improve item comprehension and ensure accuracy in data collection.

According to Article 1 of Resolution 510 of CONEP, approval by a Research Ethics Committee (CEP) was not required, as the study did not involve risks to participants, being limited to the collection of public opinion. Thus, the research followed the recommended ethical standards, respecting participants' privacy and rights.

The approach to the problem was quantitative, using a survey for data collection. According to Gil (2010), this type of research translates opinions and information into numbers, facilitating their classification and organization. To validate the constructs, the data will be analyzed through descriptive statistics.

The questionnaire was designed with questions focused on the profile of Magic: The Gathering players. The survey was conducted between May 6, 2024, and July 20, 2024, and participants were reached through dissemination on social media platforms, aiming to capture a diverse audience within the game's community.

3.3 Procedures for Data Analysis

The data collected through the structured questionnaire were first organized in spreadsheets and subjected to a process of cleaning and validation, ensuring consistency, completeness, and reliability of the responses. After this stage, the information was categorized according to the constructs developed from the literature review, especially those related to behavioral finance and cognitive biases. Descriptive statistical techniques,

such as frequency distribution and percentage analysis, were applied in order to identify patterns in participants' responses. This step enabled the quantification of tendencies such as overconfidence, anchoring, mental accounting, and loss aversion, making it possible to assess their prevalence among the players surveyed.

In addition to the descriptive approach, the analysis also involved the interpretation of the results in light of behavioral finance theory, drawing connections between empirical findings and concepts established in the literature. The responses were cross-referenced with sociodemographic variables such as age, gender, income, and playing profile, which made it possible to verify the existence of differences in perception among distinct groups of players. This comparative analysis provided greater depth to the study, allowing the identification of nuances in how cognitive biases influence decision-making. By adopting this procedure, the research not only quantified the presence of heuristics but also contextualized them, demonstrating how players' financial behavior is shaped by a combination of psychological, social, and economic factors.

4. RESULTS ANALYSIS AND DISCUSSION

4.1 Descriptive Analysis

Sociodemographic data were collected from 331 questionnaire participants, with the objective of identifying the respondents' profiles in relation to the following variables: gender, age, marital status, educational level, and geographic location.

Table 1: Sociodemographic profile of the participants

Gender		Region of Brazil	
Male	92,1%	South	20,8%
Female	6,9%	Southeast	68,6%
Other	1,0%	North	0,9%
		Northeast	4,8%
		Midwest	4,8%
Age (in year)		Number of Children	
Up to 18	0,9%	0	83,7%

18-24	19,6%	1	10,6%
25-34	52,9%	2	4,8%
35-44	25,4%	3	0,6%
45-54	0,9%	More than 3	0,3%
55 and above	0,3%		
Time Playing MTG (in years)		**Game Frequency**	
Up to 1	7,3%	Daily	14,5%
1-3	17,5%	Weekly	54,4%
4-6	20,5%	Monthly	14,2%
More than 7	54,7%	Occasionally	16,9%
Marital Status		**Player Type**	
Single	57,7%	Collector	13,6%
Married / Domestic Partnership	39,9%	Investor	0,6%
Divorced / Separated	2,1%	Casual Player	68,6%
Widowed	0,3%	Competitive Player	17,2%
Average Household Income (R$)		**Educational Level**	
Up to 1.500,00	6,9%	Elementary Education	0,6%
1.501,00-3.000,00	18,1%	High School	18,1%
3.001,00-5.000,00	23,3%	Higher Education	49,5%
5.001,00-10.000,00	28,1%	Postgraduate (Specialization and/or MBA)	23,9%
10.001,00-20.000,00	14,8%	Postgraduate – Master's Degree	5,4%
More than 20.000,00	8,8%	Postgraduate - Doctorate	2,4%

Source: Original research results

The data indicated a predominance of male players, representing 92.1% of the sample, while only 7.9% identified as female. Three response options were provided: male, female, and other. Despite the increasing participation of female players, the community remains predominantly male. Most Magic players are embedded in geek or nerd culture, which is largely male, white, middle-class, and cis-heterosexual (Salter, 2018; Salter &

Blodgett, 2017). Regarding age distribution, 84% of respondents were between 25 and 44 years old, with 45.3% aged 25–34 and 38.7% aged 35–44.

In terms of marital status, 57.7% of participants reported being single, while most of the remaining respondents were divided between being married and other categories. Concerning educational level, 49.5% of respondents reported having higher education.

The sample also presented a varied geographic distribution, with 68.6% of participants residing in the Southeast region, 20.8% in the South, 4.8% in the Midwest, 4.8% in the Northeast, and only 0.9% in the North. This geographic diversity contributes to a more representative analysis across different regional contexts.

4.2 Evaluation of Players' Financial Behavior

In this section, the objective is to understand perceptions of the Magic: The Gathering market.

Table 2: Perceptions of the Magic: The Gathering Market

	SD	PD	NAD	PA	SA
The prices of Magic: The Gathering cards are generally affordable.	23,6%	37,2%	27,5%	9,7%	2,1%
It is relatively simple to acquire Magic: The Gathering cards.	5,1%	12,7%	15,4%	38,4%	28,4%
By acquiring new cards, I can improve my deck more effectively.	0,9%	5,1%	15,4%	39%	39,6%
Obtaining cards allows me to have a stronger deck.	1,2%	3,9%	14,2%	33,2%	47,4%
If Wizards of the Coast were to restrict the production of new cards or significantly increase prices, I would not be able to keep my deck optimized.	6,3%	6,9%	13,9%	26,6%	46,2%

Note: SD - Strongly Disagree, PD - Partially Disagree, NAD - Neither Agree nor Disagree, PA - Partially Agree, SA - Strongly Agree.
Source: Original research results

When analyzing Table 2, it is observed that 23.6% of participants believe that card prices are generally affordable, while 37.2% remained neutral. Regarding the ease of acquiring new cards, 38.4% of respondents stated that it is relatively simple to obtain MTG cards, although 28.4% expressed a neutral opinion. When asked about the effectiveness of new acquisitions in improving their decks, 39.6% of participants agreed that the purchase of new cards effectively contributes to enhancing deck performance.

This pattern suggests that players' gaming experience and knowledge may significantly influence their purchasing decisions, reflecting the theory of mental accounting. By allocating budgets separately for cards, players may make decisions that disregard the overall impact on their finances. According to Thaler (1992), mental accounting leads individuals to divide their resources into different mental accounts, treating each spending category independently, which may result in suboptimal financial decisions. For example, when allocating a specific budget to a particular type of purchase, individuals often overlook the overall effect that such allocation may have on their finances.

Table 3: Card Sales

	SD	PD	NAD	PA	SA
If I manage to sell a card for twice the amount I paid (or will pay), I sell it.	13,3%	15,1%	29,3%	17,8%	24,5%
If I buy a card and it decreases in value, I do not sell it until it appreciates.	19,9%	21,5%	39,3%	11,2%	8,2%

Note: SD - Strongly Disagree, PD - Partially Disagree, NAD - Neither Agree nor Disagree, PA - Partially Agree, SA - Strongly Agree.
Source: Original research results

The willingness of players to sell cards was examined based on their relationship with selling price and value appreciation. As shown in Table 3, only 24.5% of participants stated that they would sell a card for twice its purchase price, which reveals a practical approach toward quick profits. In contrast, 39.3% of respondents indicated that they would not sell a card that had depreciated, which demonstrates the disposition effect.

In the context of Magic: The Gathering, the disposition effect manifests when players prefer to sell cards that have recently increased in price, thereby securing quick profits, while resisting the sale of cards that have lost value, in the hope that such cards will recover. According to Shefrin and Statman (1985), the disposition effect refers to investors' tendency to sell assets that have recently performed well and to retain underperforming assets in the expectation that they will eventually regain value. This behavior is largely influenced by loss aversion, that is, players prefer to avoid the pain of realizing a loss, even if this implies holding an undervalued asset for an extended period.

Table 4: Expectations Regarding Appreciation and Purchasing Behavior

	SD	PD	NAD	PA	SA
The prices of Magic: The Gathering cards are generally affordable.	23,6%	37,2%	27,5%	9,7%	2,1%
It is relatively simple to acquire Magic: The Gathering cards.	5,1%	12,7%	15,4%	38,4%	28,4%
By acquiring new cards, I can improve my deck more effectively.	0,9%	5,1%	15,4%	39%	39,6%
Obtaining cards allows me to have a stronger deck.	1,2%	3,9%	14,2%	33,2%	47,4%
If Wizards of the Coast were to restrict the production of new cards or significantly increase prices, I would not be able to keep my deck optimized.	6,3%	6,9%	13,9%	26,6%	46,2%
If I manage to sell a card for twice the amount I paid (or will pay), I sell it.	13,3%	15,1%	29,3%	17,8%	24,5%
If I buy a card and it decreases in value, I do not sell it until it appreciates.	19,9%	21,5%	39,3%	11,2%	8,2%
The appreciation of certain cards has encouraged me to purchase more cards.	39,6%	24,5%	18,4%	11,2%	6,3%
Even if the cards I own do not appreciate, my willingness to purchase new cards would remain, since other factors are more important to me than financial gains.	1,2%	1,8%	8,2%	28,7%	60,1%
I am more concerned about the value of a card in relation to its cost than with its market value, so as not to risk overpaying.	9,1%	10,6%	37,5%	26,6%	16,3%
I usually make purchasing decisions regarding Magic: The Gathering cards based on their expected future appreciation.	43,5%	29,9%	16%	6,3%	4,2%
The value of a card influences my decision to purchase it.	3,3%	5,4%	6,3%	29,3%	55,6%
The fact that players in my social circle have profited from buying and selling cards has influenced me to invest.	57,4%	18,7%	14,8%	6,3%	2,7%
I believe certain cards will continue to appreciate as they have in recent years.	7,9%	10,9%	27,5%	32,3%	21,5%
I believe certain cards may depreciate as has occurred in previous editions of the game.	0,9%	2,7%	10%	38,1%	48,3%
I evaluate the value of a card based on the price other players have paid for it.	17,5%	16,6%	29,6%	24,2%	12,1%
I use information on the appreciation of cards in specific game formats to estimate the appreciation of cards in other formats.	24,2%	12,1%	26%	23,3%	14,5%

	SD	PD	NAD	PA	SA
I seek to observe the selling price of cards with similar characteristics to those I am interested in to assess whether the price is appropriate.	15,7%	9,1%	24,2%	30,5%	20,5%
I believe that acquiring certain cards will bring me significant returns in the game.	9,1%	10,3%	20,2%	33,5%	26,9%
Purchasing cards guarantees improvement in my in-game performance.	30,8%	24,5%	17,8%	18,4%	8,5%
When evaluating the price of a card, I believe my assessment is more accurate than that of a seller, since the latter has an interest in overvaluing it.	16,9%	21,1%	34,7%	15,7%	11,5%
I am confident in my ability to identify which cards have the greatest potential for appreciation.	22,7%	26%	29%	16%	6,3%
I possess knowledge about the Magic: The Gathering card market and am able to choose the best cost-benefit options.	15,4%	19,3%	27,2%	23,3%	14,8%
I believe that the prices of Magic: The Gathering cards will rise in the coming years.	3,6%	4,8%	17,2%	31,7%	42,6%

Note: SD - Strongly Disagree, PD - Partially Disagree, NAD - Neither Agree nor Disagree, PA - Partially Agree, SA - Strongly Agree.
Source: Original research results

The results presented in Table 4 demonstrate that most players are exposed to judgment errors, which may influence their decisions regarding card acquisition and expectations of improved in-game performance. MTG players may base their decisions on past experiences or on the behavior of other players, without a deeper analysis of the actual factors that affect the value and competitiveness of the cards. This may lead to the overvaluation of certain cards or to the unrealistic expectation that simply acquiring more cards will automatically result in a stronger deck and better game performance.

Participants' perceptions of the future appreciation of cards were also highly relevant. The survey indicated that 42.6% believe that card prices will rise in the coming years, reflecting an optimistic expectation that may influence purchasing decisions. At the same time, 48.3% of participants are aware of the possibility of depreciation, which demonstrates an understanding of the risks associated with investing in cards.

Players' financial behavior also reflects the presence of overconfidence, with 22.7% of players expressing confidence in their ability to identify cards with appreciation potential and 16.9% believing that their assessments are more accurate than those of specialized sellers. This overconfidence bias may lead players to underestimate the risks

involved in card purchases, resulting in imprudent decisions, particularly in speculative markets. Faria (2015) defines overconfidence as an unjustified faith in one's own intuitive reasoning, judgment, and cognitive abilities. According to the author, such individuals believe they are more capable than others and that they possess superior information, thereby overestimating their own evaluation and forecasting abilities.

5. FINAL CONSIDERATIONS

This study aimed to explore Magic: The Gathering players' perceptions of the factors influencing their financial decisions related to the purchase and sale of cards, as well as to identify the presence of behavioral biases. The data obtained reveal that, although participants possess considerable knowledge about the game and the card market, many still appear susceptible to cognitive biases. These factors may significantly affect how players assess the value of cards and make buying and selling decisions.

The research sought to understand players' financial behavior, their perceptions of card appreciation, and the influence of their social circle on decision-making. The fact that a significant portion of participants still trusts in the possibility that specific cards will continue to appreciate suggests the presence of overconfidence, which may be problematic. This overconfidence, combined with a possible lack of knowledge about the market, may lead to impulsive decisions that are not aligned with the fundamentals of the game.

Nevertheless, the study benefited from key concepts in behavioral economics. The analysis of heuristic biases demonstrated that these factors can shape players' financial decisions. The representativeness heuristic may lead players to positively evaluate the potential of specific cards based on stereotypical opinions, while the availability heuristic may distort their perception of the frequency and impact of events in the market. Anchoring, in turn, may cause players to fixate on a specific reference price, disregarding new and relevant information.

Mental accounting also emerged as a noteworthy factor, as players often categorize their financial decisions in a superficial manner, which may lead to judgment errors. Experiments conducted by Kahneman and Tversky illustrated how the way individuals mentally allocate values can affect their willingness to spend and invest.

Kahneman and Tversky's theoretical framework proved relevant to understanding players' behavior in a broader context. The uncertainty highlighted by Kahneman and the financial fragility discussed by Tversky provide a theoretical basis that helps explain how

players' impulsive decisions are intertwined with broader economic phenomena, such as market bubbles.

Overall, the study revealed a mixed picture of players' perceptions of the Magic: The Gathering market. The research faced limitations due to the absence of prior studies in the literature that analyzed player behavior through the lens of behavioral finance. This gap hindered the comparison of the results obtained with those of other studies.

Finally, this study not only contributes to the understanding of behavioral finance in the context of trading card games but also highlights the need for further research in the field, considering the complexities involved in players' financial decision-making.

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