

How Representativeness Heuristics Impact People's Decision in Economics and Law?

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Abstract. This paper illustrates how representative heuristics lead to shortcuts in mind that cause irrational decision-making affects the economy and law. It discusses the following three case studies, the 17th-century Dutch tulip mania, the wrongful conviction of Sally Clark in England, and the rise of the gluten-free diet. Research shows that social mimicry, misunderstanding statistics, and misleading health information may cause irrational behaviour. These factors contribute to considerable risks, economic failure, miscarriages of justice, and the spread of misinformation about public health. The paper suggests suggestions such as, better statistical education, regulatory reform, increased consumer awareness, and stronger regulation. In addition, it connects historical events to current challenges through interdisciplinary collaboration. The paper also emphasises the importance of addressing cognitive biases in finance, law, and public health. These solutions are based on behavioural economics, legal theory, and consumer psychology to help solve real-life problems. Future research should focus on three main areas: cross-cultural studies, long-term studies, and examinations of how new technologies might alter decision-making processes.

Keywords: Representative heuristics, Irrational decision-making, Herd effect, Statistical fallacies, Information cascades.

1. Introduction

1.1. Background of the Study

In economics, it is commonly assumed that individuals act rationally. However, in real life decision-making, people often act irrationally due to many reasons. For instance, the reliance on stereotypes or limited legal precedents, as representative heuristics, which can result in poor judgment and irrational choices.

1.2. Purpose and Meaning

This article analyses how the representativeness heuristic appears in various applications and suggests strategies to reduce its effects. These analyses will help individuals avoid risks, enhance their judgment, and make more rational decisions.

1.3. Structural Arrangement of this Paper

The paper is organized as follows: Firstly, it will examine the tulip bubble as a case study to elucidate the influence of the herd effect on decision-making and propose potential solutions. Secondly, it will analyse the case of Sally Clark in the UK to reveal the impact of statistical fallacies on the case and suggest remedial measures. Lastly, considering concerns regarding food health, the paper will address how stereotypes rise and provide solutions through this analysis.

2. Herding in Commodity and Financial Market

2.1. Representativeness Case

In the 1730s, the Dutch Republic experienced an extraordinary speculative phenomenon known as Tulip Mania. Originally imported from the Ottoman Empire, tulips became a symbol of status among

the Dutch elite due to their rarity and distinctive beauty. As demand increased significantly, the prices of tulip bulbs surged dramatically (please see Fig. 1). Common bulbs, such as ‘Switzer’s,’ soared from a few guilders to thousands, while rare types like ‘Semper Augustus’ commanded prices cost approximately 6,000 guilders [1].

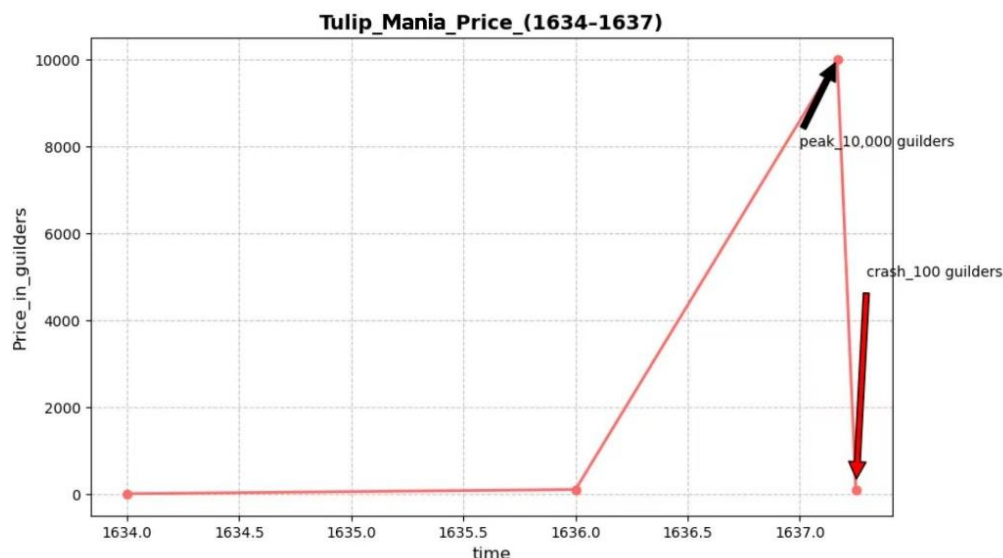


Fig. 1 Tulip Mania Price (1634-1637)

Data source: Amsterdam Museum. (n.d.). Tulip Mania. Available from: <https://www.amsterdammuseum.nl> Photo credit: Original

In the early 17th century, tulips became symbols of luxury and status, highly sought after by the wealthy merchant class and aristocracy across Europe [1].

After 1636, tulip fascination reached its peak, leading to dedicated markets in cities like Amsterdam [2]. Traders started to make futures contracts that let buyers order tulip bulbs before they were harvested. This new way of doing business attracted not just wealthy people but also middle-class traders and skilled workers who wanted to profit from the tulip trade [2].

However, in February 1637, the price of tulips fell sharply. Buyers quickly left the market, which led to a panic. Prices dropped by over 90%, causing the market to collapse [3]. Many speculators who had invested too much in future contracts went bankrupt, triggering a chain reaction that hurt the entire Dutch economy. This event is known as “Tulip Mania” and serves as a warning about the risks of speculative bubbles and market excesses [3].

2.2. Analysis

2.2.1. Social Mimicry and Information Cascades

The early lure of speculators seeking quick riches quickly seeped into social networks, driving many to participate out of fear of missing out (FOMO) [4]. Many ordinary investors often lack professional knowledge of tulip cultivation and blindly follow the behaviour of others, leading to the trend of speculative behaviour [4]. The high cost of accessing information significantly affects decision-making patterns. When individuals face excessive time commitments, mental stress or financial constraints in acquiring and processing important data, they tend to give up rational analyses and turn to copy the choices of others. This issue arises from the limitations of cognitive capacity and the varying degrees of understanding individuals have regarding information. For instance, in financial markets, comprehensive market analyses require a certain level of expertise. Retail investors, who may lack strong analytical skills, often opt to follow the investment decisions of institutional traders rather than conduct their own research. Moreover, busy professionals often face complex challenges and may rely on a colleague's solution without verifying it. This saves mental effort, especially when checking information is difficult. As a result, decisions may depend more on outside sources than on critical thinking, leading to less stable judgment for individuals and groups.

Furthermore, individuals frequently make decisions based on incomplete information, as known as information asymmetry. Due to the lack of price information of comprehensive understanding of financial implications, people may follow those who became wealth suddenly, for example, artisans selling their assets to invest in tulips. This shows the risk of speculation without a deep understanding of the market dynamics.

2.2.2. Market Structure Fuels Speculation

Futures trading facilitates the exchange of pre-production commodity information through standardized contracts. This is crucial in improving market efficiency. However, it also increases considerable trading risks. It enables traders to leverage borrowed funds, making them invest more than the capital they owned [2]. While some traders gain profits, many ordinary participants have to take the losses.

Moreover, despite the increased flexibility offered by futures trading, it was risky. The price change makes the market to rapidly adjust to changes in supply and demand [3], even though disruptions in the supply chain may reduce the advantage. Because of cognitive biases, traders may overestimate their ability and underestimate the risks, leading to even more significant losses [5].

Furthermore, in unregulated markets, prices often react excessively to minor shifts, causing large fluctuation, which lead to irrational pricing. Meanwhile, overconfidence occurs when traders focus on price increases rather than the real value of the goods [6]. Additionally, because of herding behaviour, investors often chase the market trends, thus becoming less aware of the potential risks.

2.2.3. Narrative and Symbolization

Tulips became a symbol of wealth at the very beginning because they were imported to Dutch. The significant increase in price, made people think it would continuously being valuable and attracted investors seeking higher returns [1]. When aesthetics and economic value make these flowers a symbol of social status and wealth, prototypes formed. These prototypes reflect people's vanity [1].

2.2.4. Consequences of the Herd Effect

Due to speculation, the price of tulip bulbs increased far beyond their actual value. Investors were seduced by the prospect of continuous high profits, causing prices to rise further. This led to market bubble since people relied on stereotypes of others' success rather than the actual value of the bulbs [7].

Meanwhile, the bubble's collapse reduced public trust of the markets. Due to uncertainty, the stability of these markets became unreliable, which affected consumers' behaviour and investment choices when considering holding or selling goods or stocks [3].

2.3. Solutions

2.3.1. Regulatory Intervention

Regulating leveraged instruments and futures contracts is crucial to control the speculation in financial markets. Regulators can manage risk by limiting how much investors can borrow and imposing trading rules [2]. This approach helps prevent irrational speculation and strengthens the financial system against shocks.

Market transparency is also critical. Regulators should require market participants to provide full information about transactions to fill information gaps and promote trust among traders [3]. With more information, traders can focus on reasonable analyse when making decisions rather than simply copy others' options. Combining these regulatory methods will effectively reduce risks [3]. This structured framework can be used in the commodity market and as an example of financial regulatory systems.

2.3.2. Investor Education

Encouraging critical thinking enables people to analyse and evaluate information to make correct decisions rather than just following market trends. By educating people to make decisions based on facts, they can gain a deeper understanding of market dynamics, which enables them to find out the secrets of market trends, thus avoiding simple herd behaviour and making more rational decisions [3].

2.3.3. Market Mechanism Optimization

Short selling can make the market more stable and lower sudden price increases. This strategy enables investors to make money by selling borrowed shares when the stock price drops [3]. For example, it can help investors find overpriced stocks, thereby improving stock valuations. It can also moderate sharp market fluctuations and promote more rational investment choices.

It is important to understand what causes sudden price changes and avoid trading too much during quick price rises. By recognizing these incentives, investors can create strategies that lead to a more stable trading environment [3]. This would not only protect their investments but also create healthier market conditions.

2.3.4. Social Narrative Management

Identifying motivations for price changes is essential for minimizing the risks related to overtrading. By learning these hazards, people can create strategies that establish a more stable trading environment, thereby safeguarding investors in a highly competitive market [1].

3. Statistical Fallacies

3.1. Case Study

Sally Clark was a prominent British lawyer who encountered significant legal challenges. In 1996 and 1998, she was charged with murder following the deaths of her two infant children shortly after their births [8]. The prosecution relied heavily on the testimony of a paediatrician named Roy Meadow, who argued that having two cases of sudden infant death syndrome (SIDS) in one family was exceedingly rare, estimating the likelihood at approximately one in 73 million. This assertion led to the troubling conclusion that homicide was the only plausible explanation for these heartbreaking events. Clark was convicted in 1999 and spent three years in prison [9]. However, in 2003, she was acquitted, and people found that the statistical basis of the prosecution's charges had serious limitations. Proving that simple statistics could not be relied upon in making a judgment [10].

3.2. Analysis

The prosecution's argument relies on flawed statistics. Meadow's calculation claims a one in 73 million chance of SIDS, but it mistakenly assumes that these cases occur independently. The prosecution's argument relies on simple statistics [11]. Furthermore, prosecutors failed to compare this figure to the typical rate of twin homicides under similar circumstances, which experts estimate is about one in every two million people [12]. The insufficient investigation of backgrounds misled the results, causing a mix-up between the probabilities of SIDS and the chance of innocence. The bias that SIDS is rare led the jury to link rarity with guilt while overlooking other natural causes incorrectly [11].

The prosecution's argument had serious flaws, which broke its credibility. The prosecutors wrongly believed that the two children's deaths were separate events, ignoring shared risk factors like genetic disorders and poor living conditions. Misusing probability theory made it more likely that natural deaths would happen again. Additionally, not counting SIDS cases and deaths was a major statistical mistake.

This case explains how cognitive biases can affect decision-making. They based their judgment on simple statistical probability instead of strong evidence of crime. This shows how confirmation bias can change the way people think about facts.

3.3. Solutions

Legal reforms are significant in stopping false convictions. The Royal Statistical Society has urged courts to implement stricter standards for the use of statistical evidence [8]. They emphasised the importance of distinguishing clearly between the probability of an event, such as SIDS, and the possibility of an individual being guilty [8]. Judges and juries should also receive training to become more aware of their biases, particularly in how they interpret probabilities. This training will also equip them with the skills to accurately understand and analyse statistical information [11].

4. Herding in Food Market

4.1. Case Study

In the 2010s, the gluten-free diet shifted from being a necessity for those with celiac disease to a widespread trend, with the market projected to reach \$25 billion in 2023 [13]. Celebrity and the media's promotion of clean eating has dramatically expanded this trend. These approaches often use representativeness heuristic, such as the herding behaviour, where a positive celebrity image favours a product and influences consumer behaviour [14]. Corporate marketing advocates gluten-free, despite the lack of solid evidence linking it to health issues [15]. Thus, many people without gluten allergy follow a gluten-free diet and spend more money on food that may lack nutrition [16]. However, this behaviour can lead to long-term health problems.

4.2. Analysis

Many people think gluten-free foods improve their health, but that is not always true [14]. Marketing creates this scam through appealing images and messages. This is connected to the representativeness heuristic, indicating that our emotions can distort our judgment [15].

Marketing promotes gluten-free items as healthy, shaping the public's perception. This shows how emotions often influence people's choices more than scientific evidence or medical facts [15].

The phenomenon that gluten-free foods are widely misunderstood as having adaptable health benefits reflects representative heuristics' deep impact on public cognition. Although scientific research shows that only 1% of celiac disease patients need to avoid gluten [14], marketing strategies have successfully shaped the image of gluten-free as a healthy lifestyle through celebrity images and emotional narratives [15].

The formation mechanism of this cognitive bias can be analysed at three levels. First, emotional drive replaces rational judgment. Food advertisements mislead consumers to associate gluten-free with health intuitively. This decision-making model is based on typicality rather than possibility, which makes people ignore the fact that it is aimed at gluten-allergic groups. Studies have not found that gluten-free diets have significant nutritional advantages [15].

Secondly, social media can create a misunderstanding by highlighting individual success stories about health improvements. This can mislead people into thinking that these experiences are common and directly connected to specific causes [15, 16].

Thirdly, marketing has caused misunderstandings by using people's fears. By making gluten seem harmful, food companies have turned a specific medical issue into a broad consumer trend. Originally, only about 1% of people had celiac disease, but now around 30% of healthy consumers avoid gluten [14], which indicates the representative heuristics in consumption choices, when gluten avoidance is seen as a health trend, emotional appeal and group conformity often overweight scientific evidence.

Moreover, from a nutritional perspective, people should be aware of the real implications of consuming gluten-free products. Many items are made from alternative grains, leading to lower dietary fibre levels compared to gluten-containing counterparts [16]. This decrease in fibre intake may negatively affect consumers' health and contribute to various health issues. Furthermore, gluten-free products often have a higher glycaemic index, resulting higher blood sugar levels [16]. In the long term, this can enhance the risk of developing obesity, type 2 diabetes, and other metabolic

disorders. Thus, while the gluten-free market continues to flourish, it is important for consumers to remain aware of the potential nutritional drawbacks associated with these products [16].

Also, consumers often spend up to 242% more on gluten-free products because of perceived health benefits [14], despite warnings that these items aren't necessarily healthier [17]. This creates inequitable access to nutritious food for those with genuine medical needs.

4.3. Solutions

Public health agencies are responsible to share accurate information about dietary practices, especially regarding gluten-free diets. They must focus on evidence-based information, emphasizing that such diets are only medically necessary for a small group of people, specifically those with celiac disease or other gluten-related disorders [15]. Nutritionists should actively correct misinformation on social media by addressing cognitive biases that result in the acceptance of false health myths. These biases skew public perception, leading people to value personal anecdotes over scientific evidence [15]. Meanwhile, nutrition professionals should educate the public about gluten sensitivity and promote evidence-based dietary guidelines. This will help inform people and lessen the stigma surrounding gluten consumption for those without medical reasons to avoid it [15].

Moreover, food manufacturers should ensure the product transparency, especially concern gluten-free options. They should clearly identify how the nutritional content of gluten-free products compares to standard products. Many gluten-free foods may be deficient in essential nutrients like fibre and B vitamins, and consumers need to be aware of this [16]. It is vital not to make exaggerated claims about gluten as these could cause unnecessary anxiety among consumers. When manufacturers provide accurate information, they can empower people to make the correct choices [16].

Furthermore, clearly labelling gluten-free products is crucial for people with gluten-related problems [17]. Accurate labels ensure the safety of individuals who must avoid gluten. To protect consumers from misleading claims about the benefits of gluten-free diets, strict penalties for false marketing are necessary [17]. In addition, governments should help consumers distinguish between a medically necessary gluten-free diet and a diet that is medically unnecessary. This distinction is important for understanding both nutritional needs and the economic impact of the growing gluten-free market [15]. This ensures that people who truly need gluten-free food receive appropriate support without being confused by commercialization. This means clear labelling systems can help consumers make informed choices. Establishing clear rules to distinguish between valid health claims and personal lifestyle choices will improve marketing practices and maintain the credibility of gluten-free labels [14].

5. Conclusion

The Dutch Tulip Mania shows how herding behaviour can cause market bubble. To prevent this, there should be enough regulation, along with better education and more transparency to reduce herd behaviour. This event still offers important lessons for financial markets nowadays.

The Sally Clark case exposed major problems in how statistics were used in court. The case inspires the public that legal reform and regulation are very important and be aware of how statistical evidence can be used in every specific case.

Cognitive biases also influence consumer choices, which can affect both health and the economy. By encouraging critical thinking, promoting market regulation and enforcing science-based rules, the impact of misleading trends on health and consumer habits can be reduced, enabling consumers to make more rational decisions.

However, this study has some limitations. First of all, the applications cannot fully represent other situations, especially when comparing events like Tulip Mania to modern digital economic bubbles. Secondly, focusing on errors in judicial statistics misses larger problems, such as biases in forensic science. Thirdly, while the discussion on gluten-free diets shows consumer psychology, it does not

hold companies accountable for spreading health misinformation. Lastly, the suggested fixes, like regulatory changes and public education, need to be tested under different conditions.

Future research should focus on three main areas. Firstly, cross-cultural studies can help us understand how group thinking in financial markets may vary between different societies, especially in more community-focused cultures. Secondly, long-term studies are needed to see if initiatives like statistical training for legal professionals and public health campaigns against misinformation really have long lasting effects. Thirdly, it is important to learn more about how new technologies, like artificial intelligence (AI), might change the way how people make their decisions. Combining ideas from behavioural economics, legal studies, and nutrition science may lead to better ways of tackling irrational decision-making in the real-world challenge.

References

- [1] Dash M. Tulipomania: The Story of the World's Most Coveted Flower and the Extraordinary Passions It Aroused. London: Crown Publishing Group, 1999.
- [2] Amsterdam Museum. Tulip Mania. (n.d.) [2025-02-28]. <https://www.amsterdammuseum.nl>
- [3] International Institute of Social History. The Dutch Tulip Bubble: A Case Study. (2022)[2025-02-28]. <https://www.iisg.nl>
- [4] De Bond W F M, Thaler R H. Does the stock market overreact? *Journal of Finance*, 1985, 40(3): 793-805.
- [5] Stiglitz J E. *Economics of the public sector*. 3rd ed. New York: W.W. Norton & Company, 2000.
- [6] Shiller R J. *Irrational exuberance*. 2nd ed. Princeton: Princeton University Press, 2005.
- [7] Thompson E A. The Tulip mania: Fact or Artifact?. *Public Choice*, 2007, 130(1-2): 99-114.
- [8] The Royal Statistical Society. Royal Statistical Society concerned by issues raised in Sally Clark case. (2001-03-15)[2025-03-15]. <https://rss.org.uk>
- [9] Meadow R. Unnatural sudden death of infants. *Archives of Disease in Childhood*, 1999, 80(1): 7-14.
- [10] R v Clark. EWCA Crime 1020, 2003.
- [11] Hill R. Multiple sudden infant deaths: Coincidence or beyond coincidence?. *Paediatric and Perinatal Epidemiology*, 2004, 18(5): 320-326.
- [12] Roberts P, Zuckerman A. *Criminal Evidence*. 2nd ed. Oxford: Oxford University Press, 2010.
- [13] Grand View Research. Gluten-free products market size report, 2023-2030. (2023)[2025-03-10]. <https://www.grandviewresearch.com>
- [14] Chandon P, Wansink B. Does food marketing need to make us fat? A review and solutions. *Nutrition Reviews*, 2012, 70(10): 571-593.
- [15] Kahneman D, Tversky A. Judgment under uncertainty: Heuristics and biases. *Science*, 1974, 185(4157): 1124-1131.
- [16] Wu J, et al. Nutritional quality of gluten-free products: A systematic review. *Journal of Human Nutrition and Dietetics*, 2015, 28(4): 329-346.
- [17] FDA. Gluten-free labelling of foods. (2022)[2025-03-11]. <https://www.fda.gov>