

Hindsight Bias and Its Application in Financial Investment, Legal Decisions, and Medical Diagnosis

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Abstract: This essay seeks to explicate hindsight bias as a pervasive cognitive heuristic and discusses its manifestation in everyday judgment and decision-making, incorporating the representative psychological factors that underlie different conceptual constructs. With the combination of theoretical frameworks with past contextualized experiments, three essential applications of hindsight bias in financial investment, legal decisions, and medical diagnosis, including their significance in society, are introduced respectively by extrapolation. Judgment concerning financial investment and economic outlook necessitate an unprejudiced future-centric perspective but is often susceptible to a biased retrospection that results in unwise decisions. Similarly, in the criminal justice system, hindsight bias may be responsible for numerous impartial decisions made, which would interfere with legal impartiality. In medical settings, people also have a habitual tendency to overestimate their diagnostic abilities, which may have negative implications for future therapeutic treatment. Finally, potential methods to ameliorate the influence of hindsight bias are suggested to guide more sound decisions and enhance societal efficiency.

Keywords: hindsight bias, finance, legal decisions, medical diagnosis

1. Introduction

First substantiated experimentally by Fischhoff in 1975, hindsight bias is an ingrained propensity for people to overestimate or overstate how much they did know about an incident before the truth is unfolded [1], or in other words, the inability to recall “feelings of uncertainty” prior the event and the process whereby a known outcome is deemed more inevitable only after its occurrence [2]. Also recognized sometimes as outcome bias or “creeping determinism”, hindsight bias is triggered by various stimuli and demonstrated through different mediums, which incorporates visual, auditory and gustatory judgements. With its complexity and widespread coverage across different cultures and age groups [3], hindsight has arisen the passion of researchers from a myriad of disciplines and domains.

The essay mainly revolves around five sections: the subsequent section reviews past representative literature and theoretical branches that articulate the rationale behind hindsight bias. In section 3, three applications of hindsight bias in the financial, legal and medical sector are discussed in detail alongside possible solutions. Section 4 briefly tackles the essay’s limitations and future outlook, while Section 5 encapsulates succinctly the dimensions of the proposed researches and applications.

2. Literature Review

Heterogenous theories exist to elucidate the mechanism of hindsight bias, yet there has not been a unanimous consensus regarding its classification. Nevertheless, the widespread theories can generally be categorized into three umbrellas: memory, reconstruction bias, and motivation.

2.1. Memory

One theoretical branch of hindsight bias revolves around memory distortion, a form of memory impairment featured by a failure to correctly recollect one's original prediction after learning about the actual outcome. Framed by Fischhoff and Bernstein in 2012 as automatic assimilation, the first theory within this umbrella indicates that the correct answer or outcome could be encoded by the brain almost effortlessly, which is also concomitant with the fact that people still exhibit hindsight bias even when reminded to avoid it.

The second memory-based principle, the trace strength hypothesis, was proposed to illustrate how the magnitude of hindsight bias depends on the relative trace strength of the original memory and correct answer in one's mind, with a lower accessibility of one's former prediction if the memory trace of the correct result is significant [4]. Meanwhile, another strand known as the recollection bias asserts that getting informed of the correct outcome may hampers one's ability to recall the original answer since it may overlay the initial prediction [5].

2.2. Reconstruction Bias

The second conceptual framework assumes that the reconstruction procedure of foresight knowledge is inclined towards the correct answer. One possible construct is similar to anchoring, when one utilizes the correct answer as an anchor and make adjustment accordingly, hoping to attain the initial response, but often does so incompletely.

Reconstruction bias may also be triggered by biased memory research, whereby the procedure of memory search is guided by the correct answer towards content relevant to the answer. In 2012, Yopchick and Kim conducted an experiment, dividing participants, as evinced by Figure 1, into control groups (given only the scenario e.g., a battle between the Hutu and the Tutsi) and hindsight groups (additionally given the ultimate outcome and additional information, e.g., the Hutu was equipped with "superior troop discipline") [6]. Participants were prompted to foretell the likelihood of Hutu and Tutsi winning the battle from the perspective of a "naïve" participant uninformed about the outcome. If the "correct" outcome was that Hutu won (which was consistent with the additional information), participants in hindsight were found assigning a greater probability to the correct outcome from a naïve perspective than their counterparts in control groups. This displays a tendency for the "true" result to act as a "retrieval cue" that directs people's reconstruction of previous memory or estimation towards information that accords with the answer. Conversely, if the "incorrect" answer (The Tutsi won) appears contradicting the given information, a reverse hindsight bias occurs, which shows how the relevancy of information also plays a role in shaping the extent of hindsight bias.

Another construct known as the metacognitive regulation theory centers around how adjustment towards the true result depends on the degree of surprise and subjects' confidence of their original prediction.

2.3. Motivational Theory

Based on the motivational theory, the third theoretical umbrella, agents misremember their former judgement, which is associated with their proclivity for self-protection and self-esteem. For instance, retroactive pessimism states that when encountering negative outcomes, people perceive the event as

more predictable than they did in foresight to lessen the sense of disappointment [7]. Defensive processing, another contrary idea, discusses how people play down an event's foreseeability in hindsight to exonerate themselves from a questionable or unwise decision [8]. Motivated sense-making theory combines these two principles and proposes that people juxtapose internal and external factors, which is contingent upon the specific outcomes and nature of the surprise.

3. Application in Financial, Legal and Medical Sector

Hindsight bias permeates multiple aspects of our life, casting a huge influence on decision-making, individual learning and societal well-being.

After the 2008 Great Depression, for instance, many professed that they "knew it all along", as if the calamity was indeed inevitable, but many claimed so precisely because it did occur, not that it was knowable in advance. In such incidents, agents are incapable of faithfully keeping their past track record of incorrect forecasts [9], which thereby causes them to underestimate shocks and overstate the event's *ex ante* possibility. In other words, agents, to the detriment of their learning, delude themselves that they comprehend the past very well, which implies that the future would also be foreseeable; whenever something unexpected appears, they immediately alter their perception to accommodate the surprise.

Hence, it is critical to recognize the general patterns in which hindsight bias unfolds, particularly concerning realms that necessitate people to minimize the psychological influence from upshots and make impartial judgement purely based on procedural information. In this section, the application of hindsight bias in finance and investment, legal decisions and medical diagnosis would be discussed.

3.1. Finance and Investment

Numerous psychological factors may arise to dictate people's behavioral trends and reflection in investment, among which hindsight bias plays an integral role. When investing in stocks, for instance, investors routinely adjust portfolios and speculate to allocate their financial capital to various stocks. If the portfolio turns out to be profitable, biased agents would, when subjected to hindsight bias, ascribe such success entirely to one's own skills and astuteness, whereas in fact, the proliferation in stock value may just be the result of luck or a provisional market fluctuation. But investors overestimate the event's foreseeability after the outcome unfolds, and may even blindly adhere to the strategy far into the future believing that they have succeeded in their prophecy. Alternatively, if the portfolio performance appears to be undesirable, biased agents readily arrive at the conclusion that they always knew the occurrence and its ramifications. Even in everyday judgment of the macroeconomic outlook, people, without realization, fall prey to hindsight bias.

In empirical research conducted in the London and Frankfurt, 85 investment bankers were randomly assigned to two groups, with Group B being asked to estimate several unknown variables, such as the decline of Swiss stock market, and Group A in charge of forecasting the average Group B responses after getting the actual results [10]. It turned out that Group A's predictions were significantly impacted by the new information, such that compared to the other group's answers, they put forward estimation too similar to the realization, indicative of a hindsight bias with a failure to attain efficient information processing that distinguishes between prior judgement and newly formed perception after the incorporation of new signals.

This pinpoints an extrapolation that in realities, agents' reflection is largely determined by the eventual outcome; investors may irrationally incorporate new information, such as updated announcements, which renders them unable to correctly reconstruct former cognitive processes and causes them to develop a falsely optimistic view of their investment heuristic [9]. If over-optimistic,

investors may undertake more audacious investments and lose out opportunities to gain insights from past mistakes, both of which would damage their financial assets and welfare.

One approach to reduce hindsight bias is to re-contemplate alternative investment outcomes, specifically how the market upswing and downturn that did not occur could have manifested itself in trading markets – this would render the outcomes less inevitable. Besides, diversification may be adopted to reduce the financial loss incurred by an over-confident investor. Just as what occurred in the Enron fiasco, investors conforming to the principle of diversification were hit less by the corporation bankruptcy than those who focused entirely on Enron and claimed that they “knew” Enron’s profitability would endure [2].

3.2. Legal Decisions

Apart from the application in finance and investment, hindsight bias also generates far-reaching impacts with regard to legal decisions. Specifically, jurors and judges frequently encounter a predicament when they are faced with a tragic outcome (injured victims or plaintiffs) and a defendant indicted for wrongdoings. Perfectly aware of the end results, jurors need to counterintuitively downplay the outcome and put bias entirely aside so as to ascertain whether the event was initially preventable and foreseeable from the perspective of the defendant. This process, no doubt, is easily prone to influence from the hindsight bias when the jury unconsciously assumes that the defendant could have forecast the consequences, and in turn, during decision-making, overstates the defendant’s liability, which breaches the impartiality that should have been guaranteed.

In an experiment performed by Hastie, Schkade and Payne, one group of jury-eligible residents, as the foresight group, was asked to judge whether a railroad operator should follow the instruction of not sending trains to a component of railroad deemed as perilous by the National Transportation Safety Board, while another group was asked, after an accident happened, whether the railroad should be held accountable for “punitive damages” [11]. Even though judges were less vulnerable than were jurors, a huge overall variation exists between the foresight and aftermath judgement, signifying a strong hindsight effect.

Similarly, in the criminal justice system, evidence also points towards hindsight bias resulting in a perniciously biased perception towards certain stakeholders in court cases: in a simulation experiment conducted by Bodenhausen, mock jurors were randomly allotted to read archives regarding a criminal trial that delineates either a stereotyped or non-stereotypical offender [12]. Two groups were provided respectively with a guilty and non-guilty outcome about the verdict, and the remainder group was not given any outcome information. Even when instructed to overlook the given outcome, those examining the case found the evidentiary material to be more incriminating (lower likelihood of innocence) if told beforehand that the offender was rendered guilty and less so once informed that there was not a guilty verdict, as shown in Figure 2. Surprisingly, judgement about stereotypic offenses was only subtly affected by the non-guilty outcome information, which shows that sometimes hindsight bias may be overridden by entrenched and conspicuous prejudices.

Table 1: Mean likelihood of innocence and correlated confidence based on stereotypicality of the offense and type of outcome information [12].

	Not guilty	None	Guilty
A. Likelihood of Innocence			
Stereotypic Offense	38.80 (18.27)	36.85 (23.46)	29.40(17.45)
Nonstereotypic Offense	72.60 (21.90)	49.95 (24.39)	38.50 (12.26)
B. Confidence			
Stereotypic Offense	5.70 (2.81)	5.60 (2.56)	6.10 (2.34)
Nonstereotypic Offense	6.50 (2.56)	4.30 (2.45)	5.55 (1.67)
Note. n per cell = 20; standard deviations are parenthesized.			

Both experiments have implications due to a high likelihood that they could translate into to real-world scenarios during court decision-making: jurors and judges become susceptible to the eventual outcomes of a criminal case, such that they struggle to ponder only what was known before the time of incidence without subconsciously judging its foreseeability from the present.

Antidotes to mitigate the influence of hindsight bias have also been investigated experimentally, though many were conceived to be either nonviable or ineffective. A partially effective approach – the “attorney close arguments” – was propounded by Stallard and Worthington as a debiasing tactics: the defendant endeavors to focus the attention of subject-jurors on an earlier time frame by first informing them of the plaintiff’s attempt to make them become “Monday-morning quarterback” and then requesting them not to judge the defendant with hindsight [13]. This tactic served as a departure from conventional techniques like the provision of jury instruction brought up by Wexler and Schopp in 1989, and was regarded as more effective.

3.3. Medical Diagnosis

Another significant implication associated with hindsight bias comes down to its possible deleterious effects on retrospective and future medical diagnosis. A potential impediment to medical mastery may result from diagnosticians’ deep-rooted mindset that they always “knew” that a specific treatment would work, even when the feedback they obtain differs drastically from what they have initially selected for diagnosis, so they were obstructed from gaining from experience and refining their medical expertise.

To comprehend how hindsight bias could diminish the educational benefits medical settings could bring, a quintessential study with respect to clinicopathologic conference (CPC) is examined [14]. A junior physician, after studying a pile of files regarding a departed patient, presents his inferences – including several diagnoses – in front of the seniors and discloses the diagnosis he or she believes is the most possible one, and a pathologist would then announce the correct answer. After different hypotheses are declared, the first half of the audience was asked to estimate the likelihood of each of these diagnoses being correct, whereas the second half would, after the true result was proclaimed, assign the probability to each diagnose as though they were uninformed of the answer.

It appeared that a clear hindsight was present: in three of the four diagnostic groups in different CPCs, the hindsight audience deemed the correct diagnosis as more probable compared to the foresight subjects, with an average disparity of 12 percentage points. In this case, the bias decreases the educational value of CPCs, through which the audience was supposed to learn and reflect, instead of falsely believing that their estimation would be relatively accurate had they’ve been asked to present before the truth was revealed. With hindsight bias, audience members may denounce the presenting physician for not deducing the answer “readily”, since retrospectively, they think the

answer is intuitive. Although this was a medical occasion not encountered daily, the rationale and influence the hindsight bias could exert on judgement, especially its impediment of learning, is analogous in other settings.

A similar result (large foresight-hindsight difference) was obtained by researchers after comparing the performance of physicians that read an unlabeled case history with those given a specific medical history and asked to state the probability they would have assigned if asked in advance [15].

Considering the robustness of hindsight bias in diagnosis, rather than directly exhorting novice diagnosticians and psychiatrists to circumvent hindsight bias, medical institutions may instruct them to generate and list down why alternative diagnoses may have been possible, which may boost their recognition of the case's difficulties and realization of the instructive value of the correct answer.

4. Future Outlook

The article captures the fundamentals of hindsight bias in realms with profound implications, yet some limitations remain to be tackled in future. For instance, some of the experimental studies adopted for discussion feature highly controlled environments and scenarios, and perhaps a comparison of the results from artificial and naturalistic conditions or within-subject and between-subject designs could serve as an effective supplement. It remains for the ensuing investigation to introduce typical studies targeting a wider segment of the society, within broader geographical and cultural contexts and through more varied forms, such as gustatory stimuli that triggers hindsight bias. Moreover, more numerical illustration and data could be included when it comes to evaluating the validity of experimental results with respect to hindsight bias.

5. Conclusion

Overall, it could be seen that hindsight bias is a complicated cognitive error that brings a series of ramifications, including myopia, excessive confidence, and reduced capability to gain from experience. As demonstrated by the article, hindsight bias has significant real-world implications in finance, law, and medicine in which rational decisions may be compromised. Though hindsight bias is, in many realms, unavoidable and deeply entrenched, there are some approaches which, if employed effectively, could attenuate its magnitude and impacts. Further research into the applications of hindsight bias is bound to contribute to more meaningful discourse and yield more desirable results and decision-making, thereby ensuring greater societal welfare.

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