



Behavioral Economics Principles in Action - Cognitive Biases and Heuristics in High-Pressure Sports Scenarios

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Abstract

This paper explores how cognitive biases and heuristics impact decision-making in high-pressure sports scenarios, using the framework of behavioral economics and the dual-system model of thinking. System 1 thinking, characterized by speed and intuition, is examined as a source of biases such as the hot hand fallacy, sunk cost fallacy, and loss aversion, which can lead to irrational decisions under time pressure. Real-world examples, including the 1985 basketball study by Gilovich, Vallone, and Tversky, Tiger Woods' 2008 U.S. Open win, and the 2010 FIFA World Cup final, illustrate these biases. Conversely, excessive pressure can force reliance on System 2 thinking, as seen in Greg Norman's 1996 Masters collapse. The paper argues that the inherent pressures of sports often necessitate quick, intuitive decisions, making athletes vulnerable to cognitive biases, ultimately influencing performance and strategy in critical moments.

Key Words: *Behavioral economics, cognitive biases, decision-making, sports psychology*

Introduction

Traditional economic theory assumes humans make rational choices to maximize their economic well-being. Simply put, according to traditional economics, in an ideal world, people would always make the best decisions based on carefully analyzing the costs and benefits of each option available to them. The

assumption is that rational individuals are unaffected by external factors and emotions and can make decisions based purely on what would benefit them the most. This school of thought is the foundation of several economic theories, concepts, and models from the early years. For instance, Adam Smith, considered the father of modern economics, published his magnum opus and the first modern work of economics, "The Wealth of Nations," in 1776, which included the invisible hand concept (The Chicago School, 2021). According to the invisible hand theory, a person driven by self-interest and rationality will make decisions that benefit the entire economy. Through the freedom of production, as well as consumption, the best interests of society are fulfilled (Ganti, 2024). Many criticisms of rational choice theory exist because people are easily distracted and emotional; thus, their behavior does not follow the assumptions of economic models. However, rational choice theory is still applied across different academic disciplines and fields of study.

In light of the critique of the traditional school of economics, behavioral economics, which combines psychology and economic theory to examine why people make irrational decisions sometimes, was introduced as a field. While according to rational choice theory, the rational person is unmoved by emotional factors, behavioral economics acknowledges that psychological factors also influence the actions of individuals and can lead the individual to make irrational decisions (Hayes, 2019). While normally applied in the economic market, behavioral economic principles can also be applied to understand decision-making in sports since decisions made during a sports game are primarily quick and spontaneous and are not always rational. Just as economic decisions are influenced by cognitive biases, time pressure, and heuristics, athletes may face similar challenges when making quick decisions during games (Cherry, 2024). Considering the aforementioned, this research paper aims to answer the question: "How do cognitive biases and heuristics influence decision-making in high-pressure sports scenarios?" This paper explores how the principles of behavioral economics can be applied to decision-making in sports, particularly through the lens of cognitive biases and heuristics such as choking under pressure, hot hand fallacy, sunk cost fallacy, and loss aversion - all backed by real-life examples and studies.

The Emergence of Behavioral Economics and the Dual-System Model

In an ideal world, defaults, frames, and price anchors would not affect consumer choices. Our decisions would result from carefully weighing costs and benefits and be informed by existing preferences. We would always make optimal decisions. However, the decade of the 1970s also witnessed the beginnings of the opposite flow of thinking (Samson, 2019). Behavioral economics enhances the explanatory power

of economics because it provides a firmer and more rational psychological basis. Many studies have explored various aspects of behavioral economics, leading to the introduction of the respective principles that pertain to human behavior during the previous 20 years (Rehman, 2016).

Behavioral economics has early roots in the work of Israeli psychologists Amos Tversky and Daniel Kahneman on uncertainty and risk. In the 1970s and '80s, they identified several consistent biases in how people make judgments, finding that people often rely on easily recalled information rather than actual data. Daniel Kahneman and Amos Tversky contributed concepts that have been critical to the development of behavioral economics. The first and most successful such theory is the Prospect Theory, which has had an enormous impact on both economics and social science more generally. Beyond the model's insights, Prospect Theory provides a template for the new class of theories we need. Prospect Theory shows that decisions are not always optimal. Our willingness to take risks is influenced by how choices are framed, i.e., it is context-dependent. This theory complements the expected utility theory, which tells us how people make such choices (Thaler, 2016). While the idea of human limits to rationality was not a radically new thought in economics, 18th- and 19th-century thinkers were already interested in the psychological underpinnings of economic life long before Tversky and Kahneman's work. However, their 'heuristics and biases' research program made important methodological contributions in that they advocated a rigorous experimental approach to understanding economic decisions based on measuring actual choices made under different conditions. About 30 years later, their thinking entered the mainstream, resulting in a growing appreciation in scholarly, public, and commercial spheres (Samson, 2019).

The Prospect Theory was the foundation for the collaboration of psychologists with economists, creating behavioral economics as a distinct field. In the 1980s, Richard Thaler began to build on the work of Tversky and Kahneman, with whom he collaborated extensively (Witynski, 2024). Thaler pointed to the importance of evidence about present bias (the tendency to give greater weight to near-term risks or benefits than to more temporally distant ones) from the field of psychology (Beatty, Moffitt, and Bутtenheim, 2023). He highlighted the importance of psychologically informed economics, later reflected in the concept of 'bounded rationality.' Bounded rationality is the idea that individuals make decisions based on the knowledge they have. Unfortunately, this information is often limited, whether by the individual's lack of expertise or lack of available information. Regarding finance and investing, for instance, the same public information is available to everyone, though investors may not know the true circumstances of what is happening with a company internally (Samson, 2019).

In the last decade, theories regarding the ‘Dual Process Model’ have gained much momentum as various research studies have been conducted in this sphere. The two systems introduced by Daniel Kahneman in his book “Thinking, Fast, and Slow,” have been differentiated by their individual competencies by psychologists; they can be named Systems 1 and 2. System 1 can be explained in terms of implicit, that is, embedded thoughts, which are involuntary and relational, thought processes based on experiences, non-deliberative procedures, and influential links. Simultaneously, the implicit system applies to evaluating pieces of evidence to make decisions that reflect opinions based on perceptions that can be easily obtained. When we think of ourselves, we identify with System 2, the conscious, reasoning self that has beliefs, makes choices, and decides what to think about and what to do. It is explicit; that is, it scrutinizes and analyzes cognitive processes and expresses unconcealed behavior. It is comparatively considered to be more influential than System 1 as it is under control, intentional, purposeful, and based on analysis. System 2 is mobilized with increased effort when it detects an error about to be made.

Systems 1 and 2 are both active whenever we are awake. System 1 runs automatically, and normally, only a fraction of the capacity of system 2 is engaged. System 1 continuously generates suggestions for System 2: impressions, intuitions, intentions, and feelings. If endorsed by System 2, impressions and intuitions turn into beliefs, and impulses turn into voluntary actions. When System 1 runs into difficulty, it calls on System 2 to support more detailed and specific processing that may solve the problem of the moment. System 2 is mobilized when a question arises for which System 1 does not offer an answer (Farnam Street, 2014). The automatic operations of System 1 generate surprisingly complex patterns of ideas, but only the slower System 2 can construct thoughts in an orderly series of steps (Kahneman, 2012). *The division of labor between System 1 and System 2 is highly efficient.* The arrangement works well most of the time because System 1 is generally very good at what it does: its short-term predictions are usually accurate, and its initial reactions to challenges are swift and generally appropriate. System 1, however, has systematic errors that can be made in specified circumstances. It sometimes answers easier questions than the one it was asked, and it has little understanding of logic and statistics. One further limitation of System 1 is that it cannot be turned off. For instance, if you are shown a word on the screen in a language you know, you will read it - unless your attention is totally focused elsewhere (Farnam Street, 2014).

Behavioral Economics in Sports Decision-Making

Athletes often make quick decisions under pressure, relying heavily on System 1 thinking - a mental process driven by speed, intuition, and heuristics. However, this reliance can lead to cognitive biases that impact performance and decision-making.

The Hot Hand Fallacy

The "hot hand" bias, rooted in the representative heuristic, demonstrates how people unconsciously equate recent performance with future potential. This is a classic example of system 1 thinking since it is our brains' automatic and unconscious response to believing in a "hot hand" without logical evidence. The belief in a hot hand is one shared by many gamblers and investors alike. For example, there is data to suggest that the decision of an investor to buy or sell a mutual fund depends largely on the track record of the fund manager, even though there is evidence that this factor is highly overrated. Hence, it would appear that such investors are making decisions based on whether or not they feel the fund managers are "hot" or not (Chen, 2022).

When this fallacy is extended into sports, it commonly reflects the belief that a player on a streak of success is likely to continue performing well despite no statistical evidence supporting this. This is commonly observed in specific sports, such as basketball, but may occur in almost all sports. The prevalence of this bias can impact several decisions made during the play. For instance, players may choose which teammates to pass to with only recent plays in mind. In this way, the hot hand fallacy determines not only the bets placed on a game but also the outcome of the game itself (Pilat and Krastev, 2024).

A study was conducted in 1985 by Gilovich, Vallone, and Tversky; detailed analyses of the shooting records of the Philadelphia 76ers provided no evidence for a positive correlation between the outcomes of successive shots. The same conclusions emerged from free-throw records of the Boston Celtics and from a controlled shooting experiment with the men and women of Cornell's varsity teams (Gilovich, Vallone, and Tversky, 1985). Once again, this exemplifies how System 1 thinking overrides logical reasoning, leading to suboptimal decisions.

Sunk Cost Fallacy

The sunk cost fallacy is a cognitive bias in behavioral decision-making that leads to irrational choices and suboptimal outcomes. This bias occurs when individuals feel compelled to continue investing time, money, or effort into a situation because they have already committed significant resources, even when further investment is no longer rational. Decisions influenced by the sunk cost fallacy often overlook the reality that past expenditures cannot be recovered and should not affect current choices (Galles, 2024).

In sports, this bias can manifest when athletes, coaches, or teams make decisions based on prior investments in a strategy, player, or situation rather than adapting to current circumstances. For instance, a coach may keep a struggling player in the game longer than advisable because of the time or resources spent on their training. Similarly, an injured athlete might continue to compete, prioritizing the effort already exerted over their long-term well-being. A notable example is Tiger Woods, who forced a playoff with a 12-foot birdie putt on the 18th hole and sunk another birdie to win in sudden death, all while playing with a double-stress fracture in his left tibia and a torn left ACL (Gregory, 2021).

This decision, driven by System 1 thinking, exemplifies the sunk cost fallacy in sports. Rather than prioritizing his health and future performance, Woods persisted, influenced by the desire not to "waste" his prior effort and investment in the game. While it showcased his determination, it also highlights how the sunk cost fallacy can lead to irrational choices that compromise long-term outcomes in pursuit of short-term validation.

Loss Aversion

Loss aversion, a cognitive bias in behavioral economics, describes how individuals perceive losses as more psychologically or emotionally impactful than equivalent gains. This bias often drives people to take disproportionate actions to avoid losses, even when those actions increase the likelihood or severity of negative outcomes. For instance, the fear of realizing a financial loss can lead an investor to hold onto failing investments long past their sell-by date or prematurely sell profitable stocks, sacrificing potential gains in the process (Liberto, 2021).

In sports, loss aversion is evident in decision-making strategies where avoiding potential failure takes precedence over pursuing success. This often results in overly cautious or defensive play that can

backfire. For example, in football, teams sometimes "park the bus" - defending deeply after scoring a single goal - rather than continuing to play offensively. While the intent is to protect their lead, this strategy can induce mistake-prone, overly conservative decisions, allowing opponents to exploit vulnerabilities. A notable instance is the 2010 FIFA World Cup final between Spain and the Netherlands. After taking a 1-0 lead, Spain adopted a defensive strategy, holding off the Netherlands but exposing themselves to moments of high-pressure play where errors could have cost them the match.

This illustrates how loss aversion in sports, much like in financial decision-making, can lead to suboptimal outcomes, as the fear of losing outweighs the potential benefits of maintaining a more balanced or assertive approach.

Choking Under Pressure

Most of the time, the time constraint forces athletes to make quick choices based on System 1; there may, however, be some instances where athletes slip up and start actively relying on System 2 - a much slower, more deliberate, and conscious process requiring intentional effort. This shift can place athletes under intense pressure, leading them to overanalyze and ultimately "choke" during critical moments. Physiologically, choking triggers the body's "protection from danger" response, releasing stress-related hormones such as cortisol and adrenaline. These hormones heighten the sense of threat, impairing the ability to process new information effectively and causing athletes to overthink actions that would typically be second nature (Meister and Lavanchy, 2022).

Experts say the chain of events when someone "chokes" typically goes something like this: When people get anxious about performing, they begin scrutinizing actions that are best performed automatically. This heightened self-consciousness under pressure can contribute to a domino-like chain of psychological and physiological reactions that might cause them to underperform, even when their talent or finely honed skills suggest the outcome should be otherwise (Howard, 2016). For example, choking in some form is a huge part of golf. In some cases, that may come in the form of one bad round, one bad hole, or one bad shot. In other cases, it's a career of choking that gets remembered (Dixon, 2011). The University of Chicago sports psychologist who wrote a book called "Choke" and has studied golfers extensively has pointed out that "misdirected" thinking can be as bad for an athlete as overthinking (Howard, 2016). Former professional golfer Greg Norman was prone to that. Greg Norman famously lost a six-shot lead in the 1996 Masters due to "choking." "I could feel the nervousness emanating from Greg," Faldo

said. "He gripped and regripped the club as though he could not steel himself to hit the ball." The aforementioned behaviors were symptomatic of identity threat - a psychological state where self-doubt disrupts performance (Howard, 2016).

In summary, while System 1 thinking enables rapid decision-making, it can also introduce biases like the hot hand fallacy, sunk cost fallacy, and loss aversion, leading to suboptimal choices. Conversely, under pressure, reliance on System 2 can result in overthinking and performance anxiety, underscoring the complex interplay of cognitive processes in sports.

Conclusion

In traditional economic theory, the assumption is that rational individuals make decisions based purely on what would benefit them the most. However, many criticisms of the rational choice theory argue that people are easily influenced by emotions and distractions, leading to behaviors deviating from economic models' assumptions. In response to these criticisms, behavioral economics emerged as a field that combines psychology and economic theory to explore why individuals sometimes make irrational decisions. Israeli psychologists Amos Tversky and Daniel Kahneman contributed significantly to this field by identifying consistent biases in human judgment related to uncertainty and risk during the 1970s and 1980s. More recently, theories around the "dual process" model have gained traction, particularly those introduced by Kahneman in his book *Thinking, Fast and Slow*. The two systems of thinking - System 1 and System 2 - have been differentiated by their functions: System 1 is characterized by implicit, automatic thoughts, while System 2 represents the conscious, reasoning self that evaluates, plans, and decides.

In sports, athletes frequently need to make split-second decisions under pressure, which often forces them to rely on System 1 thinking. This paper has analyzed several cognitive biases that athletes may experience in such situations. For instance, the hot-hand fallacy, the belief that a string of successes increases the probability of future success, can influence decisions both on and off the field. The sunk-cost fallacy, which occurs when individuals feel compelled to continue investing in a strategy because of previously committed resources, even when it is no longer optimal, can lead to irrational decision-making, as demonstrated by the example of Tiger Woods. Similarly, loss aversion explains why individuals perceive potential losses as more psychologically significant than equivalent gains. This can lead to overtly cautious play during competitive games where risks taken could otherwise lead to even greater gains. Finally, choking

under pressure, a phenomenon where athletes freeze and shift from automatic System 1 thinking to more deliberate but often counterproductive System 2 thinking, can lead to suboptimal performance in high-stakes situations.

Thus, behavioral economics extends beyond markets and financial decisions. The same psychological pressures that affect economic choices are also evident in the high-pressure decision-making of athletes. By recognizing these biases, we can better understand how cognitive processes influence human behavior across different domains.

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