The Psychology of Gambling: What Prospect Theory Misses

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"If the spirit has passed through a great many sensations, possibly it can no longer be sated with them, but grows more excited, and demands more sensations, and stronger and stronger ones, until at length it falls exhausted," writes Fyodor Dostoevsky in his 1866 novella *The Gambler* (Dostoevsky, 1866, p. 120).[1] In 2025, nearly half a trillion dollars flowed into gambling activities worldwide. By 2030, an estimated 1.9 billion people will gamble, representing almost a quarter of the world's population (*Statista,* 2023). The American Psychiatric Association (APA) defines pathological gambling as characteristic of "a progression, in gambling frequency and amounts wagered, in the preoccupation with gambling and in obtaining monies with which to gamble and a continuation of gambling involvement despite adverse consequences" (Fanani, 2018). Gambling Disorder is officially recognized in the DSM-5, classified under Substance-Related and Addictive Disorders as the first behavioral addiction included in the DSM (*DSM,* 2025). Prospect Theory, developed by psychologists Daniel Kahneman and Andrew Tversky in 1979, states that people are generally risk-averse when it comes to maximizing gains, but risk-seeking when it comes to avoiding potential losses (Kahneman & Tversky, 1979). Applying this Nobel-winning framework to gambling behavior reveals its limitations. All bets in a casino have a long-run negative expected value because the house always wins. Basic Prospect Theory claims that any agent who seeks to maximize his or her gains is risk-averse, and hence, will never step foot in a casino. What makes gambling such an attractive, even addictive, activity for so many people around the world, even when it defies basic Prospect Theory?

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[1] *The Gambler* is semi-autobiographical; Dostoevsky wrote it in 26 days under a predatory publishing contract to settle his own roulette gambling debts (Frank & Petrusewicz, 2010).

Static Prospect Theory

Prospect Theory does offer some insights into problem gambling behavior. In their 1992 research, Kahneman and Tversky emphasized that people tend to overweight small probabilities. In the case of buying a New York City Powerball lottery ticket, for example, the odds of winning the jackpot are 1 in 292,201,338 (*Draw Games*, 2025). The statistical unlikelihood of this event should immediately deter us. Yet, we naturally overweigh the likelihood of this nearly impossible event. Kahneman calls this the “possibility effect,” which “explains why lotteries are popular. When the top prize is very large, ticket buyers appear indifferent to the fact that their chance of winning is minuscule. A lottery ticket is the ultimate example of the possibility effect. Without a ticket you cannot win; with a ticket you have a chance, and whether the chance is tiny or merely small matters little” (Kahneman, 2011, p. 309). The decision to purchase a ticket offers a sliver of hope as opposed to no chance at all. These two options are almost equivalent. However, probabilistic thinking is not intuitive to the human brain. Our brains deal only with *stories* of what might happen, not the statistical actuality, which leads us to overweigh fractional probabilities. In turn, we seek “long-shot” bets. Furthermore, this tendency is more prominent in gamblers. In their study “Shifted risk preferences in pathological gambling,” Ligneul and other researchers (2013) found that pathological gamblers display an exaggerated probability weighting curve, especially overweighting low-probability jackpots, compared to non-gamblers (Ligneul et al., 2013). In so far as Prospect Theory accounts for the distorted perception of fractional probabilities, it helps explain some gambling behavior.

Dynamic Prospect Theory

> “At one moment I must have had in my hands about 4000 gulden. That, of course, was the proper moment for me to have departed, but there arose in me a strange

> sensation as of a challenge to Fate — as of a wish to deal her a blow on the cheek, and to put out my tongue at her" (Dostoevsky, 1866, p. 25).

Still, static Prospect Theory does not capture the entire scope of gambling behavior. For one, gambles are not one-off decisions. Rather, the gambler tends to place bet after bet, experiencing wins and losses, making gambling a *sequential* activity. In other words, the relationship between the gambler and his bets evolves as the night goes on. A 2023 study of dynamic Prospect Theory published by Tymula and others in *Science Advances* demonstrated that people update their weighing of odds trial-by-trial based on recent outcomes (Tymula et al., 2023). Even when the outcome of a gamble is fixed, humans endeavor to learn from repeated failure anyway. Hence, the gambler constantly reconstructs strategy as he plays. In his 2012 paper "A Model of Casino Gambling," Nicholas Barberis, a behavioral finance scholar at the Yale School of Management, explores this inconsistency. He models casino gambling as *planned* versus *actual* behavior. He explains that Prospect Theory, due to its probability weighing component, generates a time inconsistency in gamblers' plans. To formalize this, he distinguishes three types of agents:

(1) Naive gamblers, who are unaware of this time inconsistency and therefore plan to stop when losing but actually do the opposite once losses mount;

(2) Sophisticated, no-commitment agents, who understand that they would end up chasing losses and therefore rationally refuse to enter the casino at all;

(3) Commitment-aided sophisticates, who are aware of the inconsistency and use commitment devices—such as bringing only limited cash and leaving their ATM card at home—to force themselves to follow their original "stop-when-losing" plan.

At the casino entrance, agents have the intention to "ride wins and cut losses," which gives the initial gamble a positive expected value. For example, a gambler might intend to play roulette; win twice; lose once; and then cash out, walking away with a profit. However, the brilliance of Barberis' model is that it accounts for how the gambler's behavior changes with time. Once play begins, and losing ensues, the gambler instead tends to chase losses, rather than leave according to his original plan. For Barberis, this preference reversal means that the gambler's success is contingent on his ability to manage this underlying time inconsistency. Hence, Barberis' third agent, the "commitment-aided sophisticate," uses a commitment device to force himself to conform to his original "positive-EV" plan. This is equivalent to bringing only a fixed amount of cash to the casino. When you run out, you have no other choice but to walk away. Furthermore, when you win, you know that what you have to gamble with is all you brought, so you should walk away and cash out your winnings. Most gamblers, without a commitment device, fail to follow-through on their initial strategy. Rather, as they play their strategy fluctuates wildly due to a number of different cognitive biases.

The Gambler's Fallacy and Other Cognitive Distortions

> "'Zero has only this moment turned up,' I remonstrated; 'wherefore, it may not do so again for ever so long. Wait a little, and you may then have a better chance'" (Dostoevsky, 1866, p. 78).

The gambler's fallacy refers to the human tendency to believe in "due" outcomes despite independence of events. To illustrate this, at a casino in Monaco, the roulette ball landed on black 26 times in a row. Players began placing increasingly large bets on red, believing it was "due" to appear. The gamblers lost millions as the streak extended to black, which appeared 15 more times (Cognitive Bias Lab, 2025).[2] Probabilistic outcomes do in fact follow the Law of Large Numbers, which states that as you repeat a random experiment many times, the average of the results (the sample mean) gets increasingly close to the true, theoretical average (the expected value) ("Law of Large Numbers," 2025). However, gamblers mistakenly believe the Law of Large Numbers applies to a small series of immediate, independent events.[3] Kahneman calls this fallacy the "Law of Small Numbers," and it represents one of the most powerful forces driving irrational gambling behaviors.

In addition, the near-miss effect motivates impaired decision-making while gambling. Clark and other researchers (2012) explored differences in the effect of "near-misses" on the gambler's brain and healthy controls. These researchers not only determined that across participants, near-misses activated the same components of the brain's reward system that wins

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[2] Hence the name, the "Monte Carlo Effect."

[3] As an aside, even some games with positive EV are actually poor bets. Take, for example, a coin-flip game: Heads means you gain 100% of your net-worth, Tails means you lose 60% of your net-worth. Flipping the coin represents a positive EV bet: you expect to make +20% of your net worth each time. Initially, it seems, the game feels like it should make you endless money; you should flip the coin infinite times. In reality, however, almost all outcomes in this game eventually lead to 0. The multiplicative property of a 50/50 probabilistic event (like a coin flip) means that even though the arithmetic mean of the game is positive (+20%), the geometric mean is negative. To be clear, the arithmetic mean indicates the average expected wealth of playing the game; the geometric mean indicates the median expected wealth of playing the game. In other words, the "average" outcome of the game is heavily skewed by jackpots, and consequently, a seemingly "positive expected value" bet is negatively compounding in the long run.

do, but also, that this neural pattern shows up more strongly in pathological gamblers (Clark et al., 2012). They discovered that the more severe the gambling symptoms, the stronger the midbrain dopaminergic activation to near-misses. This cycle reinforces itself, since near-misses increase motivation to continue gambling, which increases vulnerability to be motivated by near-misses. In fact, casinos exploit distorted reward processing systems by tuning slot-machines to the optimal near-miss frequency of roughly 30% (inverted U-shaped function) (Murch & Clark, 2016). This hijacks our brains to create the subjective experience of constantly *nearly* winning, which leads to continuous play.

The Illusion of Control

> "I always felt certain that I should win. Indeed, what you say makes me ask myself—Why have my absurd, senseless losses of today raised a doubt in my mind? Yet I am still positive that, so soon as I begin to play for myself, I shall infallibly win." (Dostoevsky, 1866, p. 31)

The illusion of control refers to the human bias to believe that greater personal involvement in a random event increases its likelihood. Ellen Langer, a professor of psychology at Harvard University, explains this phenomenon through a model of behavior based primarily on the belief that our own control shapes our reality and actions. This core idea is embedded in psychological models like Self-Efficacy, Self-Determination Theory, and Choice Theory, where believing that you can act (self-efficacy), that you have autonomy (self-determination), and that you choose your responses (choice theory) enable greater alignment with one's goals through self-fulfilling prophecies. Langer's work explores the psychological paradox that underlies these theories of behavior. She emphasizes the role that *feeling powerful* plays in the perception of opportunity. In her 1975 lottery experiment exploring the illusion of control participants were sold lottery tickets. Some got to choose their own number; others were randomly assigned a ticket. Later, everyone was offered a chance to sell back their ticket. Those who picked their own numbers demanded on average $8.67 for their ticket, whereas those with a random ticket were willing to sell for only $1.96 (Nisbett et al., 1980). Gaming companies exploit the illusion of control[4] by implementing daily number games and pick-6 lotteries, in which users can choose their own numbers. This offers a unique sense of personal agency, which causes gamblers to overestimate the likelihood of winning. Orgaz's 2013 study elaborates on this exact cognitive illusion (Orgaz et al., 2013). Participants were put in a situation where they had to decide whether pressing a button turned on a light in front of them. In reality, the outcome was completely random; their actions had no actual effect. Despite this, most participants thought that they were involved in the outcome, causing the light to turn on. Problem gamblers reported a significantly higher perceived control than non-gamblers, suggesting a direct correlation between the intensity of this cognitive bias and gambling addiction. Furthermore, self-chosen gambling outcomes activate different brain regions than computer-chosen outcomes. In Clark et al.'s fMRI slot-machine study, participants sometimes chose the "play" symbol themselves and other times the computer chose for them. Even though the odds were identical, self-choice activated stronger activity in brain regions associated with reward anticipation, including the striatum and anterior insula. Hence, by instilling gamblers with a powerful sense of personal agency in the games they play, casinos exploit the cognitive illusion of control to prolong engagement.

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[4] This also manifests itself in subtle ways like the Henslin Effect, which shows that people throw dice harder when they want high numbers, and throw more softly when they want low numbers (Hayes et al., 2025).

The Pleasure in Anticipation

> "'Again, again, again! Stake again!' shouted the old lady… The wheel whirled around and around, with the Grandmother simply quaking as she watched its revolutions" (Dostoevsky, 1866, p. 79).

Much of the gambler's motivation stems from his desire for anticipation, not actually the outcome. Robinson and Berridge's 2008 Incentive Sensitization Model distinguishes "wanting" from "liking." "Wanting" is defined as incentive salience, craving, anticipation, whereas "liking" is defined as hedonic pleasure from the actual reward itself. Decoupling the two demonstrates that dopamine does not necessarily represent how much you enjoy a reward, but rather, your expectancy for it. Repeated gambling sensitizes the "wanting" system, which makes anticipation of reward increasingly powerful (Robinson & Berridge, 2008). Clark, in another study conducted in 2009, found that gamblers show increased striatal activity in response to gambling cues even before play begins. This refers to the flashing lights and sounds of a slot machine, which produce a huge motivational surge (Clark et al., 2009). Indeed, the mental computations that lead the chronic gambler to the casino may very well be totally independent of outcome. Rather, it is the anticipatory excitement itself that he or she craves. Uncertainty itself has hedonic value independent of outcomes. Gambling provides sustained access to this high-uncertainty anticipatory state.

Gambling as Affect Regulation

> "At eleven o'clock there usually remained behind only the real, the desperate gamblers—persons for whom, at spas, there existed nothing beyond roulette, and who went thither for that alone" (Dostoevsky, 1866, p. 116).

Pathological gambling also functions as a form of self-soothing. Dr. Marc Potenza at the Yale School of Medicine and colleagues (2013) document unusually high rates of chronic pain among problem gamblers, and many describe gambling as a kind of "behavioral anesthetic," where the intense euphoric focus of the game temporarily blunts both physical discomfort and emotional distress (Barry et al., 2013). While gambling, the release of dopamine narrows attention and creates a state of tunnel-vision arousal, pulling cognitive resources away from bodily sensations. At the same time, gambling triggers endogenous opioids that dampen the brain's pain-processing regions, offering a brief analgesic effect similar to the relief produced during risk-taking or thrill-seeking behavior. Psychologically, the dissociative immersion of gambling, which many gamblers call "the zone," reduces awareness of emotional pain such as loneliness, grief, or self-loathing. For individuals with chronic trauma or stress, this immersive state becomes especially attractive because it silences intrusive thoughts and replaces them with a simple, absorbing task. Over time, the brain learns to use gambling as a rapid-acting mood regulator or a way to relieve physical pain. This creates a classic negative reinforcement loop—gambling becomes not just a pursuit of pleasure but an escape from pain, making the behavior far more compulsive and difficult to stop.

In some cases, gambling is masochism in disguise. In 1928, Freud argued that some gamblers "gamble to lose," compelled by unconscious guilt to seek punishment, and Bergler later expanded this view, describing pathological gamblers as individuals who rebel against the reality principle through repeated self-destructive patterns. Modern frameworks of self-harm echo this logic. Gambling now sits alongside eating disorders and substance abuse as a behavior rooted in trauma, neglect, or chronic emotional invalidation. For the user, self-punishment paradoxically relieves the anxiety of anticipated punishment, along the lines of: "I'll hurt myself first, on my own terms." For individuals who cannot cope with warm, non-threatening environments, the volatility, pain, and inevitable failure embedded in gambling provide a familiar emotional landscape, making it a soothing activity.

Conclusion

Prospect Theory offers some valuable insights into how the gambler perceives risk and opportunity. Furthermore, by considering how the gambler's strategy changes over time, Dynamic Prospect Theory more closely approximates gambling behavior. However, this model is not exhaustive enough to capture the full landscape of cognitive, psychological, emotional, and neuroscientific factors that motivate gambling behavior. The result of this paper is that in the act of gambling, the player seeks much more than a risk-adjusted choice, as Prospect Theory supposes. The gamification of this choice, through unique mechanisms like player-choice lotteries and slot-machines, exploit existing cognitive biases like the illusion of control, the near-miss effect, and the gambler's fallacy to make gambling a more compelling activity. Beyond these cognitive biases, gambling offers a form of affect regulation for many, soothing psychological, emotional and (even chronic) physical pain. These motivational factors are embedded in the lived experience of gambling, unique to each individual, and as of yet largely inaccessible by any economic model. This is why, more than a century before Kahneman and other behavioral economists developed their theories, Dostoevsky got it right: "[You gamble] because it is so necessary for you to win. It is like a drowning man catching at a straw. You yourself will agree that, unless he were drowning he would not mistake a straw for the trunk of a tree" (Dostoevsky, 1866, p. 30).

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