WEP
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Publishing

Transactions on Economics, Business and Management Research
ISSN: 2960-1789, eISSN: 2960-2254 | Volume 17
WEPM 2026

Digital Skinner Box: Research on the Interaction Mechanism between Gambler's Fallacy and Availability Heuristic in Labubu Blind Box Consumption in the Algorithmic Era

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Abstract. Labubu's blind box products have continued to move away from their original categorical product properties as toys. Instead, they have become highly volatile financial assets. Conventional consumer psychology perspectives are unable to explain this phenomenon. This study uses neuroeconomics, probability theory, and algorithmic communication studies to assist in integrating various areas of study. Data penetrating the surface shows that the "variable ratio reinforcement" design of blind boxes is by no means a simple random reward, but a precise manufacturing of the dopaminergic system's "prediction error" to maintain addiction. Consumers are deeply mired in "negative expected value" (negative EV) games yet are completely unaware, which is rooted in the cognitive distortion regarding independent events (gambler's fallacy) and social media algorithms using survivorship bias to drastically amplify the "availability heuristic" effect. The two interlock into a closed-loop system of "induction—reinforcement—lock-in," leading to the systemic solidification of irrational decision-making. The article does not stop at theoretical disassembly, but based on bounded rationality theory, evaluates the limitations of the current regulatory framework, and proposes a new path for regulatory governance targeting algorithm auditing and probability visualization design.

Keywords: Labubu, gambler's fallacy, availability heuristic, prospect theory, variable ratio reinforcement.

1. Introduction

In the late 2010s, the blind box economy, by means of the commodification and financialization of "uncertainty," rapidly completed the leap from subcultural collection to global consumption carnival. As a core IP under the command of Pop Mart, the Labubu series, relying on its unique artistic image and pyramid-style scarcity, stirred the market between 2024 and 2025. Data confirms that the premium rate of popular secret items in this series in the secondary market has long hovered between 1000% and 5000% of the original price, with the total market scale breaking through tens of billions of RMB [1]. This declares that Labubu has transcended the category of aesthetic value physical toys, alienating into a "quasi-financial derivative" possessing both high volatility and social attributes.

Under the prosperous appearance is the irrational resource investment made by a large number of consumers against the background where the expected value (EV) is significantly negative. This type of consumption behavior presents obvious addiction, compulsivity, and extreme sensitivity to sunk costs [2]. Traditional utility theory based on the "rational man hypothesis" cannot even justify itself when facing this abnormal behavior. It is not that consumers do not know the probability is minute, but that in specific decision-making contexts, their cognitive systems are precisely invaded by "hackers."

A dual dissection of micro-psychological mechanisms and the macro-media environment is imminent. Although existing behavioral economics research has utilized "Skinner box" theory to explain the reinforcing effect of random rewards, it mostly draws a circle on the ground to confine itself to offline physical probability mechanisms, ignoring the reshaping effect of the digital media environment on cognition. In an era coerced by short videos and algorithmic recommendation, consumers' probability perception no longer solely originates from mathematical statistics, but is deeply distorted by social

media information flows. What kind of interaction relationship exactly exists between specific probability settings (such as 1/144) and specific algorithmic distribution mechanisms (such as survivorship bias content)? How do consumers fall step by step within the neural feedback of "almost won"?

This study intends to construct an integrated model to reveal the interaction mechanism of "gambler's fallacy" and "availability heuristic" in Labubu blind box consumption. The logic of the writing is as follows: first, introduce prospect theory and neurobiological foundations at the theoretical level; subsequently, calculate the real EV of Labubu through mathematical modeling to quantify the degree of consumer irrationality; then, explore how social media algorithms transform into "cognitive amplifiers" to trigger the availability heuristic by manipulating the salience of information; on this basis, this paper proposes a specific "induction—reinforcement—lock-in" vicious cycle model; finally, discarding simple policy listing, use a game theory perspective to deeply evaluate regulatory efficacy, providing policy suggestions for building a healthier consumer market.

2. Theoretical Framework Deepening: From Behavior to Nerves

2.1. Skinner Trap and Dopamine Prediction Error

The biological basis of blind box addiction stems from the "variable ratio reinforcement" mechanism in behavioral psychology. B.F. Skinner proved long ago that compared to fixed rewards, unpredictable random rewards can trigger the most persistent behavioral responses [3]. Modern neuroeconomics pushes this theory to the micro level: the brain does not respond to the reward itself, but responds to the "reward prediction error" (RPE).

$$RPE = ActualReward - PredictedReward \tag{1}$$

In the consumption process of Labubu blind boxes, the high uncertainty before opening the box causes the $PredictedReward$ to be in a fluctuating state. When the result is revealed (whether winning or not winning), the instantaneous fluctuation of RPE stimulates the ventral tegmental area (VTA) to release dopamine to the nucleus accumbens (NAc). This physiological mechanism makes the "incentive salience" brought by the process of "searching" and "unpacking" itself directly overwhelm the "hedonic value" of obtaining the doll object itself. Put plainly, what consumers buy is not the doll, but the pulse experience of dopamine.

2.2. Prospect Theory and Loss Aversion

Prospect theory proposed by Kahneman and Tversky provides a core framework for explaining "chasing" behavior in blind box consumption. The theory holds that individuals are risk-averse when facing gains, and risk-seeking when facing losses. After continuously drawing common items, the consumer's mental account is in a "loss" state. Due to the existence of loss aversion—that is, the pain caused by loss is approximately 2.25 times the pleasure brought by equivalent gain [4], consumers, in order to "break even," tend to continue investing when they should stop. This "recouping" psychology is precisely the direct projection of the gambler's fallacy. It operates at the decision-making level.

2.3. The Duet of Cognitive Biases

This study focuses on the interaction of two core cognitive biases. The first is the gambler's fallacy. This bias stems from a misunderstanding of "randomness." Individuals incorrectly believe that a self-correcting mechanism exists between independent random events. If a certain result (such as a secret item) has not appeared in the near term, individuals subjectively believe that the probability of its appearance in the future will significantly increase ($P_{subjective} > P_{objective}$) [5]. The second one is the availability heuristic. Individuals tend to assess the probability of an event occurring based on the difficulty of retrieving the event from memory (specifically its vividness and recency) [6]. In

traditional offline environments, these two biases are relatively independent. But in the algorithmic era, digital media exponentially amplifies the impact of the availability heuristic through high-frequency pushing of specific content. This thereby consolidates the cognitive foundation for the gambler's fallacy.

3. Scarcity Mechanism: Mathematical Reality and Quantification of Irrational Premium

3.1. Probability Architecture and Expected Value Analysis

The commercial logic of the Labubu blind box series is built upon a strict pyramid-style probability distribution. To quantify the game nature of this mechanism, the EV analysis is employed. Assume the retail price of a single blind box is C (usually 69 RMB), the secondary market recovery price of a common item is V_{common} (usually lower than the original price, about 30-40 RMB), and the market price of a secret item is V_{secret} (high premium).

Taking the standard series as an example, the benchmark probability of obtaining a "super secret" is usually set at 1/144 [7]. Table 1 detailedly displays this probability structure and its implied economic logic.

Table 1. Probability Distribution and Economic Structure of Labubu Blind Boxes.

Category	Probability (P)	Market Behavior	Mental Accounting
Common	1/12 (≈ 8.33%)	Rapid depreciation, poor liquidity	Viewed as "loss" or "ticket fee"
Secret	1/72 (≈ 1.39%)	Small premium, value preservation	Viewed as "small prize" or "recouping"
Super Secret	1/144 (≈ 0.69%)	Extremely high premium (10x - 50x)	Viewed as "grand prize" or "investment return"

Table 1 reveals a cruel reality: the vast majority of results (common items) are accompanied by the instantaneous depreciation of assets. We can construct the EV formula for a single draw:

$$EV = P_{\text{common}} \times V_{\text{common}} + P_{\text{secret}} \times V_{\text{secret}} - C \quad (2)$$

Since P_{secret} is extremely low, and V_{common} is significantly lower than C, the calculation result often points to $EV < 0$. This means that from the perspective of a rational economic man, blind box consumption is a negative-sum game. But the reason consumers continuously invest is that their subjective decision weight severely deviates from objective probability.

3.2. The "Dian Dao" Myth: The Cognitive Collapse of Independent Events

Under a highly uncertain probability mechanism, consumers attempt to find certainty through pseudoscience, among which the most typical is the "Dian Dao" (padding the knife) theory. This theory superstitiously believes: if previous purchasers continuously drew a large number of common items (i.e., "Dian Dao") in the same vending machine or the same box, then the probability of subsequent purchasers drawing a secret item will significantly increase.

From a statistical perspective, this involves a fundamental misreading of sampling modes. If it is an online infinite inventory mode, its mechanism approximates sampling with replacement, where every draw is an absolutely independent event, and previous results have no influence on subsequent ones. Even in the offline limited inventory mode (sampling without replacement), although $P($ Secret |

$_{\text{Failures}}$) theoretically rises weakly as the denominator decreases, this must be established under the strict premise of a "closed sample space" and "known total number." In reality, the random restocking mechanism of blind box vending machines and the opacity of backend inventory make this calculation completely invalid. Consumers deeply affected by the gambler's fallacy incorrectly view an "uncertainty system" full of noise as a precise "self-correcting system," thereby generating a strong illusion of "must win on the next box" after continuous failures. This illusion not only maintains purchasing behavior but further leads to an exponential escalation of the amount invested.

4. Algorithm as Cognitive Amplifier: Digital Reshaping of Availability Heuristic

4.1. Algorithmic Survivorship Bias Mechanism

While probability design serves as the foundation for the blind box economy, social media algorithms provide the platforms with their lifeblood — they circulate misinformation and false hopes throughout the online community. On platforms such as TikTok and Xiaohongshu, the content surrounding Labubu has been widely disseminated through social media algorithms, creating a large number of algorithmic survivors (i.e., those viewers who were able to locate their desired product from Labubu through this method).

The core goal of platform recommendation algorithms is to maximize user time spent and engagement rate. Research shows that high arousal emotional content is easier to obtain clicks than neutral content. Thus, algorithms naturally tend to push "European emperor moments" (i.e., the moment of unboxing a secret item), automatically filtering out thousands of boring common item unboxing videos. This mechanism leads to severe distortion of the information environment. For the viewer, the "winning rate" they perceive is not the objective 1/144, but high-frequency imagery purified by algorithms. This bias can be expressed by the following formula:

$$P_{\text{perceived}} = P_{\text{objective}} \times A_{\text{lgorithm\_Boost}} \tag{3}$$

Wherein, $A_{\text{lgorithm\_Boost}}$ is the amplification coefficient determined by the frequency of social media exposure, usually far greater than 1.

4.2. Vividness and Flashbulb Memories

According to the availability heuristic, the ease of memory retrieval determines probability assessment. Unboxing videos are often accompanied by exaggerated sound effects (screams), special visual editing (slow motion, special effects), and fanatical interaction in the comments section. These audiovisual elements form extremely strong "flashbulb memories" in the brain's hippocampus and amygdala. When consumers stand before an offline blind box machine to make a decision, what is preferentially retrieved in their minds is not dry statistical data, but the vivid images of those highlight moments in the videos. This ease of retrieval directly overwhelms rational calculation. The cold low-probability reality in Table 1 is vulnerable to a single blow in the face of vivid memories.

4.3. The Spread of Pseudoscience and Illusion of Control

The algorithmic environment also boosts the viral spread of pseudoscientific techniques such as "shaking the box," "weighing," and "pinching the box." Although Pop Mart has balanced tactile differences through technical means like weighted coins, "weight guides" precise to the gram still circulate on the network [8]. When consumers accidentally achieve success through these techniques, they tend to publicize it widely on social media; such individual cases are infinitely magnified under the blessing of algorithms, further reinforcing the group's "illusion of control." Consumers mistakenly believe they have mastered the key to cracking randomness through pattern recognition. This belief leads them to psychologically reconstruct a pure game of chance into a perceived game of skill. Consequently, this internal shift greatly reduces their degree of risk aversion.

5. Interaction Model: Dynamics Analysis of the Vicious Cycle

The primary conclusion drawn from this research is that irrational behavior exhibited when consuming Labubu is caused by a series of interrelated factors forming a "cycle of induction, reinforcement, and lock-in". The cycle starts when social media platform algorithms initiate the process. The algorithms produce “availability” heuristics by highlighting success stories of Labubu users and prompting users to think that they, too, can experience the same success. While the highlighting creates trends, most importantly, it diminishes the potential user's perception of risk, creating an invitation to become a consumer of Labubu.

Once a user has joined Labubu through induction, they enter the reinforcement cycle by actually purchasing Labubu and continuing to receive many experiences of winning common items (failures). This creates a gambler's fallacy where a user will attempt to mitigate the psychological pain of "loss" (lost money) and ignore the sunk costs associated with Labubu, believing that “a turnaround” will occur in their fortunes. At the same time, the “almost won” neural pathway reinforces the likelihood of an ongoing belief in the efficacy of Labubu [9].

Finally, the user reaches the lock-in stage. While the user thinks about quitting, the algorithm can re-present successful unboxing videos based on the user's recent browsing and search activity. Thus, the external confirmation bias leading to a user establishing a new “bet” is combined with the user’s own internal cognitive bias of believing that they can win a bet (gambler’s fallacy) at some point. Collectively, these biases will remove cognitive dissonance and place the user in a continuous purchasing cycle until the funds are depleted or until the user receives a winning outcome. Therefore, the closed-loop model illustrates how mentally healthy adults become “pathological gamblers” by continuing to “hunt” through a combination of “internal primeval instincts” and “external contemporary algorithms” (e.g., gambling addiction).

6. Regulatory Comparative Analysis and Game Theory Perspective

6.1. China Model: Mandatory Disclosure and Behavioral Boundaries

The State Administration for Market Regulation (SAMR) in China established rules and guidelines to regulate the blind box market through the issuance of the "Guidelines for Rules on Blind Box Business Operations" released in 2023 [10]. This market has recently been gaining momentum and growing out of control. However, the guideline uses a 'command and control' approach to regulatory oversight. The guideline uses a two-part strategy: first, by mandating that the odds be posted, it makes the implicit nature of the odds or probabilities explicit and decreases the risk of the gambler's fallacy; second, by encouraging the use of the 'guaranteed mechanism' (the ability to exchange for a guaranteed item after a predetermined number of tries), it enables the consumer to set up a stop-loss limit on their sunk cost associated with the blind box purchase.

However, from a game theory standpoint, strictly using posted probability becomes limited through the fact that consumers experience "bounded rationality"; when a consumer is feeling emotional and in a "hot cognition" state of mind, often the posted cold probability (for example, 0.69% in Table 1) will be neglected, thus making the utility derived from an information disclosure policy significantly diminished.

6.2. Western Model: Consumer Protection and Gambling Definition

In contrast, the regulatory focus of the European and American markets is more concentrated on "loot boxes" in the field of video games. The UK and EU tend to examine random extraction mechanisms based on the "Gambling Act," focusing on determining whether virtual items have realizable monetary value [11]. In the United States, although the Federal Trade Commission (FTC) maintains concern over misleading advertising based on anti-fraud provisions [12], specialized legislation regarding physical blind boxes lags relatively behind. Labubu's counterfeit and trademark litigation issues in Western markets are even more prominent than probability regulation [13], which reflects

that its regulatory focus remains on intellectual property rather than consumer mental health protection, and a systemic defense against the psychological mechanisms of physical blind boxes has not yet been formed.

6.3. Policy Suggestions: From Disclosure to Algorithm Auditing

Based on the above analysis, future regulation must upgrade from simple information disclosure to deep cognitive architecture intervention. First, regulatory agencies should implement strict algorithm audits, requiring platforms to issue risk warnings when recommending content involving random betting-type commodities, or even forcefully reduce the recommendation weight of such content, thereby breaking the "induction" link in the model. Second, a mandatory cooling-off period should be introduced, setting mandatory waiting times or single-day consumption limits at the payment link, using physical friction to force consumers to return from "hot cognition" to "cold cognition." Finally, visualized probability display should be promoted, requiring not only the publicity of numbers but also the display of probability through intuitive graphics (such as huge failure areas contrasting with tiny success areas), directly countering the bias brought by the availability heuristic. Only through this multi-dimensional institutional design can market failure be effectively corrected.

7. Conclusion

In essence, the phenomenon of blind boxes represents a digital strategy for targeting specific segments of the population based on cognitive limitations inherent in the human species. Within this context, the "digital Skinner box," theoretical approaches related to the economics of gaming, and mathematical analyses pertaining to expected value have been combined to uncover a wealth of information about the manner in which the design of a 1-in-144 chance has been used to perpetuate the gambler's fallacy; the manner in which social network algorithms exploit the heuristics of 'availability' to create a disconnect between perception and reality; and the application of this information to create cognitive arbitrage based upon big data.

This study proposes the induction-reinforcement-lock-in abusive cycle model as a way to understand the shift from traditional forms of market failure caused by asymmetric information to the current model which exploits cognitive biases at a systemic level. Effective regulatory measures must not only provide a means of transparency but must also include an in-depth examination of how algorithms are distributed and the way in which they are designed as well as implement measures through institutional power to buffer consumers' limited abilities to think rationally. Future studies should also incorporate fMRI technology to observe the cumulative effects of content presented to users by algorithms on the reward systems in their brains, thereby offering further evidence regarding what constitutes "cognitive-friendly" business ethical principles.

References

[1] N. Kumar, Labubu statistics (2026) – Global sales data, DemandSage (2026). https://www.demandsage.com/labubu-statistics/

[2] H.R. Arkes, C. Blumer, The psychology of sunk cost, Organizational Behavior and Human Decision Processes 35 (1985) 124–140. https://doi.org/10.1016/0749-5978(85)90049-4

[3] B.F. Skinner, Science and human behavior, Simon and Schuster, New York, 1965.

[4] D. Kahneman, A. Tversky, Prospect theory: An analysis of decision under risk, Econometrica 47 (1979) 263–291. https://doi.org/10.2307/1914185

[5] A. Tversky, D. Kahneman, Belief in the law of small numbers, Psychological Bulletin 76 (1971) 105–110. https://doi.org/10.1037/h0031322

[6] A. Tversky, D. Kahneman, Judgment under uncertainty: Heuristics and biases, Science 185 (1974) 1124–1131. https://doi.org/10.1126/science.185.4157.1124

[7] SmartBuy, what are the chances to get a secret Labubu? The odds range from 1 in 144 to 1 in 720, Alibaba.com (2026). https://smartbuy.alibaba.com/popmart/what-are-the-chances-to-get-a-secret-labubu

[8] Cute Finds, How to find a secret Labubu EVERY TIME (3 pro tricks) [Video], YouTube (2025). https://www.youtube.com/watch?v=riviivQFvzk

[9] L. Clark, A.J. Lawrence, F. Astley-Jones, N. Gray, Gambling near-misses enhance motivation to gamble and recruit win-related brain circuitry, Neuron 61 (2009) 481–490. https://doi.org/10.1016/j.neuron.2008.12.031

[10] State Administration for Market Regulation, Guidelines on rules for blind box business operations (for trial implementation), Chinese Institute of Food Science and Technology (2023). https://cifst.org.cn/a/news/fagui/20230619/2783.html

[11] J. Woodhouse, Loot boxes in video games (Research Briefing CBP-8498), House of Commons Library (2024). https://commonslibrary.parliament.uk/research-briefings/cbp-8498/

[12] Federal Trade Commission, FTC settlement order bans sales of Genshin Impact loot boxes to kids under 16 without their parents' consent (2025). https://consumer.ftc.gov/consumer-alerts/2025/01/ftc-settlement-order-bans-sales-genshin-impact-loot-boxes-kids-under-16-without-their-parents

[13] Z. Anderson Law, Labubu legal risks: Counterfeits, blind boxes, and consumer law explained (2025). https://www.zandersonlaw.com/blog/is-labubu-just-a-toyor-a-legal-case-study-in-modern-consumer-law