

Availability Heuristic and Probability Misjudgment: Irrational "Hidden Edition Chasing" in Trendy Toy Blind Boxes

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Abstract. Blind box marketing, characterised by its uncertainty and hidden-edition mechanism, is used to encourage customers to buy multiple times in the ever-growing and popular toy industry. Based on the case of Pop Mart, this study uses the availability heuristic and probability misjudgment to explain the psychological mechanism and behaviour of blind box consumption. The analysis suggests that the constant presentation of winning unboxing videos on social media triggers the availability heuristic, leading viewers to seriously overestimate the likelihood of a secret edition and thus repeat and compulsive buying, whereas the non-transparency of probability and the speculation of the secondary market heighten the information asymmetry and reduce consumer trust. Accordingly, targeted measures are recommended, such as compulsory and transparent probability disclosure, cooling-off periods, caps on purchasing, and intervention in the second-hand market. This study sheds light on the paradox of cognitive bias as a force that propels commercial success and simultaneously inflicts harm on consumers, demonstrates the applicability of heuristic theory from the traditional gambling arena to the recent trendy toy market, and offers a theoretical blueprint and practical roadmap for rational consumer choice, ethical corporate marketing, and evidence-informed regulation.

Keywords: Availability Heuristic, Probability Misjudgment, Blind Box Consumption, Compulsive Purchasing, Cognitive Bias

1. Introduction

1.1. Research background

It took less than 10 years for China's popular toy business to expand from a small hobby to a large-scale consumer industry. The retail value of its sales grew at a CAGR of 23.2% from RMB 20.7 billion in 2019 to RMB 58.7 billion in 2024, and is expected to grow to RMB 213.3 billion by 2030 [1]. Blind box is the most typical sales approach in this market. The industry leader Pop Mart reported RMB 13.04 billion in revenues during 2024, more than doubling the previous year, and 46.08 million registered members in the mainland with a member repurchase rate of 49.4% [2]. This

expansion is summarised in Table 1 and serves as the demand base for the blind box model described below [1].

Table 1. China's trendy toy industry market size (2019-2030)

Year	Market size (RMB billion)	Stage
2019	20.7	Early growth
2024	58.7	Rapid expansion
2030 (forecast)	213.3	Projected

This kind of engagement quickly turns into repeat, impulse and bulk buying. In the large-scale survey, a sample of 73, 206 Chinese adolescents and young adults has been associated with increased psychological risks with heavy blind box involvement [3]. Regulators have reacted, and China has mandated that the sellers of blind boxes must state the likelihood of winning items and will not sell them to children under eight years of age starting from 2023 [4]. This paper turns away from the descriptive level and tries to understand the consumer's behaviour to be self-destructive from a financial point of view by relying on the availability heuristic and on probability judgment. The question is significant commercially, as the blind box model is now the primary way to acquire customers in a rapidly expanding business, and socially, as weak-willed young people are the most vulnerable to engineered cognitive bias. To know this mechanism is essential to rational consumption and a more responsible industry.

1.2. Literature review

Studies related to this issue can be divided into two strands. The first studies judgment heuristics: Tversky and Kahneman reported the availability heuristic and the law of small numbers, and Langer reported the illusion of control [5-7]. The second concerns blind boxes and related products: Zhang and Zhang discovered that uncertainty has a positive impact on purchase intention, primarily through emotional value; Drummond et al. demonstrated that blind boxes are similar in structure to gambling; Zhai et al. indicated that blind box buying can lead to gambling disorder; and Wei and Yu verified the existence of gambling psychology in blind boxes, as well as a near-miss effect among collectors [8-11]. However, there is a significant gap. Previous studies on probability judgment have mainly focused on traditional contexts, and the popular toy blind box as a specific context has not drawn much attention from previous research; the existing studies fail to consider the "social visibility" channel of the availability heuristic constantly activated by the algorithm of social media. Little is also known about how firms "design for" these biases, and evidence-based "corrections" to the resulting irrational consumption are limited. This paper fills these gaps.

1.3. Research framework

To fill this gap, this study takes Pop Mart's SKULLPANDA series as a case and builds an analytical chain of "availability heuristic, probability misjudgment, irrational consumption." It first defines the two concepts in the blind-box setting, based on the literature above. It then explores how the bias is activated through product design, marketing communication and channel strategy using the case. It then identifies the issues that arise at the consumer, market and regulatory levels. Lastly, it suggests specific actions such as making consumers aware of the likelihood, providing cooling-off periods,

and educating consumers about the financial activities and consequences of the industry, to ensure more sustainable and responsible development of the sector.

2. Case description

Pop Mart's SKULLPANDA series, which was introduced in 2020, has become a key revenue stream for the company, accounting for RMB 1.3 billion in revenue in 2024 [2]. Each set comes with 12 regular designs and one secret edition, and the probability of obtaining one secret edition is 1/144; the price of one box is RMB 69. The availability heuristic is directly applied in the promotion of the series: the unboxing videos of the secret editions spread widely through Xiaohongshu, Douyin, and TikTok, and the recommendation algorithms continue to show these videos to the same users, making it feel much more common than it actually is to win. The online "draw machine" mini-program simulates a claw machine, making the repeated attempts seem less expensive, and limited releases create time pressure. As Figure 1 shows, Pop Mart's revenue surged from RMB 2.51 billion in 2020 to RMB 13.04 billion in 2024 [2]. Some secret editions have even been sold for more than 100 times the retail price on the secondary market, which also perpetuates the gambling mentality [12, 13]. The same mechanism is also responsible for the problems that follow and are analysed in the next section.

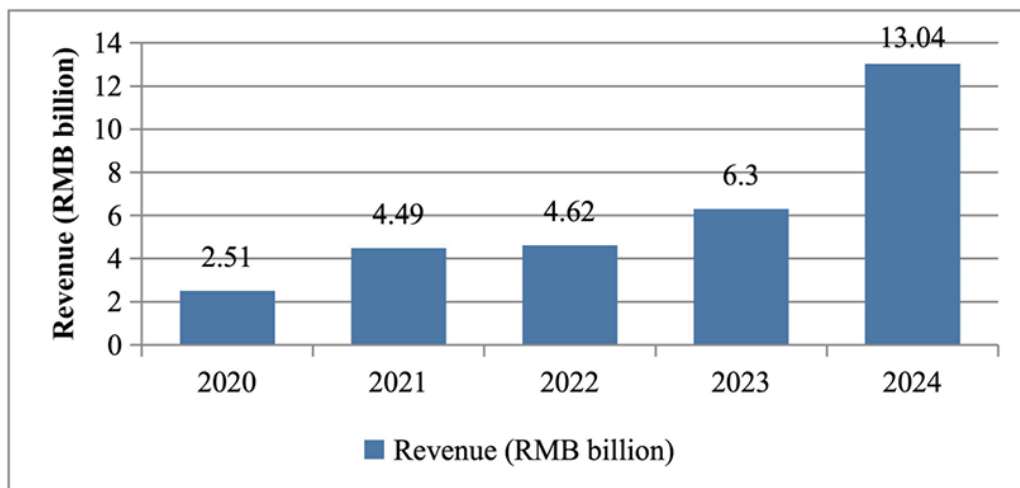


Figure 1. Pop Mart's annual revenue, 2020-2024

3. Double-analysis: commercial value and psychological/ethical risk

3.1. Commercial and social value of the SKULLPANDA blind box case

3.1.1. Emotional resonance and brand premium: IP operations and collectible value

SKULLPANDA illustrates the power this transformation brings as the blind box model transforms a simple toy into an emotional collectible. The series has a strong storyline that isn't a functional use; it is a story of identity and feeling. This is an IP-driven approach that is able to maintain a high brand premium. Pop Mart's gross margin is 66.8% in 2024, which is much higher than that of a traditional toy company, and the number of its registered members in mainland China has increased from 34.35 million at the end of 2023 to 46.08 million at the end of 2024 [2]. Part of the fun is uncertainty. According to Zhang and Zhang, the feeling of not knowing the result is the highest

influencing factor on purchase intention [8]. Each pull will be a surprise and keep the player coming back. There is no doubt that it is a premium that is not due to superior materials. It is the result of a designed emotional experience, a strength and risk in the model, as further sections make clear. Similarly, Mvondo et al. conclude that the blind box approach builds emotional commitment, whilst simultaneously creating risk [13].

3.1.2. Two easy ways to disseminate and keep users: culture and user retention

The SKULLPANDA culture of their product unboxing creates low-cost, self-powered promotion. When a buyer wins a rare design, they tend to publish it online and thus earn social currency. Wei and Yu have seen this directly: users view unboxing videos, swap identical figures with their peers and make collecting a communal social activity [11]. This user-generated content is more trusted than advertising and brings the brand continuous free exposure. The behaviour also increases switching costs. But if a consumer invests in completing a set and is a member of one of the trading communities, it is more likely that they will purchase the next set. The result is that for the brand, they're handing over a lot of their marketing to customers who then share the product and think they are performing a hobby.

3.1.3. Mainstreaming of designer toys

SKULLPANDA has helped turn the designer toy from a niche product to a mainstream product. Young consumers typically have a low entry price, which is usually below RMB 100, so they can easily try the category and gradually upscale to higher-priced product lines. It also enables a complete value chain for artists to be discovered, IP licensed and manufactured, sold, and traded second-hand. However, Pop Mart's efforts to expand overseas indicate that this model is transferable: in 2024, the revenue of its operations outside mainland China increased by 375.2%, and blind boxes have become a niche but prominent means of cultural export [2]. The demonstration effect is worth more than one company for an industry based on IP. It proposes that with a scalable sales mechanism, the emotional design can enable a local creative product to reach the world markets.

3.2. Psychological motivations and ethical issues in consumer behaviour

3.2.1. Availability heuristic and systematic probability misjudgment

The main issue is the bias in estimating probability using the availability heuristic. Great secret-edition pulls are posted on social media, and they're memorable and will stay in people's minds, while the vast majority of failed pulls remain hidden. Tversky and Kahneman demonstrated that "ease of recall" leads to an assessment of likelihood, and a consumer who continually hears "lucky" videos will likely believe that the chances are quite favourable [5]. The real odds of approximately 1/144 (about 0.7%) get lost in the shuffle. This is exacerbated by the "law of small numbers": the buyer thinks that a few observed wins are an accurate reflection of the distribution [6]. Recommendation algorithms make things worse because they provide more of the same, and thus form a kind of information cocoon in which the biased estimate never gets corrected. It's not a random design. It turns a mental shortcut into repeated buying, and it's because the consumer doesn't realise it. The threat here is subtle. While the actual scam is an outright lie, in the case of the

distortion, the seller is telling the truth, and the distortion is in the consumer's own head, which makes it a lot harder to regulate or even recognise.

3.2.2. Irrational consumption and compulsive buying: the gambling parallel

The mismanagement results in tangible monetary and mental damage. The very low chance of the secret edition leads to chasing, as after a few unsuccessful attempts, the consumer feels like they are owed a winning, and continues to buy. This is similar to the sunk cost fallacy and the gamblers' "chasing losses". The proof is no longer just anecdotal. In a study of 73, 206 adolescents and young adults by Duan et al., it is shown that blind box over-engagement increases the risk of suicide [4]. Zhai et al. further demonstrated that problematic blind box purchasing is positively associated with gambling disorder, with "chasing loss" being a key symptom [10]. This comparison to gambling is not rhetorical, but structural. Drummond et al. showed that paid random-reward schemes have similar characteristics to gambling and can be treated as such [9]. Teens are the most vulnerable group, as they are developing the skills of self-control, and the need for immediate gratification is the most challenging. Langer's illusion of control may help account for this: consumers soon feel that if they have an opportunity to make a random selection, their choice, method, or luck can make a difference [7]. This makes buying a purchase seem like a skill game – and that's how compulsive gaming works.

3.2.3. Consumer trust and information asymmetry

The third problem is structural information asymmetry, which undermines trust. Sellers provide a headline probability, which they often don't specify as per box or per case, or that the probability is consistent batch-to-batch and channel-to-channel. All of this is unverifiable by the consumer. There is also a secondary market layer of distortion. Professional resellers use their bulk-buying tools to acquire stock, which they then resell at multiples of the secret edition, a figure that can retail for RMB 69, but can be resold for hundreds or thousands of yuan [13]. This speculation leads to an investment mentality in blind boxes, causing them to draw in even more buyers and further fuel the bubble. Once consumers think they are the victim, it's difficult to restore trust in the brand. The regulatory guidance of 2023 on probability disclosure and safeguarding minors reveals that the authorities are aware of these risks, and the implementation of this guidance remains underdeveloped compared to the creativity of the market [3]. The core problem is that the industry is currently making money as a result of the very bias that is the source of these harms. If a consumer thinks the odds are higher than they actually are, a model that is paid more has little incentive to educate consumers, leaving external rules as the only means to correct the consumer's misjudgment.

4. Governance recommendations for sustainable development of the blind box industry

4.1. Mandatory disclosure of probability and decision support tools

Firstly, the misjudgement of probability needs to be addressed at its source. Regulators should mandate that blind box sellers make explicitly known the probability of each item, as a percentage, on the package and on the purchase page, and indicate whether that percentage is per box or per case and whether or not it is consistently maintained across all boxes or cases. The 2023 Chinese guidelines have already been in this direction, and Japan's gacha industry has already provided a reference for its label [3]. However, disclosure does not suffice; a consumer within the availability

heuristic does not typically take the time to perform calculations. It would thus be possible to have a simple probability calculator in the interface for the draw, so that as soon as a buyer enters the quantity of purchase, the probability of a secret edition is displayed to him. If they could still be proven to deliver approximately a 6.7 per cent chance with ten boxes, then the truth is placed right before the consumer at the precise moment they have to choose. In addition to the platform, educational institutions and consumer groups can help youth buyers become aware of the availability heuristic, making it a lasting tool. This could be supported by consumer education campaigns, using universities, that show how unboxing videos manipulate the odds. These campaigns should be seamlessly woven into financial education programs and warning mechanisms via platforms, and not as a single public service announcement.

4.2. On the regulation of purchase limits and dark-patterns

The second step is to decelerate the behaviour before it becomes "compulsive". Online draw platforms can impose a daily purchase limit and automatically send a cooling-off notice when the buyer hits the limit, just as is done in online games to prevent addiction. More restrictive limits and parental consent should be imposed for accounts that have been verified as minors because the evidence from the large-scale survey indicates that this age group is most at risk psychologically [4]. Equally crucial, platforms need to remove any features that create feelings of scarcity, including countdown timers, low-stock alerts, and other tactics that increase urgency and stifle deliberation. If these dark patterns were removed, they wouldn't kill demand, but they would allow demand to take place on a more authentic basis instead of a fake one. There are already some examples of platforms testing such reminders, indicating the feasibility of the measure, besides the necessity.

4.3. Secondary-market governance and industry self-regulation

The third stage is to regain trust in the market itself. Official second platforms with authentication and consignment service can be set up, thus satisfying the legitimate trading needs of collectors, while professional scalpers would be outdone. These platforms should be on a consignment basis, with seller verification, transaction limits per IP series and price band monitoring to counter hoarding activities on these platforms. If each figure could be traceable in a digital way, such as a scannable code, it would be more difficult to tamper or counterfeit the object, as they would be easily identified. For their part, e-commerce platforms must mark down and de-prioritise abnormally high-price resales, rather than benefit from the speculation. These practices can be coherently linked by industry self-regulation, with an enforceable code of practice prohibiting the misreporting of probability and fake scarcity, and a readily available consumer complaints process. All of these measures need not involve the relinquishment of the blind box model. They want the model to be better designed and more emotionally appealing, not to take advantage of a known bias, which is also the longer-term foundation for the industry's success.

5. Conclusion

5.1. Key findings

This study explored the effect of the availability heuristic and probability misjudgment on irrational "hidden edition chasing" of trendy toy blind boxes, taking the SKULLPANDA series of the Pop Mart brand as an example. The analysis demonstrates that blind box marketing is saturated with

visually striking "success stories" of secret-edition pulls, thus inducing consumers to engage in the availability heuristic and systematically overestimate a probability that is around 1 in 144. This error then leads to repeated and compulsive purchases, and—since buyers believe their own luck or timing might affect the random selection—the act becomes more like a game of chance, which is hard to cease. At the market level, fuzzy disclosure of probability and speculation on the secondary market further exacerbates the information asymmetry and eventually undermine consumers' trust. The paper then suggests three corresponding solutions – enforcing disclosure of probability on a percentage basis, purchase restrictions during cooling-off periods, and regulating the secondary market.

5.2. Research significance

The study is useful in many respects, not only from a practical point of view, but also from a social one. For regulators, it reveals the specific disclosure requirements, cooling-off and protection of minors' provisions that can be implemented. For companies, it is a sign that long-term brand trust is based on competing by design and emotional value—and not on engineered cognitive bias. For the consumers, particularly young consumers, it helps to create a simple guideline to understand when they are buying something due to a mental shortcut and not because of a true preference. More generally, the case is a governance template for the other random-reward business models that are proliferating in games, e-commerce and cultural goods.

5.3. Limitations and future study

The study also has some limitations. It is largely based on secondary data and one case, with the results likely not representative of the diversity of blind box consumers. Future study might be conducted using primary data, such as surveys or experiments, to determine the strength of the availability heuristic effect on probability judgements and might be carried out on different age groups and across varying cultures. This would provide a more accurate foundation for regulators and educators to inform the industry towards its healthy development.

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