

An Overview of Underlying Gambling-Related Psychological Features of Loot Boxes

Leyan Zheng

Institute of Psychiatry, Psychology & Neuroscience, King's College London
4 Windsor Walk
London, United Kingdom
Leyan.zheng@kcl.ac.uk

Leon Xiao

School of Creative Media, City University of Hong Kong
Run Run Shaw Creative Media Centre, Level 7
18 Tat Hong Avenue, Kowloon Tong, Hong Kong S.A.R, China
leon.xiao@cityu.edu.hk

Steve Sharman

Institute of Psychiatry, Psychology & Neuroscience, King's College London
4 Windsor Walk
London, United Kingdom
stephen.p.sharman@kcl.ac.uk

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INTRODUCTION

Loot boxes are in-game randomised monetisation mechanisms, that have been verified to share similarities with gambling (Brooks & Clark, 2019; King et al., 2020). Previous research found the association between loot box engagement and problematic gambling behaviours that people who purchase loot boxes are more likely to experience gambling problems (von Meduna et al., 2020; Wardle & Zendle, 2021), and longitudinal evidence suggests that non-gamblers' loot box spending can predict subsequent gambling initiation (Palmer et al., 2025). Although prior studies documented the complexity of loot box design based on random reward mechanisms (Ballou et al., 2022), the existing Loot Box Features model (LoBoF v0.1) was organised around procedural and structural characteristics of loot boxes rather than the psychological mechanisms that may drive excessive or harmful spending. Therefore, this study aimed to develop a new framework that systematically integrates gambling-related psychological factors with loot box features, categorising them into psychologically meaningful domains grounded in gambling psychology.

Based on the LoBoF v0.1 model (Ballou et al., 2022), established gambling psychology literature, and researchers' lived experience, we developed a codebook identifying 23 gambling-related features capturing six domains: (1) monetary manipulation & investment, (2) psychological manipulation, (3) sensory gambling cues, (4) fear-of-missing-out mechanics, (5) reward structure & probability systems, and (6) social dynamics. The domain structure represents an original contribution distinct from LoBoF v0.1, as our domains are organised according to underlying

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psychological mechanisms rather than procedural characteristics. The initial framework and codebook were pre-registered on the Open Science Framework (<https://osf.io/zd5y2>). We conducted a coding exercise on the first hour of gameplay content from 20 top-grossing mobile games on Google Play identified by Chen et al. (2025), excluding social casino games. Two researchers co-coded an initial subset of five randomly selected games separately to assess inter-rater reliability, and refined the framework before the first reviewer applied it to the remaining titles.

All six domains appeared in the sample. Currency conversion and monetary investment were universally present (100%), followed by limited discounts and VIP schemes (both 90%), variable-ratio reinforcement and rarity (both 85%). The near-universal co-deployment of variable-ratio reinforcement, sensory feedback, and rarity stratification suggests that top-grossing mobile games might employ a standard baseline package combining operant reinforcement with sensory amplification and reward stratification. Notably, pooling, batch pulls, and progression influence may create a perceived sense of control over inherently random outcomes, which are similar to cognitive biases documented in gambling research (Clark & Wohl, 2022). Losses disguised as wins, manifested through duplicate handling and undesirable target handling, were also frequently observed. Beyond individual feature prevalence, we observed frequent co-occurrence of features. For instance, near-miss effects often appeared alongside losses disguised as wins, and pity mechanics were commonly combined with batch pulls and limited discounts. These patterns suggest that high-grossing games do not rely on a single psychological mechanism but deploy features across multiple domains simultaneously, consistent with the structural characteristics literature arguing that design features operate cumulatively rather than independently (Parke & Griffiths, 2006).

Overall, this study developed a framework to link the features of loot boxes to established gambling-related psychological mechanisms, serving as a complementary tool to the LoBoF v0.1 model rather than a replacement. The LoBoF v0.1 was designed for descriptive auditing of loot box systems while the present framework is intended for theory-driven hypothesis generation in empirical research on player cognition and behaviour. The refined codebook, with operational definitions and justifications for each feature, offers a practical tool that can be applied across time, platforms, and cultures to support future quantitative research examining specific feature clusters and player outcomes. Several limitations should be noted. The first-hour observation window means that features unlocked through extended progression such as advanced VIP tiers and guild systems may not have been captured. Seasonal content tied to specific events was not observed due to the fixed recording window. Haptic feedback could not be assessed through video recordings. Additionally, the theorised psychological functions assigned to each feature remain to be empirically validated as this study demonstrates feature presence but does not test whether they produce the hypothesised effects on players. Future work should empirically examine whether the theorised psychological mechanisms influence player cognition and spending behaviour, use longer play windows, and validate the framework across regions.

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