Addictive UX: Heuristic Evidence from Online Gambling UX and the Need for Ethical Guidelines

Gessé Evangelista[1]

Federal University of São Carlos (UFSCar), São Carlos, SP, Brazil
gesse.pereira@estudante.ufscar.br

Abstract. With the rise of online gambling platforms, concerns have emerged regarding the intensive use of UX Design strategies that foster compulsive engagement. This article critically examines how these platforms apply usability, playability, and behavioral persuasion heuristics to keep users active, often by exploiting cognitive vulnerabilities. Through an adapted heuristic evaluation, five platforms were assessed for the presence of patterns such as sensory reinforcement, variable rewards, artificial scarcity, and the absence of protective barriers. The results indicate a standardization of UX practices oriented toward user retention, raising significant ethical concerns. As a contribution, the article proposes the beginning of a broader discussion on the need for more ethical and conscious design practices in high-risk digital environments.

Key words: Addictive UX; Online Gambling; Ethical Design; Heuristic Evaluation.

1 Introduction

In recent years, increased internet access and the widespread adoption of mobile devices have driven the growth of online gambling platforms [6]. Digital roulette and slot machine games have become especially popular among younger, connected audiences, often propelled by influencers and aggressive marketing campaigns [7]. This sociotechnological phenomenon is largely sustained by the sophisticated application of User Experience (UX) Design strategies aimed at maximizing user retention [8].

These platforms employ design elements that go beyond usability or esthetic pleasure [9]. They use techniques such as sensory reinforcement, intermittent reward loops, artificial scarcity, and manipulated social proof—among other persuasive mechanisms—that have been associated with compulsive behavior patterns and the potential development of addiction [12]. While some of these strategies are based on legitimate engagement principles, the lack of transparency and the exploitation of users' cognitive and emotional vulnerabilities raise critical ethical and social responsibility issues in digital product design [2].

Based on the problem described above, a research question (RQ) was formulated: *How are UX Design heuristics applied to online gambling platforms to*

encourage compulsive engagement, and what are the ethical implications of these practices? To answer this question, this article proposes a critical heuristic analysis of five of the most widely used online gambling platforms today, based on a set of adapted heuristics [1][2][3][5]. The analysis is complemented by a systematization of recurring experience manipulation practices, identified as common across the platforms.

As its main contribution, the article aims to initiate a broader discussion on the need for a more ethical and conscious use of UX Design, and potentially, on the regulation of its application in high-risk digital environments. The structure of the article includes: Related Work (Section 2), Research Design (Section 3), Results and Discussion (Section 4), and Final Considerations (Section 5).

2 Related Work

The use of persuasive design in digital products has been widely studied by Fogg [4], who proposed the Behavior Design model to explain and influence users' attitudes and behaviors. Subsequent studies have deepened this perspective by focusing on users' decision-making processes [10]. In this context, the concept of digital nudging emerges as an extension of behavioral economics principles to the digital environment [10]. A nudge represents a subtle push in the user's choice architecture—altering behavior in predictable ways without restricting available options or changing economic incentives—while digital nudging adapts this logic to interface design [2].

Kollmer and Eckhardt [11] show that although nudges and dark patterns rely on the same underlying psychological mechanisms—namely, non-rational influence—they differ fundamentally in intent. Nudging aims to promote user well-being or socially desirable outcomes, whereas dark patterns exploit cognitive vulnerabilities to serve corporate interests. Witte *et al.* [12] go further, demonstrating that manipulative interface practices can lead to negative psychological consequences such as reduced perceived control and increased compulsive behaviors, precisely by crossing the ethical boundary between persuasion and manipulation. The challenge, therefore, lies in identifying heuristic criteria capable of detecting interface elements that, while functionally sound, can be used persuasively or even manipulatively—particularly in environments such as online gambling platforms [2].

3 Research Design

This qualitative and exploratory study applies a critical heuristic analysis to identify UX design elements that foster compulsive engagement in online gambling platforms. Guided by heuristics adapted from classical and modern models, the analysis emphasizes ethical, emotional, and behavioral aspects, following three steps: (1) Platform Selection; (2) Heuristic Construction; and (3) Execution.

3.1 Platform Selection

To select the platforms, a search was conducted on Google Trends[1] using a search *string* ("*online gambling*" OR "*casino games*" OR "*betting*"). For the definition of the *string* a relevance-based selection strategy grounded in semantic clarity, user familiarity, and prior use in academic and grey literature on digital gambling. The terms were chosen because they are widely searched by the general public, conceptually cover key segments of the gambling ecosystem (general betting, gamified casino experiences, and sports betting), and are semantically distinct enough to allow comparative analysis without significant overlap.

The five platforms with the highest and most consistent search interest in the last twelve months were chosen as the relevant and accessible services to users. To ensure neutrality and avoid legal issues, they were anonymized using coded identifiers, as detailed in Table 1.

Table 1. Description of the analyzed online gambling platforms (anonymized).

Code	Neutral Game Description
J01	Game with a simplified visual interface, based on a single-attempt betting mechanic. It presents a playful environment with an animated mascot and immediate visual rewards.
J02	Real-time sports betting platform focused on popular sports. Structured and minimalist interface with advanced betting options and features such as "early cash-out".
J03	Platform with a dark, modern interface aimed at crypto users. Offers fast and simplified games with high unpredictability and animated feedback.
J04	Friendly and intuitive platform for sports betting and daily promotions. Features smooth navigation and vibrant colors.
J05	Local platform targeting a national audience, with strong integration to instant payment systems. Simplified interface with direct appeal and low-complexity games.

3.2 Heuristic Construction

The set of heuristics used in this analysis was developed by integrating four main sources. These include Nielsen's ten usability heuristics [5], which are widely recognized for their applicability across various interface domains; the playability heuristics proposed by Desurvire et al. [1], designed for evaluating interactive and game-based experiences; the taxonomy of addictive elements in games, as described by King, Delfabbro, and Griffiths [3]; and the conceptual framework on dark patterns and manipulative design practices, as systematized by Gray et al. [2]. Based on these foundations, ten adapted heuristics were defined and are presented in Section 4 in Table 2.

3.3 Execution

The study adopted a document analysis approach [13] to systematically review and interpret each of the five platforms, as well as to observe their interfaces and

[1] Google Trends is a public analytics tool by Google that displays the relative popularity of search terms over time. Available at: `https://trends.google.com/trends/`.

the interactive features available. For each heuristic, the presence or absence of corresponding elements was assessed using objective descriptors and observable examples. To illustrate the analytical process, one example can be drawn from Platform J01. During the observation, animations and sound effects triggered after each spin or win were identified as evidence of *H1 – Immediate Feedback and Sensory Reinforcement*, since they provide immediate gratification and reinforce continuous user engagement.

The collected evidence was organized into a heuristic matrix, enabling cross-comparison between platforms and heuristics. All the documentation is available **at this Link**. Subsequently, both quantitative synthesis (occurrence frequency) and qualitative interpretation (critical reading of patterns) were carried out, with emphasis on identifying points of convergence among addictive UX practices.

3.4 Threats to Validity

It is important to acknowledge that this analysis is based exclusively on external observation of the platforms' interfaces and publicly available materials. The study does not include access to source code, backend systems, or internal algorithms. Moreover, although no user testing was conducted, the findings are grounded in a robust body of literature on behavioral design and digital ethics, which supports the interpretation of the identified patterns. This methodological choice ensures analytical rigor while recognizing the inherent limitations of interface-level assessments.

4 Results and Discussion

The heuristic analysis across all platforms revealed a consistent use of UX design strategies focused on maximizing user retention, often displaying persuasive and occasionally manipulative patterns. All ten heuristics were fully present on every platform, indicating a 100% convergence and a shared design logic that favors behavioral engagement over ethical transparency. Full results are in Table 2.

Regarding **Heuristic 1**, all platforms were observed to use sounds, flashing lights, and animations to reinforce actions such as wins, near misses, or simple clicks—establishing immediate sensory reinforcement with strong emotional appeal.For **Heuristic 3**, the use of intermittent rewards, surprise bonuses, and unpredictable elements—such as mystery boxes—fosters engagement loops that encourage compulsive user behavior.

Heuristic 6 was also widely evident: all analyzed interfaces included countdown timers and phrases like "last chance," activating scarcity and urgency triggers that drive impulsive decisions.In relation to **Heuristic 7**, social proof is strategically manipulated through the constant display of messages showcasing alleged winnings from other users, distorting the perception of ease and generalized luck. As for **Heuristic 9**, a notable absence of control mechanisms was found: none of the platforms display warnings about risky behavior or offer

Table 2. Adapted Heuristics for UX Analysis in Online Gambling Platforms.

Nº	Heuristic Name	Adapted Description	Theoretical Basis	Evidence Observed on Platforms
1	Immediate Feedback and Sensory Reinforcement	The game provides instant visual and sound responses to every user action (win, near miss, click), generating immediate gratification.	Nielsen (1994); King et al. (2010)	Flashy animations, vibrant sound effects, and mascots celebrating wins—even minimal ones—reinforcing constant clicking.
2	Illusion of Control	The player is led to believe they influence outcomes, despite the system being essentially random.	King et al. (2010); Gray et al. (2018)	Features like bet amount selection, game speed, or cash-out buttons simulate choice but do not alter randomness.
3	Variable Reward (Intermittent Loop)	The unpredictability of rewards encourages continuous repetition, exploiting Skinner's reinforcement model.	King et al. (2010); Desurvire et al. (2004)	Presence of random bonuses, near misses, and intermittent prizes, keeping the player engaged without predictability.
4	Emotional and Affective Design	Use of characters, colors, mascots, and cheerful environments to create emotional attachment and empathy.	Desurvire et al. (2004); King et al. (2010)	Visual interface with friendly mascots (e.g., tiger), warm colors, and festive settings that humanize the system.
5	Progression and Persistence	Elements like progress bars, daily bonuses, and missions encourage habitual behavior and constant return.	Desurvire et al. (2004); King et al. (2010)	Incentives for daily logins, spin goals, cumulative rewards, and notifications reminding users to "keep playing".
6	Scarcity and Urgency	Limited-time offers and bonuses trigger impulsive decisions and fear of missing out.	Gray et al. (2018)	Countdown timers, "last chance" banners, and time-limited promotions create artificial urgency.
7	Social Proof and Anchoring	Display of other users' winnings, leaderboards, and high-value bets to encourage larger bets.	Gray et al. (2018); King et al. (2010)	Panels show recent wins from other users; high bet amounts are displayed as default suggestions.
8	Low Cognitive Load	Simplified, intuitive interface with continuous flow to minimize critical thinking and maximize impulsivity.	Nielsen (1994); Gray et al. (2018)	Navigation reduced to few buttons, no explanatory text, and visual emphasis on automatic and quick actions.
9	Absence of Warnings and Barriers	Lack of clear messages about losses, usage time, or betting limits. Risks are hidden from the interface.	Gray et al. (2018)	Interfaces do not show excessive usage or accumulated loss warnings. No forced breaks or visible configurable limits.
10	Violation of UX Ethics	Deliberate exploitation of cognitive and emotional vulnerabilities without transparency or user protection mechanisms.	Gray et al. (2018); Nielsen (1994)	Set of persuasive practices without ethical safeguards, such as alerts, voluntary exclusion, or visible limits.

visible configurations for betting or time limits, reflecting a lack of concern for responsible gambling practices. Finally, **Heuristic 10** reveals that the deliberate combination of the above patterns—without any moderation or user protection mechanisms—constitutes a clear ethical risk.

5 Final Considerations

This study examined how UX heuristics are systematically applied in online gambling platforms to foster compulsive engagement. Findings of this analysis directly address the research question by showing that UX Design heuristics are systematically applied in online gambling platforms to foster compulsive engagement. Specifically, the study revealed that design principles originally intended to enhance usability and enjoyment—such as feedback, progression, and emotional design—are strategically adapted to sustain behavioral loops and exploit users' cognitive and emotional vulnerabilities. This convergence of persuasive techniques demonstrates how UX heuristics can be transformed into mechanisms of manipulation when user well-being is not prioritized. Consequently, the

ethical implications are significant, as these practices blur the boundary between engagement and exploitation, calling for critical reflection on the role of design ethics in digital entertainment ecosystems.

In future work, we intend to expand the scope of this study by conducting a broader comparative analysis, including additional gambling and gamified platforms, as well as complementary data sources such as advertising content and user testimonials. This will allow for a deeper understanding of how persuasive and manipulative design patterns evolve in digital ecosystems. Furthermore, we plan to develop and evaluate a heuristics-based assessment framework that can help designers and regulators identify high-risk UX practices and promote responsible design standards. Beyond its academic contribution, this research aims to inform public discussion and ethical guidelines for digital environments where user vulnerability is systematically exploited for profit.

References

1. Desurvire, H., Caplan, M., & Toth, J. A.: Using heuristics to evaluate the playability of games. In CHI '04 Extended Abstracts on Human Factors in Computing Systems (2004).
2. Gray, C. M., Kou, Y., Battles, B., Hoggatt, J., & Toombs, A. L.: The dark (patterns) side of UX design. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (2018).
3. King, D., Delfabbro, P., & Griffiths, M.: Video game structural characteristics: A new psychological taxonomy. International Journal of Mental Health and Addiction, 8(1), 90–106 (2010).
4. Fogg, B.J.: Persuasive Technology: Using Computers to Change What We Think and Do. Morgan Kaufmann, San Francisco (2003).
5. Nielsen, J.: Usability Engineering. Morgan Kaufmann, San Francisco (1994).
6. Wardle, H.: The Lancet Public Health Commission on gambling – industry growth is fuelled by the rise of online gambling, widespread mobile accessibility, and legal reforms. *Lancet Public Health* (2024).
7. Bolat, E., Panourgia, C., Yankouskaya, A., & Kelly, M.: Influencer-driven gambling content and its impact on children and young people: A scoping study. *Current Addiction Reports*, 12, 3 (2025).
8. Galmés-Cerezo, M., López-Aza, C., & Martinez-Navarro, G.: Responsible marketing communication in online gambling: A systematic review of strategies targeting youth. *Review of Communication Research*, 13, 172-191 (2025).
9. Sánchez Chamorro, L.: Ethical tensions in UX design practice: Exploring the fine line between persuasion and manipulation. (2023).
10. Weinmann, M., Schneider, C., & vom Brocke, J.: Digital nudging. *Business & Information Systems Engineering*, 58(6), 433-436 (2016).
11. Kollmer, T., & Eckhardt, A.: Dark patterns: conceptualization and future research directions. *Business & Information Systems Engineering*, 65(2), 201-208 (2023).
12. Witte, J., Kenning, P., & Brock, C.: Consequences of user manipulation through dark patterns. In: *Proceedings of the Forty-Fourth International Conference on Information Systems (ICIS 2023)*, Hyderabad, India (2023).
13. Bowen, G.A.: Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40 (2009).