**Reflection of the mathematical dimension
of gambling in iGaming online content - A qualitative analysis:
Factors influencing the content policies
- Technical report no. 7 -**

Cătălin Bărboianu, PhD

The quality of the content of a website and the extent to which it fulfills the criteria of objectivity, trustworthiness, and consumer-care of the information provided is the direct result of the website's policies, including of course its content policies. For a gambling-related site, the fulfillment of such criteria is tightly related to the expert content the websites are able to provide, including the mathematical dimension of gambling, which is the matter of the current research project. That is because the gambling phenomenon is very complex, and its description and advertising pose sensitive issues regarding understanding, interpretation, and possible effects.

With the previous technical reports, we presented the main insights from the qualitative analysis of the reflection of the mathematical dimension of gambling in gambling-related sites, in its structural, linguistic, epistemic, and informative aspects. In this report we will focus on the factors responsible for the patterns that the content of the gambling-related sites exhibit and the way that the mathematical dimension of gambling is reflected in this content, namely the factors that influence the content policies of these sites.

The report will also point to further directions of research – for both this project and for other investigators – for finding the appropriate balance and relation between the commercial policies on the one hand, and the adequacy and ethics of the content on the other hand.

Introduction

Mathematics is strongly connected to gambling through the mathematical models underlying any game of chance. Mathematics is reflected not only in games' design/characteristics and their outcomes, but also in gamblers' perception and knowledge of the mathematics-related facts of gambling – which influence their gambling behavior.

The math-indispensability principle (Bărboianu, 2013) applies not only in problem-gambling research, but also in the gambling industry. The structural, informative, strategic, psychological, pathological, and ethical aspects of gambling have been

identified to be grounded in the mathematics of games and gambling (Griffiths, 1993; Bărboianu 2014, 2015; Turner & Hobay, 2004; Harrigan, 2009, and others).

Gambling cognitive distortions, language, and miscommunication

Gambling-specific cognitive distortions (in the form of misconceptions, misunderstandings, reasoning fallacies, biases, false or irrational beliefs, or illusions, alone or mixed) are believed to be an important cause of the development of problem gambling and are considered as major risk factors (Lambros & Delfabbro, 2007; Leonard & Williams, 2016, and others). We have analyzed these cognitive distortions in relation to the mathematical dimension of gambling and found that most of them are mathematically related (Bărboianu, 2022, pp. 219-221).

An important element that shapes and influences the aspects of gambling mentioned above, especially cognitive distortions, is language. The language of gambling can be intentionally or innocently misleading, confusing or conflicting, largely due to the mathematical nature of the essential concepts governing gambling, but also to the nature of language itself. The language of gambling unavoidably uses mathematical and mathematically-related terms and as such is a mixed language and therefore predisposed to semantic conflicts. This language may aim toward descriptions of the games, of their associated strategies, for communication between gamblers and between gamblers and experts, and to express any observations or research results in regard to this phenomenon. The fact that some specialized terms belong or are tightly related to probability theory accounts for their conflicting potential in the gambling language, since the concepts of probability theory are sensitive to interpretation, despite their mathematical nature (Bărboianu, 2022, pp. 203-218).

The problematic gambling language manifests in the activity spheres of developers, operators, gambling communities, information providers, experts (including problem-gambling experts), and gamblers' relationships with these people. This language affects the descriptions of games and gambling that the players actually use to become informed about the phenomenon; also affected are the communication between gamblers, and between gamblers and people from the gambling industry or experts as well as gamblers' own conceptual judgments related to gambling.

Goals and outcomes of the study

In this theoretical framework, research is able to derive concrete norms and criteria to adequately reflect the mathematical dimension of gambling in the communication and texts associated with the gambling industry. These norms and criteria of adequacy will be further communicated to policy and decision makers in both governmental and private sectors, with the recommendation for implementation.

Our study aims to evaluate qualitatively the reflection of the mathematical dimension of gambling in the content of gambling websites. This analysis is necessary in order to have an objective and concrete image of the actual state of this matter in the online industry and of the challenges that such research and application would face in the real world of gambling.

Existent gambling-related websites will be reviewed annually for their content in that respect. A statistical analysis will record the presence of the mathematical dimension of

gambling and its forms in the content of participating websites, and a qualitative research will analyze and assess the quality of the content with respect to that dimension.

Methods and technical description of the instruments

The current study is a combination of quantitative and qualitative analysis, in which the latter is predominant and is given the central role.

The participants in the study (gambling websites, through their webmasters) were recruited through online advertising and direct invitations. Given the focus on the qualitative aspect of the study, the sample is not representative for the entire population. Besides, representativeness cannot be established with respect to the specificity of the population (gambling websites) and of the targets of the study.

The criteria of eligibility for participation that we have applied are:
- not having legally prohibited content or advertising;
- meeting the gambling legal requirements;
- having informative content besides the games and games' rules
- being fully operational and navigable.

The quantitative analysis will use basic descriptive-statistics methods, summarizing the data recorded from the sample by standard statistical indicators, with the following main specific variables:

v_1 - the presence of structural descriptions of the games in parametric terms (valued yes/no);

v_2 - the presence of informative sections ('How to' articles, blogs, guides) (valued yes/no);

v_3 - the presence of sections dedicated to odds/probability/math (valued yes/no);

v_4 - the usage of essential math terms specific to gambling (odds/probability, expectation, average/mean, etc.) (valued yes/no);

v_5 - the presence of the definitions of the math terms used (valued yes/no);

v_6 - the correctness of the math definitions used (valued on a scale from 0 to 5)

v_7 - the presence of game strategy topics (valued yes/no);

v_8 - the presence of math-based game strategy topics where applicable (using notions of probability theory, statistics, and game theory) (valued yes/no);

v_9 - the presence of systematic-learning or advanced content of gambling math (lessons, academy-style sections, in-depth guides, etc.) (valued yes/no);

v_{10} - the mentioning of author for math-related articles (valued yes/no);

v_{11} - the match between the math-related articles and their authors' declared expertise (valued on a scale from 0 to 3);

v_{12} - in-text presence of awareness on possible misconceptions, fallacies, and irrational beliefs in regard to gambling (valued yes/no);

v_{13} - the correlation of the above awareness with the mathematical aspects of gambling (valued on a scale from 0 to 3).

The values are conditional on each other as follows:

v_3, v_7, v_9 conditional on v_2; v_5 conditional on v_4; v_6 conditional on v_5; v_8 conditional on v_7; v_{11} conditional on v_{10}; v_{13} conditional on v_{12}.

The qualitative analysis will use as methods discourse analysis, content analysis, thematic analysis, conceptual interpretation, semantic analysis, doubt about sense, and analysis of arguments. It will have a strong component of linguistic-conceptual-logical analysis, targeting the following main elements:

1 - the usage of terms with non-uniform semantics;
2 - the contextual usage of math terms;
3 - the conceptual linkages relative to the relevance for the topic;
4 - the soundness of arguments based on applied math;
5 - the association between game strategy and the concepts of probability theory and game theory;
6 - the presence and contextual impact of "mathematically prohibited" or misleading terms (such as 'winning strategy', 'how to win', etc.).

Although the qualitative analysis is independent of the quantitative one, correlations will be made between the conclusions of the former and the variables of the latter.

Representation of the mathematical dimension of gambling may or may not be adequate in the content of gambling websites. The main goal of the qualitative analysis is to establish the disciplinary areas, as well as their individual roles, which can contribute to the theoretical framework that will derive the norms and criteria for such adequacy in the content of the websites and of the gambling communication. These disciplinary areas entitled for involvement include mathematics, psychology, linguistics, philosophy of language, epistemology, and philosophy of mathematics.

Content and roles of the technical reports

Monthly technical reports describing the partial results of the qualitative analysis will be published on academic channels, preceding the main publication at the end of the study.

Each technical report will cover the review and recording of data from ten websites, which are nominated in the section titled *Appendix*, along with brief descriptions from their owners.

We found such technical reports necessary, first because the current study is atypical in what concerns the statistical analysis and the qualitative analysis, as well as the objects under investigation. Therefore, the main role of the technical reports is to detect and define any methodological and technical difficulties encountered during this study and any challenges they may pose, for them to be analyzed and surmounted in both the continuation of the current study and any future similar research.

Besides presenting these difficulties and challenges, the technical reports will also contain unpredicted observations regarding the analyzed content that might require the revision or change of the methods and instruments used.

The results of the technical reports will be gathered, and general conclusions will be drawn in the main publication.

Observations and conclusions from the review of the current sample

The difference between a website and a traditional publication (like a printed book or magazine article) is that the former is interactive and may serve various purposes besides informing or teaching their readers, including that of selling something. Both these

features (interactivity and commerce) render a website (as an organizational, institutional, or commercial unit) dependent upon their management and responsible in various respects for their relationships with their readers, and as such, both features submit to the ethics of both communication and commerce.

The quality of the content of a website and the extent to which it fulfills the criteria of objectivity, trustworthiness, and consumer-care of the information provided is the direct result of the website's policies, including of course its content policies. For a gambling-related site, the fulfillment of such criteria is tightly related to the expert content the websites are able to provide, including the mathematical dimension of gambling, which is the matter of the current research project. That is because the gambling phenomenon is very complex, and its description and advertising pose sensitive issues regarding understanding, interpretation, and possible effects.

Gambling as a human activity has been found to predispose its participants to harmful social, medical, and psychological effects, falling within the field of problem gambling. This is why every feature of the gambling phenomenon, including in its industrial side, has to be carefully assessed from an ethical perspective.

The communication feature of gambling is very important, especially on the web. The predominant way by which people gamble is through gambling and casino websites, and this form of gambling is even more predisposed to becoming problematic (Mora-Salgueiro et al, 2021). In this picture of online gambling, the gambling and casino websites play an important role in the development of one gambler's behavior as problematic or non-problematic, just because gamblers are offered not only the games they play, but also (where available) information about these games and gambling. This influence by information (or lack of information) of course comes along with the content of these sites.

With our current and past research, we have established the crucial role of the mathematical dimension of gambling in the development of a problematic gambling behavior, especially in what concerns gambling-related cognitive distortions in the form of misconceptions, fallacies, and irrational beliefs.

Our qualitative analysis of the reflection of the mathematical dimension of gambling in gambling-related sites revealed categories and patterns across the gambling-related sites, with respect to how this dimension is reflected in their content. Both the qualitative and the quantitative analyses thus far have found that in most of such websites, this reflection is insufficient, poor, or inadequate, although there are also sites that stand high in this respect.

Why is the mathematical dimension of gambling reflected in the way it is on gambling-related sites? What are the factors that influence the content policies of these sites and have a direct impact on this reflection?

Referring exclusively to content, without taking into account other commercial purposes, we found that content policies are focused on following the most popular Google keyword searches in the gambling niche, for SEO reasons. Such a policy reflects the purpose of attracting more organic traffic; however, in this niche this comes many times at the cost of sacrificing the quality of the content and even making it misleading. In the gambling niche, a wide range of Google searches reflect misconceptions and irrational beliefs. For instance, popular searches are in the form "how to win at…", "how to

increase your odds at…", or "… winning system", which make no mathematical sense. Yet, many gambling-related sites adopted these searches and came to have such wordings in the titles of their articles.

A relevant and popular example of SEO-guided inadequate content is that with the topic like "[what are the] games with the best odds". Non-expert authors developed such content without employing the distinctions between the various meanings of the term 'odds', which is the most important mathematical term in gambling (odds as probability, odds as payout rate, odds as related to house edge). Most of these authors used the term with the latter meaning.

Our partial statistics presented in the fifth report of this research project showed that 11.86% of the reviewed sites included definitions for the gambling math terms they used; only 8.47% of the reviewed sites presented correct definitions.

In general, the lack of interest in having systematic expert content dedicated to gambling math is assumed to have two main reasons: one is the focus on the SEO criterion of following the popular searches (which by the way does not exclude the possibility of having systematized expert content), and the second is the amount of internal resources dedicated to writing (including funds for hiring expert authors).

In regard to the main structure and categories of content, we noticed the prevalence of casino reviews (and sometimes slot games reviews), to the detriment of the detailed description of the casino games. This content policy is the most followed by the affiliate sites (counting 72.29% of the sites reviewed in our study).

The policy is explained by the fact that such sites have to advertise their partner casinos and explain to their users why they should play there, and the only descriptive way to do that is in the form of a promotional review. Given that they earn from referring the casinos, the focus on casino reviews rather than other types of content is economically justified; however, it does not bring many SEO benefits as long as the reviews share similar structure and language across the gambling-related sites.

Gambling is a commercial product (or service, if you prefer) like any other. When buying a product, customers are primarily concerned with its detailed description (characteristics, scope, pros and cons, performance, side effects, etc.) and then with the brands that produce it and stores that sell it. When getting informed about gambling as a product to buy, gamblers should seek in this information not only where to play the games, but also how to play them, what to expect from them, and what possible harmful effects they can produce. Such expert information comes from the mathematical models on the basis of which the games are conceived, their characteristics described in mathematical terms and statistical indicators (including those concerning strategies of playing and their effectiveness), as well as responsible gambling norms and problem gambling awareness. In this respect, most of the reviewed sites limited themselves to include a formal responsible-gambling page, more as a tacit obligation and habit in the niche. A very few of them mentioned playing informed as a responsible-gambling norm, and even fewer related this norm with gambling mathematics.

The economic and ethical principle above suggests that moving the focus from casino reviews to games' detailed descriptions can have only positive effects on a site's authority, as the latter category of content offers plenty of expert information to consider. Managers of gambling and casino sites should never forget that what they are ultimately selling is playing games, and describing the games rather than advertising sellers and brands should be more productive from a SEO perspective.

Our study was based on reviewing the content of the websites and not by administering a questionnaire to their managers. Communication and feedback from webmasters and managers were marginal, but these communications supported our above hypotheses about reasons. A survey in which managers will answer directly a set of questions regarding their motivations and intentions for their gambling content policies would be useful for both confirming our hypotheses and a research extended on gambling websites as organizations and not only as informative units.

With the next reports, we will continue to point to further directions of research in the zone of ethics of gambling and ethics of commercial communication in this niche. We can fairly hypothesize that the results of such prospected research will be fruitful in both gambling studies and more general sociological studies investigating the balance and relation between the commercial policies on the one hand and the adequacy and ethics of the descriptive and advertising content on the other hand.

Appendix – Selective list of reviewed websites

allcasinos.in (reviewed in November 2024)
Platform for independent reviews and guides for Indian gamblers, curated by domain experts.

mypokercoaching.com (reviewed in November 2024)
Site dedicated to poker and other casino games, featuring guides for beginners and advanced players, reviews of poker rooms.

casinohacks.com (reviewed in November 2024)
Site with expert casino and slot games reviews. Casino guide consisting of video lessons.

casinorankings.com (reviewed in November 2024)
Casino reviews and rankings provided by experts. Beginner's guide to casino gambling in both local and online casinos.

legitgamblingsites.com (reviewed in November 2024)
Expert information for the informed gambler. Blog with both casino and sports topics, strategy guides, and casino reviews in several categories.

realmoney.games (reviewed in November 2024)
An extensive guide to real money games, gaming, and gambling. The primary focus is on the different types of games and their variants.

onlinecasinoinfo.eu (reviewed in November 2024)
A guide to gambling in online casinos for players in Europe. Expert picks and reviews for online European casinos.

professionalrakeback.com (reviewed in November 2024)
A guide to online gambling containing expertly-written poker, casino, sports and gambling news, articles, and editorials.

bettingwebsites.org.uk (reviewed in November 2024)
General gambling guide covering sports, casino, gaming, poker and gambling psychology. Aimed at all levels, from beginners guides up to strategy articles for experienced users.

btcgosu.com (reviewed in November 2024)
Bitcoin casino guide with up-to-date reviews of crypto gambling sites alongside analysis of the key aspects of gambling with cryptocurrencies.

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