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Reflection of the mathematical dimension of gambling in iGaming online content: A qualitative analysis
- Fourth technical report -

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In light of the observations and research design presented in the previous reports, the current technical report is focused on the relationship between the quality and specificity of the content of the gambling sites and the site's SEO and marketing policy. This relationship is dependent upon the category of the gambling site and the difference in content quality, and the degree to which the mathematical dimension of gambling is reflected in this content is explained by this dependence.

Site categories (online casino or operator, affiliate, portal, and other) are also subject to analysis in what concerns the adequate sampling for this qualitative research, which was also debated in the previous reports. A new kind of sampling is proposed as related to this taxonomy, as well as an alternative sampling based on treeing the external links of the sites.

A new type of observation was tested and is worth pursuing further, namely the intention of the owners to improve their content with respect to the mathematical dimension of gambling. This brings a new interactive feature of the qualitative research and leads to prospecting a new variable to be employed, reflecting the actual further changes in the content as result of the declared intention.

The cumulated results of the statistical analysis are presented, showing no significant deviations from the previous tendency.

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.

A minimum number of 120 gambling 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

As we found and presented in the previous reports, the general management and in particular the SEO policy of the sites impact directly both the chosen topics and the quality of the content. Staying with the basic taxonomy of gambling sites as online casino (operator), land-based casino site, affiliate, gambling portal, and others (those which do not fall within the first four categories), the following observations have been made:
In regard to expert descriptions of the games and of their functionality, the mathematical dimension of the games and gambling, strategy aspects, and general misconceptions

about gambling (which generally fall within the descriptive role of the variables $v_2, v_3, v_4, v_7, v_{10}$, and v_{12}) are these:

a. The poorest content detected was in the casino sites (offering only the games and affiliation for other sites). Affiliates come after the operators in that ranking.

b. The content with the highest quality and coverage was found predominantly on the gambling portals.

These qualitative results are explained through the different content policies each category of gambling site adopted with respect to their commercial objectives. The categories needing the highest organic traffic are the affiliates. For most of the affiliates, the affiliate sales are the only type of revenue, and it can be fulfilled only if enough visitors land on the site. This is why their policy is focused on SEO, which implies a content policy based on popular searches. But following popular searches does not necessarily mean expert content, but rather titling and heading the content and packing it with keywords to match those searches. The immediate goal for such sites is for a visitor to land on it as result of a good ranking in the searches rather than having that reader leave with adequately explained knowledge and information. We have found the same topic on several affiliate sites, in content with identical keywords and similar headings. The analysis of such texts revealed that the major concern of the editors was to make the text looking unique, for avoiding duplication, rather than coming with something new or incorporating expert content.

Of course, this is not the case with all the affiliates. We have reviewed affiliate sites with quality content and gambling-math sections as well.

The operators are less interested in adopting a SEO policy based on keywords and ranking. The major brands have a natural backlinking from all their affiliates, which automatically increases their Google ranking. Both the large and medium to low operators have their marketing policy oriented toward advertising and sponsoring (in the search engines, press media, gambling portals, major gambling forums, etc.) and their revenue comes from the sales made through their affiliate network. This explains their disinterest in having not only expert content, but even too much content as well. Their visitors are expected to play and not to read about the games.

Therefore, the relationship between the quality and specificity of the content of the gambling sites and the site's SEO and marketing policy is dependent upon the category of the gambling site and the difference in content quality and the degree in which the mathematical dimension of gambling is reflected in this content is explained by this dependence.

The above taxonomy of the gambling sites is analyzed from the perspective of adequate sampling, discussed several times in the previous reports. The idea was to review sites in each category in a certain proportion, as indicates the share of each category on the gambling web market, for having a representative sample. The requirement for such an approach is to identify published statistical reports with this topic, and one of its foreseen shortfalls is the existence of and access to expert directories sufficiently populated with such websites.

Another idea of sampling – staying with the initial 'at random' attribute – was that of 'treeing' a site. This means to follow the external links of a chosen site (directing to gambling sites), include those second-level sites in the review, then moving to the third-level links and so on, eventually stopping at a certain level. Advantages and issues of such a proposed sampling will be analyzed with the next reports.

Isolated professional correspondence with the owners or managers of the reviewed sites took place, having as the main topic the current research. In most of these discussions, we noticed that these persons are open to improving content with respect to the mathematical dimension of gambling. Their declared intentions of incorporating gambling-math content had mainly SEO motivations, that is, on the one hand, to cover as large a range of search keywords as possible in the niche, and on the other hand, to comply with the new Google requirements for authorship and expertise in regard to content.

These observations are worth pursuing further; however, this new interactive feature of the qualitative research would require additional resources to be allocated and also a new variable to be employed, reflecting the actual further changes in the content as result of the declared intention.

The cumulated results of the statistical analysis showed no significant deviations from the previous tendency. If a new kind of sampling is applied, slight deviations are expected to occur.

Appendix – Selective list of reviewed websites

casino.nl (reviewed in February 2024)
Online platform providing information about online and offline casinos in the Netherlands. It offers casino reviews, game explanations, strategies, legal and regulatory updates and responsible gambling guidelines.

onlinecasino.nl (reviewed in February 2024)
Comprehensive guide to online casinos in the Netherlands, providing information on games, strategies, legal updates, and responsible gambling. It offers game reviews and news about the online gambling industry.

blackjackonline.nl (reviewed in February 2024)
Resource providing details on blackjack rules, strategies, and variations. It offers insights into online blackjack gaming options and guides for beginners and experienced players, emphasizing responsible gambling practices.

automatenspieler.net (reviewed in February 2024)
Platform about streamers and online games, operated by gambling experts. Providing German-speaking players with news, guides, and strategies related to online slots and casinos.

beatthefish.com (reviewed in February 2024)
Independent gambling resource, featuring expert strategy, reviews, and in-depth analysis of online poker, casino games, and sports betting.

spikeslot.com (reviewed in February 2024)
Portal for online slot game enthusiasts, featuring reviews and critical analysis of various slot game offerings.

casinosquad.it (reviewed in February 2024)
Italian-centric guide to casino gaming, providing insights into game mechanics and casino gaming strategies.

betblack.it (reviewed in February 2024)
Specialized in sports betting, this site offers strategy guides and insights for a variety of sports betting markets.

spikeslotcanada.com (reviewed in February 2024)
A dedicated platform for Canadian players, offering detailed reviews of slot games and gaming strategies.

spikeslot.pe (reviewed in February 2024)
A resource for Peruvian slot game players, focusing on game reviews and strategies specific to slot gaming.

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