

Diagnostic Algorithms and Problem Gambling

An International Gaming Institute
GlobalScan Special Report

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In a variety of gaming jurisdictions, questions have been asked about the potential for diagnostic gambling algorithms on a casino floor. In this GlobalScan report, we outline these key questions, and then provide some research-based insights and answers.

1. What kinds of approaches are currently in use?

There are several newly developed tools used to track player behavior with the aim of addressing problem gambling, including PlayScan (used by Svenska Spel in Sweden) and Observer (used by 888.com, based in Israel). These approaches have been extensively deployed in online gambling settings, but have not been widely used in land-based gaming settings (Griffiths & Whitty, 2010).

One notable land-based exception is the iCare product, implemented by the Saskatchewan (Canada) Gaming Corporation. The iCare system identifies and tracks high-risk players in real time, notifies casino management of high-risk play, and can track staff interventions with players. Player club card data is analyzed to identify patterns in play, and once high-risk players are tagged in the system, the management system identifies best practices for the staff to follow to interact with the players (Davies, 2007).

The companies who have created these tools claim that they can detect problematic gambling behavior through analysis of gambling data. Developers of these tools also claim that they are based upon a combination of behavioral science, psychology, mathematics, and artificial intelligence. We will examine these claims in the next sections.

2. What has research concluded about these approaches?

Very little has been published in the peer-reviewed research literature on these algorithms in general, and no peer-reviewed articles have directly examined their effectiveness for preventing problematic gambling in particular. This is partly due to intellectual property issues, as creators are perhaps hesitant to subject their work to peer review because the process would entail releasing the algorithm itself.

Unfortunately, however, the result is a dearth of academic articles on the topic.

In fact, there appears to be just one article in the peer-reviewed literature that touches on these specific algorithm issues – albeit indirectly. Griffiths, Wood, & Parke published a 2009 article that relies largely upon self-reported experiences and opinions about PlayScan, the aforementioned Swedish system that includes an algorithm of this type.¹ This article provides *indirect* evaluations of the algorithm's features (by asking some participants how they *feel* about them), but does not provide direct measurements of whether this approach works. Specifically, the authors survey those who had used PlayScan (only about a quarter of all gamblers) about their opinions on the PlayScan features, and whether they felt these features helped them. These are not, of course, objective, direct measurements of efficacy.

¹ The authors appropriately disclose that their work was funded by the developers of the PlayScan program (Svenska Spel).

The authors report that “many features were seen as useful,” though this statement might be a bit optimistic when viewed in context of the overall gambling population. For instance, it would seem that roughly 12-13% of all online gamblers in Sweden (less than half of those who use PlayScan) find the algorithmic “gambling profile” feature useful. Furthermore, even fewer PlayScan users deemed the “gambling profile predictions” feature useful (36% of PlayScan users, or 9-10% of all gamblers, endorsed this feature). While these data tell us little about effectiveness, these data do suggest that the Swedish gambling population as a whole is less than enthusiastic about *using* these mechanisms.

In sum, there is no conclusive evidence that these tools can or do prevent problem gambling, and to our knowledge, these claims are not made anywhere in the peer-reviewed scientific literature.

3. What are the strengths and weaknesses of these approaches?

Strengths of this approach: If these “algorithm approaches” were fully subjected to the rigors of academic peer review, and we could be confident in its effectiveness, it could well provide benefits to those looking to better understand their gambling behaviors. However, as it stands now these are “could” statements – unproven assumptions about the potential utility of this approach.

Weaknesses of this approach: First of all, gambling data does not necessarily tell us much about pathology (in fact, as we will see later, most of the official diagnostic criteria for pathological gambling have nothing to do with gambling volume). Put simply, we cannot equate frequency with pathology: there are many people who gamble often and intensively with no problems at all. Conversely, mistaking low volumes of play for a lack of pathology is also problematic, as many problem gamblers gamble small amounts but suffer substantial problems at home or at work.

Second, in cultures where tracking (and then assessing) gambling patterns conjures up “Big Brother” imagery, this kind of system leaves its promoters vulnerable to public criticism. The United States, based upon our recent research projects, is one of these jurisdictions where these very types of interventions are exceedingly unpopular (Wood & Bernhard, 2010). In Sweden, where the population is more accustomed to government interventions in everyday life, this is perhaps less of a consideration. Depending upon the anonymity of the system (the Swedish PlayScan system, for instance, does not seem to qualify as “anonymous” in the research sense), however, these approaches would increase both user discomfort and potential legal liability.

Furthermore, depending upon “limitations on liability” language and local law, there is potential for liability associated with, for instance, a gaming operator “knowing” that a person is pathological and continuing to serve that individual. And even a small error rate could mean that many players would be given false labels/diagnoses – which itself could lead to liability and ethical concerns. Finally, as we have stated in a previous report, a reasonable question is whether gaming operators should be in the business of diagnosing problematic play at all (Bernhard, Lucas, & Jang 2006).

The unintended financial consequences of these moves should also be considered. Just one month ago, Svenska Spel reported a decline in net gaming revenues for the second consecutive

year (2009-2010). In media reports, Svenska Spel's CEO claimed that this decline was due to the problem gambling measures put into place to limit individual gambling – though he notes that as a state-sponsored organization, profits are not their primary objective (see appendix). Whatever the case, while many gaming jurisdictions are rightfully concerned with responsible gambling, policymakers should also realize that some approaches may have adverse tax impacts.

Most importantly, however, the major weakness is the near-total lack of peer-reviewed research that directly evaluates these algorithms' effectiveness. As we have written elsewhere, without research, even well-intentioned problem gambling policies can backfire and lead to unintended consequences (some of which might harm rather than help their target constituency). In some instances, the "first do no harm" principle has been violated, as was the case in Australia where governments slowed down the reel speed of slots, only to find that problem gamblers played *longer* on these altered devices (Bernhard & Preston, 2004). We would not release a pharmaceutical drug based upon a single peer-reviewed study that asks individuals how they *feel* about the drug, and it seems imprudent (or at least premature) to follow a similar path now with these types of gambling algorithms.

4. What are the key risks of behavioral analysis and predictive algorithms?

As indicated above, liability issues constitute one of the major risks, but there are other reasons for concern as well. In 2006, we were asked to address these risks in a report to the Nova Scotia Gaming Corp (Bernhard, Lucas, & Jang). Though some research has taken place since this time (research we discuss elsewhere in this report), our perspectives on this topic remain valid:

The Difficulty of Diagnosis

Since the earliest days of the pathological gambling field, a search has been underway for a "magic algorithm" that could determine (through a complex calculation based on gamblers' play) who was gambling problematically and who was not. This pursuit is of profound relevance to those interested in responsible gaming devices (RGDs) because this represents a task that RGDs potentially could be called upon to do – should we be confident that this was possible. In this section, we will review these possibilities, and critique the assumptions inherent in making these sorts of arguments.

To those who would want responsible gaming devices "doing more" – i.e., having the machine track play and then "diagnose" a problem gambler based upon his/her wagers, a few considerations need to be taken into account. To review, the DSM-IV lists ten diagnostic criteria for pathological gambling. Five of these criteria need to be met for a diagnosis to be "achieved." Simply stated, the ten criteria consist of the following:

- 1) Preoccupation (excessive thinking about gambling or getting money to gamble)*
- 2) Tolerance (feeling a need to gamble increasingly to achieve a desired state)*
- 3) Loss of control (an inability to quit gambling despite repeated attempts)*
- 4) Irritability/restlessness (when attempting to stop gambling, growing restless/irritable)*
- 5) Escape (gambling to escape from problems)*

- 6) *Chasing losses (after losing, “chasing” those losses by attempting to “win back” those losses with further gambling)*
- 7) *Lying (to cover up gambling activity)*
- 8) *Criminal acts (to support gambling activity)*
- 9) *Family/work problems (due to gambling activity)*
- 10) *Financial bailouts from others (to alleviate financial pressures due to gambling activity)*

Source: American Psychiatric Association (1994)

Certainly the centrality, importance, and value of the DSM are debatable – and vigorously debated. However, it is notable that virtually none of these criteria (in fact, we will argue that not a single one of these) are currently identifiable based upon some calculation made at the machine. In fact, it would seem that virtually all of these would be “invisible” to the gaming machine (indeed, many of these can be challenging to identify even for trained mental health professionals).

To the degree that it has been suggested that any of these criteria can be detected via a mathematical calculation, the two criteria that are often deemed “visible” are chasing losses and (usually to a lesser degree) tolerance. Assuming for a moment that our diagnostic detection abilities were such that we were confident that these two criteria could be accurately detected at the machine, this would still represent only two-fifths of a diagnosis – three other criteria would still have to be met for pathological gambling to be “officially” diagnosed.

However, a closer examination of these criteria indicates that achieving a proper diagnosis of even these two criteria might be overly optimistic. Chasing behavior ostensibly is tracked via machines by observing whether gamblers wager more money after they lose money. Even if we are able to do this, though, a major (and invisible) step is missed: we still do not know whether the gambler has gambled more money after a loss in order to win back losses. It could be, after all, that these betting patterns are taking place for other reasons rather than to “win back” a previous loss (a loss that the patron may or may not recall). This important cognitive step needs to be probed – ideally, we believe, by a trained mental health professional.

A similar concern arises when contemplating the “diagnosability” of tolerance – a perceived need to gamble more where less used to do the trick. Once more, simply observing frequency patterns – a gambler gambling more over time, for instance – is insufficient. For a proper diagnosis, we also need to demonstrate that the gambler is doing this because of a felt or experienced “need.” To use an alcohol analogy, seeing an individual increasing his drinking intake alone does not necessarily mean that we have seen him display tolerance; we need to see him do this to get to the same “place” that he used to get to with less. Put simply, our concerns with the “diagnosability” of this problem in this environment might be summed up as follows: given our current state of knowledge, we cannot equate frequency with pathology.

A further concern even if these behaviors were “diagnosed” are unintended consequences – how would patrons who are misdiagnosed (or even properly diagnosed) react to such a diagnosis? How could we be sure that this sensitive moment was indeed handled sensitively, appropriately, and effectively? To our knowledge, these questions are central, and they have not as yet been adequately addressed.

As such, we would argue that the machine is not at this stage an ideal environment to diagnose a pathological gambler (at least as it can be done via the DSM), and as such, responsible gaming efforts should focus on other ways in which the device might provide tools for responsible gaming. Ideally, diagnosis and treatment are to be done by professionals – machines can provide some tools for responsible gambling, but as the field currently stands, gaming machines are not diagnostic machines (as exists, for example, with health problems from heart disease to brain tumors).

Though the landscape has changed somewhat since this report was released, these remain important points to ponder. Diagnosis of problem gambling is a complex matter (even when it is not guided by a “diagnostic manual” like the DSM) – one that challenges even astute mental health professionals. This challenge was recently highlighted in England, where the Royal College of General Practitioners noted that even trained medical professionals have extreme difficulties in diagnosing gambling problems (see appendix).

As such, there are many reasons to be concerned with the process of conducting a diagnosis (even a seemingly innocuous diagnosis such as “risky gambling”) in a casino, with access to just the information presented in this environment. Based upon our current understanding, we lack the proper research support to embrace this approach – and this lack of research support could create problems even as it attempts to provide solutions.

6. What are the reasonable conclusions that might be drawn at this stage?

While we cannot (and indeed should not) wait for hundreds of definitive studies to be released before embracing approaches that can help problem gamblers, in a field of study with precisely one peer-reviewed study – and one that does not directly measure whether this approach prevents problem gambling – it seems prudent to be cautious.

As we concluded in our 2006 report to the Canadian province of Nova Scotia,

(I)t is our belief that the philosophy ... should continue to be “tools” oriented rather than oriented towards diagnosis or intervention (both of which are complex tasks best done by mental health professionals). The recommended approach, then, is one that provides tools for responsible gambling, rather than one that emphasizes diagnosing (or treating) problem gambling. While more aggressive interventions may someday be possible, it is our belief that today, based upon current knowledge and research, this hope is overly optimistic.

Appendix: Active Intervention in the News (with links)

Svenska Spel (Sweden) two-year decline in revenues attributed to responsible gambling programs [Story](#)

Betfair has a process in place in the case that they recognize patterns of behaviors which are seemingly problematic. [Story](#)

French online gaming regulation requires that operations must provide customers with information relating to the amount of time that has been played and the amount of money a player has staked in a session. [Story](#)

Slot machines in Catalonia flash messages every 30 minutes, warning gamblers of the amount of time they have been playing. Video lottery terminals are programmed to shut off after 90 minutes of uninterrupted play. [Story](#)

The United Kingdom requires that online firms active in their jurisdiction will be required to share information about suspicious betting patterns that may indicate problem gambling. [Story](#)

The Royal College of General Practitioners in the UK has acknowledged that even trained doctors may not be able identify patients with gambling problems, as they are not experienced enough with the diagnosis. [Story](#)

Roman Abramovich (owner of Chelsea Football Club) successfully sued the Italian newspaper La Repubblica for libel damages when they printed a story alleging that he had a serious gambling problem. [Story](#)

References

- Bernhard, B.J. (2007). Sociological speculations on treating problem gamblers: A clinical sociological imagination via a bio-psycho-social-sociological model. *American Behavioral Scientist* 51(1): 122-138.
- Bernhard, B.J., Lucas, A.F., & Jang, D. (2006). Responsible Gaming Device Final Report. Final Report to Nova Scotia Gaming Corp. University of Nevada, Las Vegas International Gaming Institute.
- Bernhard, B.J., & Preston, F.W. (2004). On the Shoulders of Merton: Potentially Sobering Consequences of Problem Gambling Policy. *American Behavioral Scientist*, 47, 1395-1405.
- Davies, B. (2007). iCare: Integrating responsible gaming into casino operation. *International Journal of Mental Health and Addiction*, 5, 307-310.
- Griffiths, M.D., Wood, R.T.A., & Parke, J. (2009). Social Responsibility Tools in Online Gambling: A survey of attitudes and behavior among internet gamblers. *CyberPsychology and Behavior*, 12(4), 413-421.
- Griffiths, M. & Whitty, M. (2010). Online behavioural tracking in Internet gambling research: Ethical and methodological issues. *International Journal of Internet Research Ethics*, 3(1), 104-117.
- Lee, C., Lee, Y., Bernhard, B.J., & Youn, Y. (2006). Segmenting casino gamblers by motivation: A cluster analysis of Korean gamblers. *Tourism Management*, 27, 856-866.
- Wood, R. & Bernhard, B.J. (2010). *Found in Translation: A Multi-method Examination of Responsible Gambling Perceptions*. Special grant-funded report for the Nova Scotia Gaming Corp (government agency regulating gambling in the province), Canada.