

Resolving problem gambling: a mathematical approach

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Abstract: The current model for treating problem gambling is either control your gambling (known as Controlled Gambling) and quit Gambling (known as Abstinence). In Controlled Gambling the patient is allowed to gamble on a limited basis. In Abstinence, the patient in recovery must completely abstain from all gambling. Abstinence is the goal of Gamblers Anonymous and most, though not all, treatment professionals. A new model is devised for treating problem gambling as a generalization of the current model by including Controlled Gambling and Abstinence as treatment possibilities; but also including Optimal Gambling, Correct Gambling and Eradication. The model is based on a process which is trying to maximize the return to the player whilst allowing for the entertainment factor in gambling. The following strategies are now identified:

Optimal Gambling → Correct Gambling → Controlled Gambling → Abstinence → Eradication

The process is a one-way path whereby if a strategy fails for a particular gambler then the next strategy to consider is the next one in line. Every gambler starts at the Optimal Gambling strategy, where the best way to maximize return and gamble is to be playing games where the odds are actually in your favour e.g. card-counting in blackjack. If the Optimal Gambling strategy would not be successful for the particular gambler, then the next strategy would be a new option known as Correct Gambling, where the approach is to allow gambling whilst playing the right games and strategies to minimize losses and to take advantage of the free food and drinks on offer (more commonly known as comp points). Note that this approach allows the gambler to keep playing, whereas in Controlled Gambling the gambler is only allowed to gamble on a limited basis. If the strategies of Correct Gambling followed by Controlled Gambling followed by Abstinence would not be successful for the particular gambler, then the final strategy is Eradication. This could be in the form of moving to a country or state where gambling is illegal or a location which is a great distance (say 100+ km) to the nearest gambling venue.

Casino games are comprised of mathematical formulations which can be found readily in the literature. The percent house margin (or return to player) establishes how much a player is expected to lose in the long run. While the percent house margin is important to consumers (players are consumers of casino games) in determining the choice of games or how long to play a particular game, there is other information which could also influence these decisions. For example, the probability of the consumer ending up in profit after 100 trials, or the probability of the consumer losing more than \$100 after 200 trials, would be valuable information. The analysis of casino games is covered to obtain distributional characteristics of profits, the distribution of profits and the percent house margin. For Correct Gambling, the analysis of casino games consists of poker machines, pontoon, blackjack and video poker.

A consumer's decision as to the choice or how long to play a particular game, may consist of knowing the distribution of payouts. To calculate the distribution of payouts on a poker machine requires the probabilities associated with each particular payout. The probabilities on poker machines cannot be obtained from the playing rules (as is the case with table games), and therefore poker machines could be considered as being "unfair". Mathematical and logical reasoning to poker machine regulations are given as suggestions for amendments to the "the Standard" with the purpose to increase consumer protection.

For Optimal Gambling, the analysis of casino games consists of video poker and blackjack; and a predictions model in tennis is given as another means for optimal gambling. A question that arises whenever a game is favourable to the player, is how much to wager on each event? The famous Kelly criterion is addressed and an explicit formula is derived for when multiple outcomes exist which typically applies to video poker. Blackjack is typically recognized as the "best" gambling game for profit as depicted in the movie "21". The author will provide evidence that automating online video poker is not only the "best" but "optimally" the best gambling game for profit.

Keywords: *Problem gambling, poker machine regulations, casino game analysis, tennis betting, profitable gambling, Kelly Criterion*