

Resolving Problem Gambling: a mathematical approach

By
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Abstract

A method based on mathematics is proposed that generalizes the current model for treating problem gambling.

1. Introduction

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 (Healey 2006). 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. Barnett 2012 outlines a method for automating online progressive video poker for profit. The system utilizes the fact that if you are able to make \$10/hour on one machine, then you can make \$100/hour on ten machines with the same amount of risk (profit is linearly proportional to risk).

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. Three gambling games have been identified for this purpose in Correct Gambling.

If the strategies of Optimal Gambling followed by 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.

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 (Barnett 2010).

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 the distribution of profits and the percent house margin.

2. Gambling games

2.1 Slot machines

Slot Machines - It seems paradoxical that slot machines can be the best game to minimize losses and yet represent the most common form of problem gambling (at least in Australia). The strategy is simply to play 1 line on a 1c slot machine. Assuming 18 spins per minute, the player is expected to lose between \$1.00 and \$1.70 per hour (depending on the house margin).

2.2 Jackpots

Jackpots - The two most common forms of jackpots are progressive and deterministic. Refer to Barnett and Clarke (2004) for more information on progressive jackpots in video poker. It is common for slot machines to be linked to a deterministic jackpot. This means that the jackpot must go off before it reaches a specified amount. This is interesting because if you were able to occupy all the machines when the jackpot reached a certain level, then you would be guaranteed to hit the jackpot and generate a profit. The strategy for the general player is to play deterministic machines when the jackpot is towards the specified maximum rather than the minimum.

2.3 Card games

Card Games - Despite what thousands of websites say about making money through card-counting in blackjack, it requires "large" bankrolls, generally playing in a team, hours of training and a significant amount of concentration and hard work whilst playing. Refer to blackjack-masters.com for more information about being a successful card-counter. The strategy for the general player is to play basic strategy blackjack with a house margin of 0.59% in Sydney or even better basic strategy Pontoon with a house margin of 0.42% in Sydney. Refer to wizardofodds.com for strategy charts on Blackjack and Pontoon. Assuming a player wagers \$10 per hand and plays 100 hands per hour, the player is expected to lose \$5.90 per hour in blackjack and \$4.20 per hour in Pontoon.

3. Poker machine regulations

Mathematical and logical reasoning suggest several straightforward amendments to the Standard for poker machines, with the purpose of increasing consumer protection. These possible amendments are:

1. The probabilities associated with the payouts should be displayed on the gaming machine.
2. Win amounts should refer to profit payouts rather than return payouts.
3. Gaming machines should allow players to withdraw amounts less than \$1.
4. The total number of gaming machines at each venue should be proportioned by different denominations.
5. The standard deviation should be regulated on gaming machines with a fixed initial cost that is consistent across all machines.
6. There should be regulations for the coefficients of skewness and excess kurtosis.

4. Displaying probabilities

4.1 Poker machines

Consider the sample poker machine for a single trial given by table 1. The initial cost (the cost to play) is \$1, and the initial cost is given directly on every machine within Australia. The payouts for each possible outcome (column 2) are also given directly on every machine in the form of prices. However, the probabilities associated with each outcome (column 3) are not given on the machine, and this fundamental piece of information is required to calculate the expected payouts (column 4), which enables the consumer to know how much he/she is expected to lose each spin of the machine. This expected loss is obtained as \$0.10 from table 1. It can also be readily shown that there is a 13.9% chance of ending up with any profit and a 60% chance of ending with a loss (losing the initial cost of \$1 to play the game).

Outcome	Profit (\$)	Probability	Expected Profit (\$)
O ₁	1000	0.000125	0.125
O ₂	100	0.00125	0.125
O ₃	10	0.0125	0.125
O ₄	1	0.125	0.125
O ₅	0	0.261125	0
O ₆	-1	0.6	-0.6
		1	-0.1

Table 1: The payouts with associated probabilities for a sample poker machine

Suppose there are 10 spins per minute on a typical machine. Then a player is likely to spin $10 \times 60 = 600$ spins per hour, and this allows such calculations as the chances of ending up ahead, more than \$200 ahead or more than \$200 behind after 1 hour of play. This information is represented in table 2 and shows that even though a player is expected to lose $600 \times 0.1 = \$60$ per hour, there is a 26.2% chance of losing more than \$200 per hour and a 8.9% chance of winning more than \$200 per hour. This type of information along with the type of information represented in table 1 could be readily displayed on each machine to enable the player to make decisions as to whether to play a particular machine and how long to play for. Furthermore, this statistical information could potentially be available for table games (e.g. blackjack, roulette) and distributed via computerized information kiosks at the particular gambling venue.

Hourly Profit (\$)	Chances
<-200	26.2%
-200 to -100	37.1%
-100 to 0	19.4%
0 to 100	7.1%
100 to 200	1.3%
> 200	8.9%

Table 2: The chances of obtaining various payouts after 600 spins of a sample poker machine

4.2 Roulette

Figure 1 represents the relevant statistics for roulette given Type of Bet: Red/Black, Initial Cost: \$10 and Plays per Hour: 45. These input parameters are used to generate information containing the probabilities for each outcome on a single play, average loss per play, average loss per hour, and the chances of obtaining various payouts after 1 hour of play. The operations of the information kiosk are such that the input parameters (Type of Bet, Initial Cost, Plays per Hour) are defined by the player, and the statistical results are generated accordingly.

Roulette			
Parameters			
Type of Bet	Red/Black		
Initial Cost	\$10		
Plays Per Hour	45		
Outcome	Profit	Probability	Expected Profit
Player wins	\$10	0.486	\$4.86
Dealer wins	-\$10	0.514	-\$5.14
		<u>1</u>	<u>-\$0.27</u>
Number of Plays		Average Loss	
1	\$0.27		
45	\$12.16		
Hourly Profit		Chances	
< -\$100	9.1%		
-\$100 to \$0	47.5%		
\$0 to \$100	39.0%		
> \$100	4.4%		
	<u>100%</u>		

Figure 1: Relevant statistical information for the Red/Black bet in Roulette

Conclusions

This article generalizes the current model for treating problem by including optimal gambling, correct gambling and eradication as treatment possibilities. Poker machine regulations are given as amendments to the “Standard” and relevant statistical information is given for poker machines and roulette that could be displayed at the relevant game.

References

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