A Perspective on Gambling

Horace Heffner November, 2004

Serious consideration is now being given in Alaska to a state lottery and to taxing and permitting gambling machines and casino gambling in Alaska. Many people oppose such moves based on moral principles, based on fear of attracting organized crime, or based on a history of negative experiences with gambling in other localities. Though these concerns may be valid, the purpose here is to give consideration to a completely different perspective on these issues in Alaska and Nationwide. This perspective is a view of the potential deception associated with gambling, a deception possibly so vile and yet so veiled and unchallenged as to be comparable to cigarette advertising in some prior decades. This perspective brings clarity to the nature of gambling not only in Alaska but to gambling in general. Further, when the public is invited by slick advertising to come "try its luck" or to use some special set of strategies to improve its odds, good reason will be disclosed here why the public should be fully informed as to the near inevitability of the final outcome.

The potential deception involved consists of advertising that gives a false impression of a gambling customer's chances of being a winner. Advertising that gives the gambler the impression that he has any reasonable chance of not losing all his money if he continues gambling, if he never stops gambling forever at some early point, is deceptive advertising. "Reasonable" here means better than one chance in a billion, but much smaller chances can be substituted without much change in the final results. That's right. A gambler who gambles indefinitely will lose money with a quantity and a certainty that increases astoundingly with time. Many gamblers think it is just their bad luck that they are continual losers. They think if they could just get another stake then they could redeem themselves, that their "bad luck" is overdue to change. They don't have a clue how completely false this outlook is, and that going broke is not even just normal or bad luck, but rather the only outcome that should be expected. The ultimate outcome over time remains certain to an extreme degree, regardless of any strategy that may be learned or employed, provided the house retains even a small advantage. Advertising for gambling establishments does not give people even a clue as to exactly how fast they can expect to lose all their money. A small advantage applied to repeated betting adds up over time to an amazingly large advantage for the house, to very large probabilities of the gambler "going broke", which is to say losing all the money he starts gambling with, his "purse."

Careful analysis shows that the probability for going broke behaves in a cruelly deceptive way over even brief time frames. The probability of being "alive", not going broke, stays flat for a while and then falls off a cliff - so fast in fact that in a startlingly short time the odds for being alive are less than the odds of winning a major lottery.

Video poker games and slot machines in general sometimes operate at a margin or "take" of 10 percent. Many people think that this means they can expect to lose 10 percent of the money they start with, their purse, when they go out to gamble. This is completely false. The expected loss is 10 percent of the total amount bet, which increases with every hour of betting, often at a rate of 100 bets per hour or more. At 100 bets per hour, assuming here all bets are the same size, you can expect to lose a net of 10 bets per hour. At $5 a bet you would then expect to lose about $50 per hour. The house take is typically higher for machines that take smaller bets quickly, like small denomination slot machines, than for larger bet machines or games.

In a simple win/lose game, given a house margin of 10 percent, i.e. a house excess probability of

winning of 0.1, you expect the house to win (in excess of fair odds) 1 in 10 bets on average, so the house should be expected to take away a 100 bet purse in about 1000 bets. You should expect to be able to place about 1000 bets before going broke, loosing all your 100 bet purse. However, most people don't realize that even this is an overestimate of the time you have to gamble, because it only applies to someone with a larger purse. If you actually have a finite purse of 100 bets, then at a 10 percent take there is only a 43.701 percent chance of making it to 1000 bets before going broke. This is because when you hit bottom you have to quit, while a person with a larger purse has a finite though small chance for a comeback if the 100 bet loss line is crossed. In any event, with a large purse or small, the odds of going broke grow astronomical amazingly fast with time as betting continues.

When the house take is only 5 percent, with a purse of 100 bets, you would expect to have a 50/50 chance of making it to bet 2000, instead of only the 41.42 percent chance you do have. More significant is the effect of increasing the bet size, i.e. decreasing the purse size, on surviving a given number of bets. With a 10 bet purse, at a 5 percent house take, you only have about 50.6 percent chance of making it to 100 bets, and only a 28.46 percent chance of making it to bet 200, about 3.167 chances in 1000 of making it to 2000 bets, and 1.39 chances in a million of making it to 6900 bets. With a 10 bet purse, at a 10 percent house take, you only have about 32.74 percent chance of making it to 100 bets, only a 11.29 percent chance of making it to bet 200, about 0.892 chances in 1,000,000 of making it to 2000 bets, about 0.648 chances in a BILLION of making it to 3300 bets, and about 1 chance in a TRILLION to make it to 4600 bets, with an expected purse value at that point of about 0.000000000011 bets. This information is possibly more meaningful converted to hours. In a typical game there might be 100 bets an hour, so the number of bets above easily translate to approximate gambling hours by knocking off the last two digits. Mathematically speaking, it is possible to determine a minimum number of bets required to reach any desired probability of being broke, no matter how small the probability, regardless of the size of the house take provided that take is larger than zero.

It's now pretty easy to see why gamblers go broke with great certainty if they keep gambling. Also interesting is the way the probabilities tend to "hook" the gambler. If you have a 100 bet purse, then at 99 bets you have a 100 percent probability of still being alive. At a 10 percent house take, this number diminishes very slowly at first, to 98 percent at bet 500, 84 percent at bet 700, 57 percent at bet 900. But then it falls off a cliff, reaching 1.22 percent at bet 1900, 1.87 in 1000 at bet 2300, 0.37 in 1,000,000 at 4000, and 2.246 chances in a BILLION of being alive at bet 5000, i.e. after 50 hours of play. It is easy to see, at a 100 bets/hour, why the gambler with a 100 bet purse of $500, bet at the typical minimum house bet of $5, can lose his purse in a vacation of 3 days or less. It is also somewhat deceiving that, with a 100 bet purse, at a 10 percent take, there is a 98 percent confidence of being alive at bet 500 and more than 98 percent confidence of being out of the game by bet 1800. A tricky effect, even with a comfortable 100 bet purse. At 5 hours nearly everyone is still plugging away with big hopes, but after 18 hours there is about no chance of making it that far.

It takes roughly twice as long for the above effects to take place if the house take is 5 percent. At differing house percentages the expected deceptive qualities and expected final result, going broke, are similar - it simply takes more bets to happen with smaller house percentages and less bets with larger house percentages.

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It may require a miracle to make all this into a simple pamphlet that explains in a clear way to the average person what inevitably happens when one continues to gamble against even the slightest of house odds, and just how amazingly inevitable it is that all will be lost. However, the state has a duty to see that its citizens are fully informed in some similar manner if it elects to take revenue from gaming machines or casinos. The consequences are too dire, too predictable, and yet too hidden from the common consumer to excuse less than full disclosure. The mathematics of this subject may be suitable for a book, but the crucial information must be made available and understandable to the gambling public in some very simple fashion. Perhaps a video or advertising of some kind would be helpful. A marketing miracle is required to get enough gambler interest in the subject to make it possible to communicate the subtleties. Though the details are subtle, the outcome and the degree of certainty are not subtle for the gambler who will not permanently quit, and this affects the community as a whole.

The idea that past losses mean soon to be realized wins is called the "gambler's fallacy". It is well known that this is an addictive fallacy to entertain, for it justifies continued betting in the face of steady losses. Even so, it is ironic that the numbers presented here, developed through random walk analysis, show that yet another of the fundamental errors in thinking that people make is to think of every bet as a "new day", a chance to start over, to change luck, when in fact this also is not true at all. It is further ironic that one of the first things taught in probability theory is the nature of independent vs dependent events. Most well educated gamblers are taught to think of each event, each roll of the dice, as an independent event. This is true only in an academic sense when applied to the human experience of gambling, that a specific roll of the dice is an independent event. The successive rolls of the dice are not independent if the gambler has a finite purse. They are all made dependent by the limits of what the gambler has available to bet. This limitation changes the nature of the situation into a random walk with boundaries, and when there are such boundaries they will eventually be crossed.

The numbers presented here are tedious but necessary to any understanding of house gambling. They are the prima facie indicators of what is really happening in casinos today, and the fundamental facts for this article. No field investigation of other facts is essential to the understanding of the principle points here. It is the accuracy of the numbers that is essential to the basic truth being presented. Unfortunately, the common person has no access to random walk analysis. Only the derived odds thus have real meaning to many people, and few people have had access to the information presented here.

If the house has any advantage at all, it can be expected to take the gambler's purse given enough time. It is not commonly known just how short a time that is. At typical house percentages and bettor purses of about 100 bets the amount of time it takes the house to cause the gambler to go broke, to "fleece" the gambler, is astonishingly short. The odds for being fleeced grow rapidly and grow arbitrarily large with gambling time. Advertising that does not accurately and fully communicate this is misleading.

Perhaps this insight, this perspective on gambling, offers a new means to fight the apparent injustice, through the same means the cigarette industry was fought ... in the courts. The gambling industry clearly knows the score, so is its advertising fair? Is the public properly informed?

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In Alaska the issue of revenue generation by gambling could politically boil down to a choice of the lessor of two evils. Given a choice between a lottery and gambling machines or casinos, a monthly lottery is by far the most fair and least harmful to the public. The consistent long term gambler is more likely to win the lottery than to avoid losing all or the majority of what he bets long term. A lottery, due to the long time between bets, and the fully advertised odds, lacks the deceptive quality that is inherent in gambling machines and casino games. The lottery would be even less harmful to Alaskans for the benefit provided if designed to attract out of state money.

It might be asked why a monthly lottery with a 50 percent take and less than a chance in a million of winning could be considered far less harmful and addictive than, say, betting red or black in roulette, which has an about 5.263 percent house take and nearly even chances of winning each bet. The answer is that the roulette player typically places much more than a single bet. According to Ian B William's *Slot Machines: Fun Machines or Tax Machines*, $51 billion a year is spent in the US on casino gambling, and about 70 percent of that on slot machines. If the typical gambler bet only a few times, then each slot machine and table would have lines of people going out the door and down the street. This is not what you see at casinos. People bet repeatedly for long periods. Repeated betting increases the expected house win amount drastically.

To see which is better, a monthly lottery or roulette, take a look at the expected purse amounts for the two alternatives over the one month period of the lottery. If a gambler has $100 to bet for that time he will likely gamble it all away. His expected purse value after the 100 hours or so of roulette gambling time possible during the month will be a tiny fraction of a cent. If a roulette wheel has 38 slots then 2 will be without color (or green, house take) and 18 will be black and 18 red. The house take will be about 5.26 cents per dollar bet. Due to a typical house $5 minimum the gambler's $100 will likely only be a 20 bet purse. If allowed to make $1 bets the gambler will have a 100 bet purse and can expect to be broke in less than 1900 bets, or less than about 19 hours of betting. He will probably try to obtain even more money with which to vindicate himself. The following table shows in 100 bet intervals the probability of being broke and the expected value of the purse for roulette color bettors that start with a 20 bet purse.

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Number of bets in better's starting purse 20
House percentage = 5.263  percent

 Bet  Prob. Alive       Expected Value
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 100  0.881083267382    14.891433066690
 200  0.619848498510    10.952448130541
 300  0.435274926086     8.199805170679
 400  0.313261560357     6.245178037378
 500  0.230621461565     4.823106110599
1000  0.062016797315     1.514700202615
2000  0.007334798455     0.206508730270
3000  0.001127300806     0.034033899035
4000  0.000195968405     0.006173086380
5000  0.000036627971     0.001187554885
6000  0.000007182650     0.000237810615
6900  0.000001707388     0.000057358537
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The roulette gambler at a 5.263 percent house take and a $100 to bet at $5 a bet can expect to be broke in less than 3 hours. In fact, from the table, you can see that at bet 300, about 3 hours, he has a 43.5274926086 percent chance of being alive. He has about 1.7 chances in a million of lasting 6900 bets, or about 69 hours of betting during the month, and only a small fraction of a cent expected purse value by that time.

At $5 a bet and 100 bets an hour he can be expected to lose 0.05263 * $5/bet * 100 bets/hour = $26.32 per hour. If he has 100 hours to gamble in the month, and does so, he can be expected to lose about $2,632 per month. The estimated 100 bets per hour may be high, and a lower bet rate will reduce the expected loss per hour.

The lottery ticket buyer probably will not even spend the full $100 on tickets, unless there are lots of quick turnaround small pots, which will in fact act just like casino gambling. A single large pot can be expected to attract out of state money - especially when no winner shows up and the expected win becomes positive on a subsequent "let it ride" round. But let us assume the lottery player does spend the full $100 on the lottery in order to compare apples to apples. Lotteries typically take about half the proceeds. The $100 provides about a $50 expected purse at the end, as opposed to the small expected fraction of a cent purse for the roulette gambler that bets more than 70 hours.

Typically both betters end up broke. However, the lottery ticket buyer is more likely to stay on budget, more likely to win, and will definitely be provided the truth about his approximate odds. If the lottery goes into a "let it ride" round, a late ticket buyer may even end up with more than fair odds. Lastly, the lottery ticket buyer really only needs to buy one ticket a month to keep his dream alive. The machine gambler has to find a way to keep feeding the beast to keep his dream alive.

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The National Gambling Impact Study Commission Report of June 18, 1999 states: "... government decisions regarding the introduction and regulation of legalized gambling would best be made according to a well defined policy, one formulated with specific goals and limits in mind. While governments have established a variety of regulatory structures, it is not at all clear that these have been guided by a coherent gambling policy or even that those making the decisions have had a clear idea of the larger purpose they want to promote. ... Instead, much of what exists is far more the product of incremental and disconnected decisions, often taken in reaction to the pressing issues of the day, than one based on sober assessments of long term needs, goals, and risks."

The numbers presented here clearly show that the need for prevention of deceptive advertising and the need for full disclosure and public education with regard to expected gambling outcomes together provide a much needed focus to government gambling policy. The issues being addressed are clearly far more fundamental than those being considered only in Alaska, but rather affect and involve the entire country.