How to Gamble

Actually, this isn’t about how to gamble, it’s about the mathematics of gambling. So in a way, you’re being suckered in the same way the gambling industry lures its victims. But if you understand a few things about the mathematics of gambling, you may, in fact, learn “how to gamble.”

There are two basic facts to know about gambling. The first is that in every game of chance offered by gambling casinos, the gambler will lose in the long run. There is one exception I will get to later on, but even that’s only an apparent exception, not a real one. Take roulette, for example, the easiest game to analyze mathematically. An American roulette wheel has 38 slots positioned around its circumference. Eighteen of these are red, 18 are black, and 2 are green. The red and black ones are numbered from 1 to 36, the green ones are numbered 0 and 00. The simplest bet to make is $1 on either red or black. If the ball lands on the color you bet on, you win back the original $1 plus an additional $1, a total payoff of $2. If the ball lands on the other color or 0 or 00, you lose your bet of $1. The probability of your winning is the number of ways you can win, 18, divided by the total number of slots on the wheel, 38, or 47.37%. It would be an even bet if the two extra slots weren’t there, resulting in the house edge. It would also put the casinos in the business of offering free entertainment. And they aren’t.

If you make repeated bets on one color, as described above, and it doesn’t make any difference which one, you will end up receiving back an average of 94.74 cents on every dollar bet, or a payback of 94.74%. It turns out that this payback is exactly double the probability of winning on a simple $1 to $1 bet and it also simplifies the discussion of gambling probabilities. This is because every gamble has a payback associated with it and it means the same thing for any bet. In the case above, you will get back only about 95 cents for every $1 you put at risk over the long haul. You will certainly win on some bets, and you may win on a series of bets. You may even win for a night, especially if you don’t make a lot of bets. But in the long run, you will lose. If you don’t understand this, you are a potential problem gambler.

There are of course other variations to roulette. In addition to betting on one color, you can bet on combinations of one number, two numbers, three, four, five and so on. If you’re wondering which one’s the best, don’t spend a lot of time at it. With one exception they all have exactly the same payoff as betting on one color—94.74%. The exception is betting on a combination of five numbers. The payoff here is 92.1%, making it the worst bet. So much for strategy.

Most long-standing casino games and their variations have a payoff of about 95%. Blackjack is a little higher and craps is the best of all, assuming you ignore most of the more complicated betting options. These side bets usually make things worse for the gambler. There is one version, however, taking free odds, which produces an astoundingly high payback of 99.13%. The player still loses, of course, but more slowly.

Just about the worst form of gambling ever, in terms of payoff, is video poker, once popular in South Carolina. The average payback for video poker was 72%, as reported by the gambling industry itself. (They prefer to be called the “gaming” industry on the spurious assertion that through skillful play the gambler can somehow win. With a payback of 72%, it’s obvious who is “winning,” and we can continue to refer to them as the “gambling” industry.) So,
you’ll still lose in the long run playing video games, you’ll simply lose a lot more and a lot faster. The reporting was accomplished on the honor system, by the way, so the 72% payback may not be entirely accurate.

The second thing to know about gambling is that when individual bets are independent of one another, it is impossible to devise a betting system that will alter the underlying odds against you. “Independent” means that the game has no memory from one bet to the next. In roulette, for example, the wheel has an 18 out of 38 chance of landing on red the first spin and the second spin and also the 100th spin. It never varies unless the wheel somehow becomes unbalanced, an event unlikely to alter the odds materially. A craps game constitutes a series of independent bets because you’re rolling dice and the dice cannot remember what happened on the previous roll. As in the previous section, you have to qualify things a little bit when talking about video games. They rely on a computerized random number generator. I have a good deal of experience with random number generators on PCs and can tell you that they are, for all intents and purposes, independent from one number to the next. I don’t have any proof, but suspect that the generators in the computer games are independent also. A nagging skepticism tells me that if they aren’t, they benefit the operator, not the player.

Anyway, gamblers use various “systems” to try to beat the games. In the simplest of these, the Martingale, or “double if you lose” system, the gambler doubles the previous bet until he wins, thus “assuring” that he will eventually win. In fact, he usually does win. But a little analysis reveals the essential weakness of the method. Suppose you bet a dollar and lose. Bet $2 on the second bet and lose again. Bet $4 on the third bet, $8 on the fourth bet and so on. Let’s suppose you bet and lose on 9 successive bets. Your bet on the 10th one will be $512. If you finally win on the 10th bet, how far ahead will you be? You will be ahead by exactly $1, the amount you bet the first time. Now, add up all the bets you made. You will find that you have put at risk a total of $1,023. This is a lot of money to win just $1 and it illustrates the underlying flaw in the system. Even though you will usually win, when you lose, you lose big. Sooner or later you will lose everything you have. In one computer simulation, I lost 19 times in a row before I finally won on the 20th bet, putting at risk a total of $1,048,575, all to win just $1. This was assuming a payoff of 80%. Very few people have a big enough bankroll to support this strategy.

A mathematical analysis of a Martingale system will reveal that its payback is exactly that of any of the individual bets. The reason is that this system, as any other, consists of a sequence of individual, independent bets, each with the same probability of winning and each with the same payback. Altering the sequence of bets does nothing to alter the odds of the individual bets. I have simulated this system, along with others, on a computer and confirmed that it does not, in fact, help the gambler.

Before getting back to gambling, there’s at least one similarity between gambling and the stock market (lately, there may not be much difference). Many investors pick stocks on the basis of price performance. They draw charts of stock prices and use these charts to decide on when to buy a stock. It’s called charting, or technical analysis. In its simplest version, if a stock bottoms out and then starts to climb, you should buy. If it peaks and then starts to decline, you should sell. So you’re buying and selling on trends. The problem is that price movements may in fact be independent of one another. If they are, these “trends” are imaginary and you can’t beat the market using technical analysis. The reason you can’t follows pretty much the same line of
reasoning that says no system will work for independent gambles. There are an awful lot of statistical studies demonstrating that, prior to the 1990’s, stock prices exhibited independence, at least enough so that, after commissions, you couldn’t beat the market. You see, prior to the 90’s large institutions dominated the market: mutual funds, college endowment funds, pension funds and so forth. These institutions hire high-priced analysts to study stocks and they do a pretty good job of determining value, at least a good enough job that they have a hard time outguessing one another. There are a lot of studies showing this also, again prior to the 90’s, so that a stock’s price at any particular time reflects all publicly available information and is affected only by randomly occurring outside events. This is why the term “random walk” is often used to describe stock prices. To be more precise, stock prices follow a process known as “random walk with upward drift,” because they tend to go up over time. During the 90’s, for various reasons, many individual investors starting making their own investment decisions. Many of these investors were not, to put the kindest face on it, particularly knowledgeable. (If you don’t believe that, look at how many people violated the cardinal rule of investing—diversify!—and put all their money in one stock. And not just Enron employees!) When enough unknowledgeable investors buy stocks on the basis of stock movements, their actions will cause further price movements, and trends may occur. These trends sometimes turn into bubbles, and that was one of the big problems in the 90’s. If you’re interested in further study along these lines, get a reputable investment book and look up the Efficient Market Hypothesis.

A few paragraphs ago I mentioned that there is one exception to the rule that every casino game results in a long-run loss to the gambler. That exception is blackjack. Blackjack lends itself to a “system” because, unless a new or reshuffled deck is used for every deal, successive deals are not independent. A statistician, E. O. Thorpe, devised a counting system in the 1960s that worked, briefly, to alter the odds in favor of the bettor. I say “briefly” because when the casinos realized they were being snookered they started adopting ways to nullify this and other counting systems, such as more frequent reshuffling of decks. If these don’t work, they simply kick the gambler out of the casino. It’s actually kind of funny. Even if you can legitimately win, they don’t let you.

Remember the title, and how I conned you into reading this under the pretense of teaching you “how to gamble?” Well, here’s how—Don’t!