

Principles of Casino Game Design
by H. D. Vinod, April 6, 2007.

Blaise Pascal (1623-1662) the great Mathematician discussed the problem of gambler's ruin. Bernoulli invented the Binomial distribution in 17th century. However the merchant class recognized that there was a need to relieve the (hereditary) rich (dumb) aristocrats in Europe of their feudal wealth (short of openly cheating them). Casino gambling was invented for that purpose mostly in the French Riviera regions and was helped by several smart mathematicians of the time over the centuries. The basic format of most of the games in Casinos today was invented centuries ago. Just like engineers design cars, these smart folks designed the Casino games.

The objects of a Casino game design are two fold.

- (1) Make sure that the house wins.
- (2) Make sure that the gambler comes back to play again and again.

The two goals are contradictory, but can be achieved with the help of smart people as follows. Keep the expected value of the gamble negative (in the long run the house must win). Expected value (EV) is simply the sum of probabilities times net gains from gambling. All casino games have negative expected value. For example, the roulette may have 102 slots with 2 for the house.

Loss-Doubling (LD) Strategy is troublesome to Casinos

This strategy says that when a gambler wins he can keep the winnings but when he loses he should double the bet and try again. If he is allowed to keep this up forever, he will eventually regain all losses.

Casinos are not in the business of letting customers win so easily. Hence the Casinos disallow this LD strategy by imposing a maximum on the amount anyone can bet. This harmless sounding restriction keeps the expected value negative under the loss doubling strategy.

How to encourage gamblers to come back? Marketing strategy is to publicize winnings, making it a pleasant experience, providing perks etc. Above all, the Casino industry does not want customers to know about negative expected values. I do not understand why so many smart people (even some who are trained in statistics) fail to grasp the basic design tenets of all games and refrain from Casino gambling.

Bottom line: Casino gambling (all forms of gambling where expected gain is negative) is dumb.