

Un-Crappy Math: The Mathematics of Craps

By: Kenneth Rossi, Jr.

The Game of Craps

- One out of the two purest games of chance
- Involves players surrounding a table and a pair of die
- Popular in casinos and streets around the world
- Gambling vs. the House



The History

- Arabic dice game “Al Zar”
- 1125 AD- Sir William of Tyre and the castle of Hazarth
- Hazard became popular throughout England in the 17th and 18th centuries
- The French adaptation
 - Changing the name of the game to Crabs

History cont.

- Brought across the Atlantic
- Adopted by John H. Winn
 - “Father of Modern Craps”
 - Simplified game and created the modern layout
 - Betting against the shooter to avoid loaded dice
- Becoming worldwide by soldiers in WWII

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

The Game Explained



- Involves set of dice numbered 1 through 6
- Winning on first roll with a 7 or 11
- Losing on first roll with a 2, 3 or 12
- Anything else becomes a point
- Shooter rolls both die until either the point is rolled again (win), or they roll a 7 (crap out).

The Gamble

- A game of gambling vs. the House or other players (if played on the streets)
- A player places bets against the house before initial roll
- Those on the side can place bets prior to initial roll, or during the shooter's turn
- House places odds on each particular bet



The Math Involved

- Probability -6 possible rolls from each die
 - Rolling the dice- $6 \times 6 = 36$ possible outcomes.
- Winning on First Roll
 - Rolling a 7 or 11 = $8/36$
- Losing on First Roll
 - Rolling a 2, 3 or 12 = $4/36$
- Establishing a Point
 - Rolling anything else = $24/36$



Lucky 7

- Seven has the highest probability of being rolled by two die out of any other number.
 - It has a probability of $6/36$.
 - $\{(1,6),(6,1),(2,5),(5,2),(3,4),(4,3)\}$
- More likely to win or establish a point on initial roll
 - Once point is established, more likely to *crap out* than getting your point

Roll/Possible Outcomes	# of Combinations	Odds
2 	1	35-1
3 	2	17-1
4 	3	11-1
5 	4	8-1
6 	5	31-5
7 	6	5-1
8 	5	31-5
9 	4	8-1
10  	3	11-1
11  	2	17-1
12 	1	35-1

Online-Casinos
Only The Best In Online Gaming.

Strategy: How to Win in Craps

- Understand that this is a game of chance.
- Casinos secure certain edges against the players to make profit for themselves.
- The edge is built into the game, so there is no strategy for gaining the edge.
- Best Strategy: Reduce the House's edge to a minimum
 - Place 'good bets' instead of 'bad bets'

Taking the odds

■ Bad Bets:

- The Field- The field is a one time bet that the next roll will be a 2, 3, 4, 9, 10, 11, or 12. All wins pay 1 to 1, except the 2 and 12 pay more.
 - House Edge: 5.6%
- Big 6/ Big 8- The Big 6 and 8 are exactly like the place bets on 6 and 8, respectively, except pay only even money. The house edge on the Big 6/8 is much higher than the 1.52% on 6 and 8 place bets.
 - House Edge: 9.1%
- Horn- The basic horn bet is simply making an equal valued (usually just one dollar) one roll bet on 2, 3, 11, and 12. The total cost of this is only \$4, and each one of these has such a large payout, that if one of these wins it greatly outweighs the other three losing bets.
 - House Edge: 12.5%
- Craps 2/ Craps 12- Winning if 2 or 12 is rolled.
 - House Edge: 13.9%
- Any 7- Wins if a 7 is rolled.
 - House Edge: 16.7%

Taking the Odds cont.

■ Good Bets:

- Pass- One can place this bet before the player shoots the dice. If the come out roll is a 7 or 11 you win, a 2 or a 3 you lose.
 - House Edge: 1.41%
- Don't Pass- The don't pass is almost the opposite of the pass line bet. If the come out roll is a 2 or 3 then you win, a 7 or 11 you lose. A 12 is a push.
 - House Edge: 1.36%
- Come- This is like the pass bet, but it can be made at any time.
 - House Edge: 1.41%
- Don't Come- The don't come bet is like the don't pass bet, but is made on a non-come out roll.
 - House Edge: 1.36%

Conclusion

- Craps is a game of chance!
- It has been shaped over time and place to become the popular game it is today.
- A good day at the Craps table is one where you've enjoyed yourself and you've made some money by playing the right bets and understanding the odds.

Questions?

