Use of Repetition on n Person Dice Game (Ludo Gambling) Under Game Theory

Satyaprakash Sahu[1,*] and A. J. Khan[1]

1 Department of Mathematics, MATS University, Raipur, Chhattisgarh, India

Abstract: Here we study about how to increase winning probability of n person dice game (Ludo) by using repetition. This paper shows that by using of repetition we can see a player can increase his winning probability.

1. Introduction

A game is a formal description of a strategic situation. Game theory is the formal study of decision-making where several players must make choices that potentially affect the interests of the other players. In game theory, an n-player game is a game which is well defined for any number of players. When there are more than two players are playing that is called n person game. A game is a description of strategic interaction that includes the constraints on the actions that the players can take and the players' interests, but does not specify the actions that the players do take. A solution is a systematic description of the outcomes that may emerge in a family of games. Game theory suggests reasonable solutions for classes of games and examines their properties. In game theory, we are going to study about n Person Dice Game (Ludo). A simple game in which players move counters round a board according to throws of a dice. Ludo is a popular board game derived from an ancient Indian game called Pachisi. Dice are small throw able objects with multiple resting positions, used for generating random numbers. Dice are suitable as gambling devices for games like craps and are also used in non-gambling or gambling tabletop games. A traditional die is a cube, with each of its six faces showing a different number of dots (pips) from 1 to 6 . Tesserae were smaller dice with sides numbered from one to six.

2. History and Impact of Ludo Game

The game of Pachisi originated in India somewhere around the 6th century. The illustration of playing boards on Ajanta caves are the earliest proof of this game to be played in India. In India, Pachisi was also played by the various Mughal emperors. The great Mughal emperor Jalaluddin Muhammad Akbar used to play live Pachisi by using his harem girls. Other variations of the Pachisi game were introduced to England around late nineteenth century. One of these versions

---

* E-mail: satyaprakashsahu305@gmail.com (Research Scholar)

which appeared around the year 1896 was successfully patented under the name Ludo. Dice games are a family of games that are played using a dice or a number of dices. These games also have some of the oldest historical records. In fact, various forms of dice games have been mentioned in old documents dating as far back as 3000 BC. Ancient dices have also been found in remnants of Egyptian tombs. These games were also quite popular during the Roman times. These games are known for their versatility. Many times these games are simply based on luck; however, skill and proper planning also play a significant role in deciding who will be the winner at the end of the game. Some dice games can be played by only 2 players. Other varieties of dice games can be played by more number of players; some can even be played by twenty or more players. Dice games have found immense popularity with all age groups and both 4-year old as well as 70-year old people seem to like them.

These games also have an educational side to them. Dice games encourage children to count and play with numbers as well as teach them how to perform quick mental calculations. These games are also an excellent way to reinforce various concepts, such as taking turns, keeping score both on paper as well as making mental calculations, winning or losing gracefully, developing patience and various other important skills. By the time a child reaches the age of 7, he or she might even learn how to avoid throwing the dice to the floor every time they roll the dice. It is also during this point when they start developing the urge to try to manipulate the dice and affect the outcome of the dice rolling. Although a lot of dice games for young children depend primarily on luck, many games also require strategic thinking and careful planning. Another important feature of dice games is that they are portable. This means that it is fairly easy to carry the equipments of a dice game. You can conveniently carry a small number of dice in your pocket and most dice games only require a pencil and one small sheet of paper to calculate the results. While traveling with a collection of your favorite games, you can carry a bundle of print-outs, some small pencils, a number of dices and some other vital equipment in a box or a small re-sealable plastic bag. Nowadays numerous varieties of dice games, like Yahtzee, are readily available in game shops. You can also place a mail order to purchase them. Most young children love to handle and play with small dices and are eager to build up their own collection of dices. Dices are also very cheap. A number of dice designs can be found in the existing genres of dice games, and they can be certainly picked up from small stationery stores, gaming shops, discount stores, educational catalogues and garage sales. Many individuals also buy sets of dice games just to collect the dice.

3.   Definition of Ludo Game

Special areas of the Ludo board are typically coloured bright yellow, green, red, and blue. Each player is assigned a colour and has four tokens in their colour. The board is normally square with a cross-shaped playspace, with each arm of the cross having three columns of squares, usually six per column. The middle columns usually have five squares coloured; these represent a player's home column. A sixth coloured square not on the home column is a player's starting square.
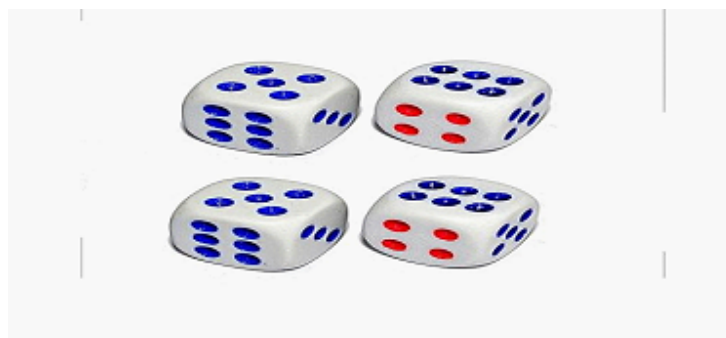
The game of Ludo originates in India as far back as 3300 BC. Easy to learn, this classic game is fun for children and adults alike. Ludo's popularity has gone on to spawn variations such as Parcheesi and Sorry. With centuries of tradition behind Ludo, you will surely become a fan as well. To begin, a player must roll a six to move a piece out of the base and onto the starting square. That piece is then in play. The player cannot make any other moves until at least one piece is in play. If a player has a piece or pieces in play, they can move any one of their pieces 1 to 6 squares along the path according to the number they roll.

Rules of the 6's:

(1). If a six is rolled, the player can choose to either move a piece out of his base onto the starting square or move a piece that is in play.

(2). Anytime a six is rolled, the player gets an extra roll after his move. If a six is rolled three times in a row, the player loses his turn. Landing on a shared square

(3). If a player's piece lands on an opponent's piece, the opponent's piece is sent back to their base where he must roll a six again in order move it out onto the starting square.

Ludo is played with six, sided dice. There are six different symbols(figure or point) on each of the sides of the dice which is showing in image. Players bet on which symbol will appear face up the most often. The dice are then rolled and the symbol that appears most often wins.

3.1. Repetition on Ludo Gambling

In this game there are one organizer who arrange the game and another are players. According to this game organizer has a six sided dice. In which dice has six different image in all outside cover. And they have also a chart which shows all six image. organizer move his dice and without showing the dice he covered that dice by the basket. Then after player choose any image for play. According to this game organizer will pay (6*multiple amount of their principal amount) that player who has same type of image shows. If their has no matching image then player take that money means organizer wins. In the box after the open if a player has same image then he will find 6*multiple amount of their principal amount.

If a player want to profit in this game then he should repeat that image for next play and he should also increase his principal amount. In the last step whenever same image will come then he will earn his lost money and get profit. For winning probability a player should follow the given chart by using $N = 2^{n-1} * p$ rule.

No. (N= number)	Principal amount ($2^{n-1} * p$)	If loss (no image)	Finally profit (same image)
1.	100	100	600-100=500
2.	200	100+200=300	1200-300=900
3.	400	300+400=700	2400-700=1700
4.	800	700+800=1500	4800-1500=3300
5.	1600	1500+1600=3100	9600-3100=6500
⋮	⋮	⋮	⋮

Table 1.

4. Conclusion

With the help of the mathematical formula a player can increase the probability of winning, but it required a lot of money, passion, continuity, and patience. And a player can always get same profit of their principal amount. In a two person model, the meaning of exchanging favors is very clear. With more than two players, when in a position to do a favor, it is not so clear whom a player will provide a favor to. This will require careful modelling with respect to the values of favors from different opponents and the cost of doing favors to different opponents. If we assume that the benefit and cost are identical for all players, we will still have to incorporate in the strategies some rules on how favors are done. For example, a player might do one favor for each opponent before doing any second favors. With an appropriate generalization to the n-player case, it is reasonable to still expect the comparative statics results for the equilibrium set that we see in the current model. It is harder to say what the equilibrium strategies for the Pareto frontier will look like.

References

[1] Diagram Group and Ruth Midgley, *The Way to Play*, Paddington Press Ltd, (1975).

[2] H.J.R. Murray, *A History of Board-Games other than Chess*, (Reissued ed.), Hacker Art Books Inc, (1978).

[3] R.C. Bell, *The Boardgame Book*, Exeter Books, (1983).

[4] Parlett and David, *The Oxford History of Board Games*, Oxford University Press Inc, (1999).

[5] A Ludo Board Game for the AGTIVE 2007 Tool Contest, Moritz Kroll Rubino Gei, July 15, (2007).

[6] Arend Rensink, Alexander Dotor, Claudia Erme, Stefan Jurack and Ole Kniemeyer, *Ludo: A Case Study for Graph Transformation Tools*, In: Schurr A., Nagl M., Zundorf A. (eds) Applications of Graph Transformations with Industrial Relevance. AGTIVE 2007. Lecture Notes in Computer Science, vol 5088. Springer, Berlin, Heidelberg, (2008), 493-513.