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Critical Review of Contemplation on Probability in Game of Chances

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ABSTRACT

The science of uncertainty is chance. This provides our own ignorance with clear mathematical rules for understanding and analyzing. For many situations, continuation of the experiment is unlikely many, many times. Given these limitations, the definition of relative frequencies is a valuable way to think about probabilities. It gives us a structure to work with our limited knowledge and make rational choices based on what we do and don't know. The simple games of chance involve coin flipping, dice and football teams choosing which side to start on at the start of a game. The likelihood to strike H or T is 50 percent each so that one has the possibility p=1/2 to be right and p= 1/1 to be wrong, The research of this study clarifies about the probability and its use by different examples and theatrical way. The analysis of this study clarifies the chances of probability in Game of chances. The study is done on the basis of secondary source.

1. Introduction

We're still met by our own ignorance in life. If we are focusing on the traffic jam today, the weather of tomorrow, stock markets of next week, an upcoming election, or where we put our hat, we still don't know with certainty about an outcome. Alternatively, we are forced to hedge our bets, to guess, estimate. The science of uncertainty is chance. This provides our own ignorance with clear mathematical rules for understanding and analyzing. It doesn't tell us the weather of tomorrow or stock prices of next week; instead it gives us a structure to work with our limited knowledge and make rational choices based on what we do and don't know.

The say that tomorrow's rain is forty per cent probability is not to know the forecast of tomorrow. Rather, it's about what we don't know about the weather in tomorrow. Through this text we will build a more detailed interpretation of what it means to suggest tomorrow there will be a 40 percent chance of rain. We must learn how to function in ways that are flexible and mathematically simple with ideas of randomness, likelihood, expected value, prediction, estimate, etc...

Including confusion, there are other causes of randomness too. Computers also use pseudorandom numbers, for example, to make games enjoyable, accurate simulations and efficient searches. According to modern quantum mechanics theory, the composition of atomic matter is indeed absolutely random in a certain way. All these random sources can be analyzed using the techniques found in this text. Another way to think of chance is with respect to relative frequency. For example, to say a coin has a 50 percent chance of heads coming up can be interpreted as meaning that if we flipped the coin many, many times, then it will come up heads approximately half the time.

There are also drawbacks to the definition. For many situations (such as the environment of tomorrow or stock prices of next week), continuation of the experiment is unlikely many, many times. In fact, what exactly does this case mean by "approximately?" Nevertheless, given these limitations, the definition of relative frequencies is a valuable way to think about probabilities and gain intuition about them. Of course, confusion was with us forever, but the scientific probability theory emerged in the seventeenth century.

In 1654, Le Chevalier de Méré, a Parisian player, asked Blaise Pascal about certain possibilities that emerged in gambling (Such as, if the game of chance is disrupted in the middle, what is the probability that each player will win if the game had continued?). Pascal was fascinated with these questions and he corresponded with the great mathematician and lawyer Pierre de Fermat. Pascal later wrote the book Traité du Triangle Arithmetique, which discussed binomial coefficients (Pascal's triangle) and the distribution of binomial probability. At the beginning of the twentieth century, a more systematic mathematical probability theory was developed by Russians such as Andrei Andreyevich Markov, Andrey Nikolayevich Kolmogorov, and Pafnuty L. Chebyshev (and American Norbert Wiener). Americans William, in the 1950s Feller and Joe Doob wrote significant books on probability theory mathematics. They popularized the subject in the Western world, both as an important area of pure mathematics and as having important applications in physics, chemistry and later in computer science, economics and finance.

2. What is Probability?

Probability is the mathematics division referring to numerical explanations of how likely an occurrence is to occur or how likely a statement is to be valid. The likelihood of an occurrence is a number between 0 and 1, where 0 indicates the uncertainty of the occurrence, generally speaking, and 1 indicates the certainty. The higher the probability of an occurrence, the more likely the incident is to happen. A simple example is the flipping of a fair (unbiased) coin. Because the coin is fair, all results ("heads" and "tails") are equally likely; the likelihood of "heads" is equal to the likelihood of "tails;" and since no other results are probable, the likelihood of either "heads" or "tails" is 1/2(which could be written as 0.5 or 50 per cent as well).

These concepts have been given an axiomatic mathematical formalization in probability theory which is commonly used in areas of study such as mathematics, economics , finance, gambling, science (especially physics), artificial intelligence / machine learning, computer science, game theory, and philosophy to draw inferences about the expected frequency of events , for instance. Probability theory is often used to explain the dynamics and regularities that underlie complex systems.

A figure below will help you understand about the probability. Here this figure denotes that there are 3 chances of an event/thing to occur (i.e. there is a probability of 3 chances of an event to happen).

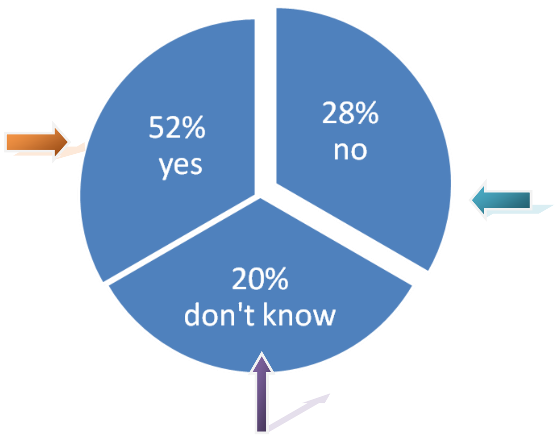

Fig. 1 Probability explanation

Probability in Game of chances

The "probability" is the foundation of casino game mathematics. Informally, we interpret probability as a number that defines the likelihood that anything will happen. This is typically given as a fraction or decimal with a value from 0 to 1, or as a percentage with a value from 0 to 100%. A chance of 0 means it will never happen. A likelihood of 1 also means the occurrence occurs. Toss two dice, for example, and have the sum come up 13; this is unlikely, so the likelihood is 0. Throw a coin and either the heads or the tails come up; that's a certainty, so the likelihood is 1. Within our mathematically ideal universe the dice and coins never fall on the bottom.

The structured probability theory starts by knowing what's known as the "sample space." It is essentially a definition of all potential outcomes – all that could happen. Types include:

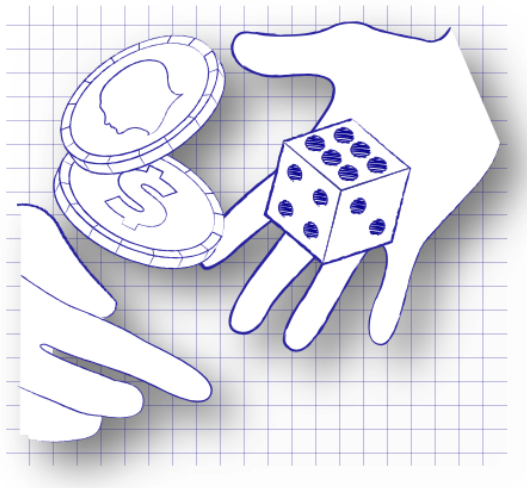

Fig.2 showing dice and coin toss games

- When a coin is tossed there are 2 outcomes; the sample space is {Heads, Tails}.
- If one die is rolled, there are 6 outcomes; the sample space is {1, 2, 3, 4, 5, and 6}.
- If two dice are rolled, there are 36 outcomes (the first dice and the second dice each generate a value of 1 to 6, so there are 6 = 6 outcomes). The sample space is {[1,1], [1,2], [1,3], [1,4], [1,5], [1,6], [2,1], ... and so on, or more precisely {[x , y] 1 x x 6, 1 x y 6}.
- There are 38 tests when a wheel is turned on roulette. The sample space consists of numbers 1 to 36, with zero and double-zero in addition.

Event/ game of chance is made up of some of the events that could happen in the experiment. The event is a way to define some of the events out of all that could happen in a game. Here are some examples of events in which suit some of the games:

- ❖ Toss a piece of coin and get heads.
- ❖ Roll two dice, and get a total of seven.
- ❖ Dealing a blackjack against an Ace's dealer up-card.
- ❖ Being played like a five card poker hand with a full house pat.
- ❖ Being dealt a straight that loses in Three Card Poker to a higher straight.

We need to learn two pieces of information to determine the likelihood of a game of chances / events. Next, we need a complete count of the number of single elements in the sample space. Second, we need to know how many individual elements corresponding to the event are in the set. Simply put, we need to learn sample space size and event size.

3. Knowing these Values, the Probability of the Event By The Equation We Define:

$$\text{HOLD} = (\$8{,}800 \times 100) / \$54{,}000 = 16.30\%$$

The term "Probability" is difficult to write out; when referring to the likelihood of an case, it is common to use the letter "P"

What's not clear from the probability equation is how to calculate the size of different sets. Unfortunately there are very few basic problems in gaming and these problems of counting can be incredibly complex. For those situations where it's easy to count, probabilities can be measured easily. We'll go through a few examples to demonstrate some of the techniques. Eventually these examples can help to explain the definition of probability for games of chances, as well as some of the approaches used to establish such values.

4. Objectives of the study

The study shows some of the following objectives which are clarified below:

- The study articulates about the Probability and its theory in Game of chances/Events.
- This study articulates about quantum mechanics theory where atomic matter composition was clarified.
- The clear understanding of what probability is? And about probability on game of chances is clarified with various examples and figures.
- This study clarifies about some of the drawbacks of the definition of Probability by some authors.

5. Data Collection & Analysis

This study is done on the basis of one source of data collection. The data is collected on the secondary source of data collection through some PDFs, websites, and some related sources of data collection. The data of this study is based on the game of chances and mainly the analysis of this study is done on some of the games i.e. flipping of coin games, dice games etc.

6. Analysis

- **Firstly we analyze the data on flipping of coins**.

The simplest of games of chance involves coin flipping. One flips a single coin in its most primitive form, with an adversary calling heads (H) or tails (T). When a single coin gives only two options, one states that the likelihood to strike H or T is 50 percent each so that one has the possibility p=1/2 to be right and p=1/2 to be wrong. That is what competing football teams do at the start of a game to decide which side should start and which way the winner prefers towards the target. If one simultaneously flips two similar coins, and records the outcome, four possibilities will occur. Those are-

HH HT TH TT

It implies that there is a p=1/4 chance of having either two heads or two tails in a row With a probability of p=0.5 to have one of each happens two times out of four. We may say that the probability of having two heads is p=1/4, and that not having two heads is p=1-1/4=3/4. Remember that the probability of an event occurring is p and the event not occurring is (1-p). This leads to the obvious inference that the probability-

[for an event occurring] = 1- [not occurring]

Because one usually does not differentiate between the words HT and TH, we can also write as-

HH 2HT TT

This time start flipping with three similar coins. This provides the 8 possible outcomes-

HHH HHT HTH THH THT THT TTT

or the equivalent-

HHH 3HHT 3TTH TTT

In terms of probability we consider p=1/8 for three heads or three tails, p=3/8 for two heads and one tail, and p=3/8 for two tails and one head. Extending items to flip n coins at the same time one considers the pattern of probability.

1
1/2 ½ ← 1st flip
1/4 1/2 1/4 ← 2nd flip
1/8 3/8 3/8 1/8 ← 3rd flip
1/16 1/4 3/8 1/4 1/16
1/32 5/32 5/16 5/32 1/32
1/64 3/32 15/64 5/16 5/64 3/32 1/64

Chance of all heads/all tails after n flips= (1/2)

Table 1Probabilities in Flipping Coins

Equally well this result applies to taking a single coin and tossing it n times. It is obvious from this Pascal like triangle is that the low likelihood of p= (1/2) n is to get all heads or all tails after n flips. We can also read off that the chance after six flips of having an equal number of heads and tails is p=5/16. This is twenty times more common than six-headed ends. Probability adding along any given row is always equal to 1. You may think of tossing a coin as a statistically random mechanism when a head or tail comes up equally probable. There are also other cases of two potential consequences of these random behaviors. Another such probability arises in a random number such as the square root of two when looking at the event and odd character of the corresponding digits. There we have the first 100 digits grouped as twenty five-digit groups every look like this:

sqrt(2)= 1.4142 13562 37309 50488 01688 72420 96980 78569 67187

53769 48073 17667 97379 90732 47846 21070 38850 38753 43276

If we now take the even numbers as 0-2-4-6-8 and the odd numbers as 1-3-5-7-9, we would expect the total number of even digits to equal the total number of odd digits, since the likelihood for one or the other is exactly p=1/2 for a random cycle. In the first 50 digits we find 26 even numbers and 24 odd numbers and 48 even numbers and 52 odd numbers for the first 100 digits. In both cases are similar to the predicted fifty-fifty split between even and uncommon numbers. The calculated difference from that predicted for both cases is here 2/50=4/100=4 percent.

- **Analysis of Probability on Rolling on Dice game**

The next simplest random number generator used in chance games involves dice after using the coins. Introduced since ancient times, a die has six surfaces on which the numbers one to six are set in the form of dots. The numbers are arranged in such a way that the sums for each face and its opposite side always add up to seven.

The likelihood of any of the numbers coming up on rolling a die is one in six which yields a probability of p=1/6. It implies that having to throw the die twice has a chance of (1/6)(1/6)=1/36 to get two, twos, etc in a row. This result represents a special case of the **Law of Probabilities** which states the effective likelihood of p1, p2, p3, .. Equal to their product for n independent events with probabilities.

If we roll two dices the sample space when rolling is {[x, y] 1 x x 6, 1 x y 6}; the sample space contains 36 elements. The "having a total of 7" case corresponds to the sample space subset {[1,6],[2,5], [3,4], [4,3], [5,2], [6,1]}. This subset is composed of 6 elements.

Hence,:

p(sum of 7)= 6/36=0.1667

CRAPS

TOTAL (X)	PROB (P)	TOTAL (X)	PROB (P)
2	0.0278	2	0.0278
3	0.0556	3	0.0556
4	0.0833	4	0.0833
5	0.1111	5	0.1111
6	0.1389	6	0.1389
7	0.1667	7	0.1667

Table 2. Probability of the various sums of two dices

7. Conclusion

In this study/investigation a basic critical review of probability is clarified on the game of chances that are basically played in casino. In similar way, the weather of tomorrow, stock markets of next week, an upcoming election, or where we put our hat, we still don't know with certainty about an outcome. It doesn't tell us the weather of tomorrow or stock prices of next week; instead it gives us a structure to work with our limited knowledge and make rational choices based on what we do and do not know. Alternatively, we are forced to hedge our bets, to guess, estimate. This provides our own ignorance with clear mathematical rules for understanding and analyzing. The say that tomorrow's rain is forty per cent probability is not to know the forecast of tomorrow. The higher the probability of an occurrence, the more likely the incident is to happen.

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