

A Gambler's Dispute

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October 6th, 2014

Dice have been in use (dating back to a 5000-year old backgammon set in the Burnt City) even before recorded history. The basic concepts of probability dealing with dice have existed for centuries dating back to BC, but they were not designated as a branch of mathematics until the seventeenth century. However, ideas of probability came to fruition during the fifteenth century, when several works regarding this topic emerged. In 1494, Italian mathematician Fra Luca Bartolomeo de Pacioli published his first book, "Summa de arithmetica, geometria, Proportioni et proportionalita." In this book, the famous Friar Luca explained mathematical concepts as well as bookkeeping methods. After all, he was also known as the father of accounting, so most of his works were geared towards bookkeeping. Still, Pacioli is recognized as a somewhat prominent figure in probability theory due to the fact that his analyses of games involving chance were incorrect, and there was not much other information to rely on during this time in the Dark Age. Although the mathematics behind these problems was unknown, it was becoming increasingly apparent that there could indeed exist calculations for probability.

During the sixteenth century, Italian Renaissance mathematician Gerolamo Cardano came to light, as he was low on money yet filled with wit. To stay solvent, he would famously play chess and gamble successfully. His book on arithmetic, which was written in the 1560s and not published for another hundred years, was named "Liber de ludo aleae" ("Book on Games of Chance"). In this book, Cardano listed the first system of probability and effective cheats. Using the simple game of throwing dice, Cardano experimented to determine the basic concepts of probability for his book. He is known to have defined odds as the ratio between favorable and unfavorable outcomes, subsequently implying that probability must be the ratio between favorable outcomes and the total number of outcomes. Also, Cardano was aware of the multiplication rule for independent events, but he was confused as to which values should be multiplied. It is evident that by this time, humans were envisioning the concept of probability, but no one knew what it truly was.

A gamblers dispute in 1654 led to the creation of probability theory as we know it today. French nobleman Chevalier de Mere and writer Antoine

Gombaud had an interest in gambling, which led to the question of gaming probability. De Mere frequently gambled to increase his wealth, so he bet that at least one 6 would appear during a total of four rolls of one dice. From his past experiences, Mere knew that he was successful with this game of chance and that he would be able to make money off of it. Interestingly, he got bored of this winning strategy, so he moved on to a new dice game, in which he bet that he would get a double 6 on at least one occasion in 25 rolls. He swiftly recognized that his method was producing worse results than his first game, so he asked his acquaintance, Blaise Pascal, why this was the case. Pascal worked through the problem and eventually determined that de Meres new approach had a probability of only 49.1 percent, while his first strategy had him winning 51.8 percent of the time. This question along with others regarding a similar problem led to exchanging letters between Blaise Pascal and French lawyer/avid mathematician Pierre de Fermat, in which they shared their vast mathematical knowledge to solve the problem of probability. Historians to this day believe that the first couple of letters exchanged between the pair involved Meres problem, so Pascal and Fermat are recognized as the founders of probability as a mathematical topic.

Although Fermat and Pascal did not publish a book featuring their new discovery together, a Dutch scientist by the name of Christian Huygens did. Huygens learned of the correspondence and soon (1657) published the first book based only on probability- *De Ratiociniis in Ludo Aleae*. In this book, Huygens mainly discussed problems with probability in gambling. Games involving chance grew exponentially in popularity, and thus there were more mathematicians on the subject in the eighteenth century. A couple contributors of this time include Abraham de Moivre (1667-1754) and Jakob Bernoulli (1654-1705). In the nineteenth century, Pierre de Laplace (1749-1827) published his version of mathematical text, entitled "Thorie Analytique des Probabilits." Unlike previous mathematical writers, Laplace focused on scientific and practical facets of probability. In the nineteenth century, other aspects of probability, such as statistical mechanics and the theory of errors, appeared.

Today, probability is used in numerous areas including engineering, statistical analysis, genetics, and economics; however, it is interesting to note that the entire theory arose from a simple dispute between gamblers.

References:

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[3] <http://www-history.mcs.st-and.ac.uk/Biographies/Pacioli.html>

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