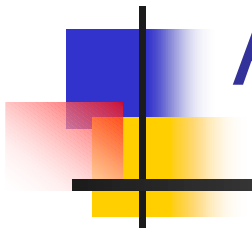
Source:
http://staff.ustc.edu.cn/~zwp/teach/Prob-Stat/A%20short%20history%20of%20probability.pdf



A Short History of Probability

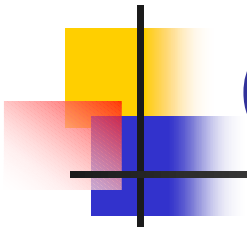
Dr. Alan M. Polansky
Division of Statistics
Northern Illinois University

French Society in the 1650's

- Gambling was popular and fashionable
- Not restricted by law
- As the games became more complicated and the stakes became larger there was a need for mathematical methods for computing chances.

Enter the Mathematicians

- A well-known gambler, the chevalier De Mere consulted Blaise Pascal in Paris about a some questions about some games of chance.
- Pascal began to correspond with his friend Pierre Fermat about these problems.



Classical Probability

- The correspondence between Pascal and Fermat is the origin of the mathematical study of probability.
- The method they developed is now called the classical approach to computing probabilities.
- The method: Suppose a game has *n* equally likely outcomes, of which *m* outcomes correspond to winning. Then the probability of winning is m/n.

Problems with the Classical Method

- The classical method requires a game to be broken down into equally likely outcomes.
  - It is not always possible to do this.
  - It is not always clear when possibilities are equally likely.

Experience

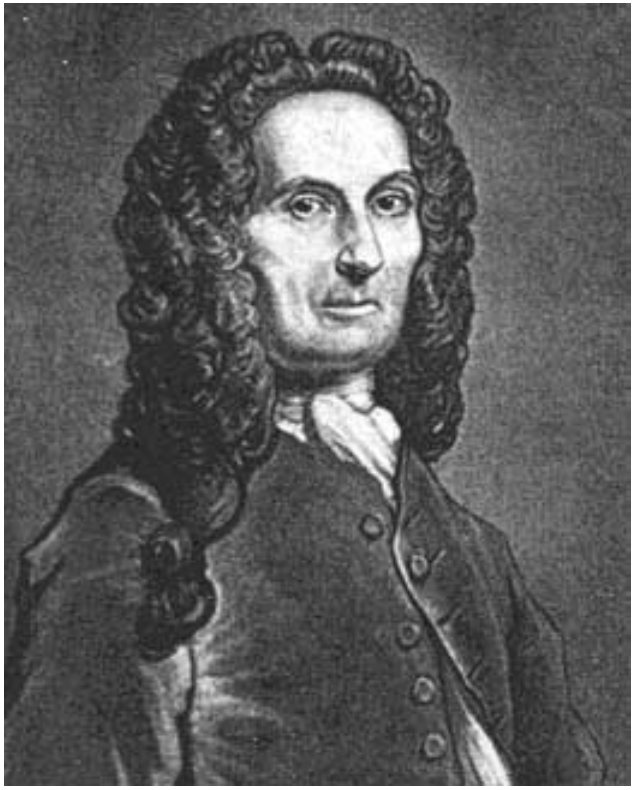
- Another method, known as the frequency method had also been used for some time.
- This method consists of repeating a game a large number of times under the same conditions. The probability of winning is then approximately equal to the proportion of wins in the repeats.
- This method was used by Pascal and Fermat to verify results obtained by the classical method.

Early Generalizations

- James Bernoulli proved that the frequency method and the classical method are consistent with one another in his book Ars Conjectandi in 1713.

Early Generalizations

- Abraham De Moivre provided many tools to make the classical method more useful, including the multiplication rule, in his book The Doctrine of Chances in 1718.
- The book was popular, eventually going through three editions.



From Games to Science

- Throughout the 18th century, the application of probability moved from games of chance to scientific problems:
  - Mathematical theory of life insurance - life tables.
  - Biological problems - what is the probability of being born female or male?

Applied Probability

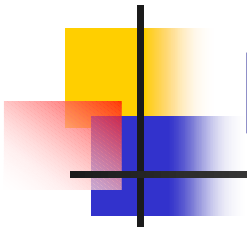
- Pierre-Simon Laplace presented a mathematical theory of probability with an emphasis on scientific applications in his 1812 book Theorie Analytique des Probabilities.
- Unfortunately, Laplace only considered the classical method, leaving no indication on how the method was to be applied to general problems.

Stagnation the Frustration

- After the publication of Laplace's book, the mathematical development of probability stagnated for many years.
- By 1850, many mathematicians found the classical method to be unrealistic for general use and were attempting to redefine probability in terms of the frequency method.
- These attempts were never fully accepted and the stagnation continued.

Axiomatic Development

- Andrey Kolmogorov developed the first rigorous approach to probability in his 1933 monograph Grundbegriffe der Wahrscheinlichkeitsrechnun.
- He built up probability theory from fundamental axioms in a way comparable with Euclid's treatment of geometry.



Probability Today

- Modern research in probability theory is closely related to the mathematical field of measure theory.
- Modern innovators in the field include Patrick Billingsley (University of Chicago), Yuan Shih Chow (Columbia), Kai Lai Chung (Stanford), Samuel Karlin (Stanford), Rolf-Dieter Reiss, Sheldon Ross (Berkeley), Henry Teicher (Rutgers) and many many more...