The Laws of Chance

Calculation by mathematical methods of the Probability of Certain Events.
Deciding the Authorship of Literary Compositions By Means of an Ingeniously Devised Word Spectrum.

The Anaconda Standard

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Some days ago Prof. T. C. Mendenhall of the geographical survey lectured at the National museum at Washington on "Chance and the Long Run." In the beginning of the lecture, says the Washington *Star,* Professor Mendenhall referred briefly to the history of the doctrine of chance or the law of probability, saying that it bad its real origin in the work of Pascal, who in about the year of 1634 was called upon to settle a dispute between two gamblers. From the time of Pascal to the present the subject had received the consideration of the ablest mathematicians, including especially the great Laplace, and nearly every great mathematical scholar had contributed to its growth. Then he proceeded to show that the probability, or chance, or "facility" of an event might be expressed mathematically by means of a fraction. When the value of this fraction was one the event was certain to happen. References were made, in illustration, to the tossing of coins, throwing dice, drawing balls from jars, &c. It is possible to calculate the probability of some very complex events, and the processes involve the use of very difficult mathematical methods. It was therefore desirable to verify the result of this mathematical treatment of the subject by meads of experiment. Several experimental tests of the doctrine of chance were described. It was possible to calculate the probability that a short stick in falling on a surface ruled with parallel lines would or would not lie across one of those lines. Having computed this probability, Professor Mendenhall said that he had verified the result by pitching a stick upon such a surface and noting now it fell 20,000 times. This is probably the most experimental test ever applied.

The numerous applications of the laws of chance were next referred to. Especial attention was given to its use in expressing the credibility of human testimony and determining its weight. If the credibility of a man were expressed by the fraction four-fifths it meant that what he said would in the long run be true four times out of five. Reasons were given for believing that the average credibility was about three-fourths, in which was included not only any tendency to lie which might exist, but also the chances of being mistaken. It was stated that if the credibility of witnesses were one-half, one witness was as good as 100; if it were less than one-half the fewer such witnesses called the better, and if more than one-half additional testimony would strengthen the evidence.

Some of the fallacies of gamblers were referred to, and illustrations were given to show their absurdity. It was shown that games of chance indulged in for gain were bad from a "business standpoint," if from no other, and in any case the loss was greater than the gain.

An application of the laws of "chance and the long run" was made in a proposed plan for detecting authorship by a sort of word analysis. The method depends on two or three assumptions.

The nature of the process, the speaker said, is extremely simple, but it may be useful to point out its similarity to a well-known method of material analysis, the consideration of which actually first suggested to the writers its literary analogue. By the use of the spectroscope a beam of non-homogeneous light is analyzed, and its

components assorted according to their wave length. As is well known, each element, when intensely heated under proper conditions, sends forth light which, upon prismatic analysis, is found to consist of groups of waves of definite length and appearing in certain definite proportions. So certain and uniform are the results of this analysis that the appearance of a particular spectrum is indisputable evidence of the presence of the element to which it belongs.

In a manner very similar it is proposed to analyze a composition by forming what may be called a "word spectrum," or "characteristic curve," which shall be a graphic representation of an arrangement of words according to their length and to the relative frequency of their occurence. If now it shall be found that with every author, as with every element, this spectrum persists in its own form and appearance, the value of the method will be at once conceded. It has been proved that the spectrum of hydrogen is the same whether that element is obtained from the water of the ocean or from the vapor of the atmosphere. Wherever and whenever it appears it means hydrogen. If it can be proved that the word-spectrum or characteristic curve exhibited by an analysis of "David Copperfield" is identical with that of "Oliver Twist," of Barnaby Ridge," of "Great Expectations," of the "Child's History of England," etc., and that it differs sensibly from that of "Vanity Fair," or "Eugene Aram," or "Robinson Crusoe," or "Don Quixote," or anything else in fact, then the conclusion will be tolerably certain that when it appears it means Dickens.

The validity of the method as a test of authorship then implies the following assumptions: That every writer makes use of a vocabulary which is peculiar to himself, and the character of which does not materially change from year to year during his productive period; that, in the use of that vocabulary in composition, personal peculiarities in the construction of sentences will, in the long run, recur with such regularity that short words of medium length will occur with definite relative frequencies.

Prof. Mendenhall suggested that the method was capable of application to the celebrated Shakespearean-Bacon problem, and he ventured to assert that if it were correctly used it would not fail to settle this question. The authorship of the letters of Junius might also be determined by this interesting process.

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