

William Sealy Gosset & the t -distribution



William Sealy Gosset (1876 – 1937)

William S Gosset was a chemist working in quality control for a Guinness brewery in Ireland. He is often considered the first industrial statistician of modern times. His employer, Arthur Guinness, Son & Co had been very strict on product quality control and Gosset in applying his statistical knowledge to the selection of the best yielding varieties of barley, had come up with a set of major *inferential* statistical tests based on the numerous regular samples received in his laboratories. You may know that one basis for inferential statistics is the use of known probability distributions such as normal and binomial distributions to make inferences about real data sets.

After working systematically through related techniques such as correlations to solve problems at his workplace, Gosset realized a fundamental constraint of limited or small number of samples and the limitation of techniques at that time that could assume large numbers of observations and/or experiments to determine the data reliability.

Gosset published an 1908 article under the pseudonym Student on t -distribution function, due to objections of his employer for the publication; hence, the t -distribution is sometimes called the Student's t -distribution and the t -test, the Student's t -test. We now know that there are three major types of t -tests, all of which are concerned with testing the difference between means and involve comparing a test statistic to the t -distribution to determine the probability of that statistic if the study's null hypothesis (H_0) is true.

Later techniques, such as the analysis of variance (ANOVA) developed by R.A. Fisher, relied heavily on Gosset's exposition of the t -distribution. The one-way ANOVA procedure with two groups is mathematically equivalent to the t -test.

Indeed, Gosset has been considered as the father of small-sample methods because at that time there was little appreciation of the importance of small-sample statistics. His life and work provide excellent examples of the interaction between applied science and theoretical development.

