Roland Fisher (1890–1962): Analysis of Variance

This was the statistical technique introduced by Fisher to determine the probability of results being statistically significant or not due to chance. It involves a comparison of systematic variance (the variability due to the influence of an independent variable or experimental manipulation) against error variance (the effect of uncontrolled variables). Results are judged significant if there is a low probability of their being due to error.



Between group variation above refers to the difference between the means of the two treatment groups (the systematic component). Within group variation refers to the error component within each distribution. Total variation refers to the spread of scores around the grand mean (the mean for all of the scores from all subjects in both groups.

Analysis of variance (systematic and error) is impacted by three factors. First is the *size* of the *observed effect*. The larger the difference between means for the treatment groups (different levels of the independent variable), the greater is the likelihood of the difference being significant (statistically). Second is the number of individual subjects or observations. The larger the number, the greater is the likelihood of finding significance. That means that a small difference between the means with large numbers of observations may be significant and a large difference with small numbers may not be. Last is the variability in each group (error variance)—the less variability within each group the greater the likelihood of significance being obtained.