

ST. XAVIER'S COLLEGE (AUTONOMOUS), KOLKATA

DEPARTMENT OF STATISTICS

**A Review work on Comparison of different Approaches
related to Behrens - Fisher testing Problem through
simulation**

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SEMESTER: 6

SESSION: 2019-2022

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APRIL, 2022

SYNOPSIS

One frequently occurring problem encountered by researchers and applied statisticians is the testing of equality of means. When two independent samples are available. The problem of comparing two distributions F_1 and F_2 is one of the oldest problems in statistics. The goal may be comparing the means of the distributions i.e $H_0: \mu_1 = \mu_2$ vs $H_1: \mu_1 \neq \mu_2$ where μ_i is the expectation of F_i ; $i=1,2$. In this case many different procedures are available depending on different assumptions. The usual t test is the test of choice when the variable of interest is normally distributed and its variances are same for both the distributions. But if the assumption of homogeneity of variances is violated, the usual t-test is no more robust for unequal sample sizes. The type -1 error probability is severely affected.

The problem of testing the equality of two means from normal populations with unknown variances is known as **Behrens-Fisher** (BF) problem. The Behrens-Fisher problem has been well known since the early 1930's. In the literature associated with the Behrens-Fisher problem, there have been quite a few solutions proposed. One reason for its popularity is that there is no exact solution satisfying the classical criteria for good tests. Fisher, Welch, Aspin, Cochran and Cox, Qin and Jing have all suggested different solutions.

Objective:

1. To compare the methods for the difference between means of two normal populations when equal variances assumptions may be violated.
2. Here We consider three to four methods: classical Fisher's t-test, Fisher – Behrens test based on fiducial approach, Welch (WS) test by Welch (1938 and 1947) and Banerjee's approach by Saibal Banerjee by computing the type 1 error probability and power of those tests and conclude which is better.