

CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES
VIRTUAL COLLOQUIUM

Friday, March 12
3:00 – 4:00 PM

<https://ccsu.webex.com/meet/gotchev>

**Estimation of the Intraclass Correlation
in the Analysis of Toxicological Data**

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(Joint work with Suojin Wang)

Abstract: The intraclass correlation (IC), a quantitative measure of the resemblance among observations within clusters, is one of the most widely applied and versatile indices in applied research. For example, it is frequently used to quantify the familial aggregation of disease in genetic epidemiological studies. Properties of the different point estimators of the IC have been studied extensively, but little attention has been paid to extending these results to the problem of the confidence intervals. In this article, we generalize the results of the four-point estimators by constructing asymptotic confidence intervals using closed-form asymptotic and sandwich variance expressions of those estimators. It appears from simulation results that the asymptotic confidence intervals based on these four estimators have serious under-coverage. To remedy this, we introduce the Fisher z-transformation approach, the profile likelihood approach based on the beta-binomial model, and the hybrid profile variance approach based on the quadratic estimating equation for constructing the confidence intervals of the IC for correlated binary data. As assessed by Monte Carlo simulations, these confidence interval approaches show significant improvement in the coverage probabilities. Moreover, the profile likelihood approach performs quite well by providing coverage levels close to nominal over a wide range of parameter combinations. An application to toxicological data is provided to illustrate the methods.

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