

# Poster Session Abstracts

---

## **Differences in Intra Uterine Growth Retardation in Cocaine Exposed Newborns**

**Cindy Davis**  
Clemson University

Given the significant growth retardation of cocaine exposed newborns, I am studying the differences in the growth retardation when we control for other prenatal exposures (cigarette smoking, alcohol use, and other maternal risk factors). I am also looking at the interaction between these risk factors and cocaine use, of particular interest is cigarette smoking. In addition, there is the issue of the baby's gestational age. Each of the above risk factors is also a risk factor for gestational age. Therefore, gestational age is both an outcome and a covariate that will influence growth.

---

## **Type I Error and Power of the Rank Transform Factorial ANCOVA**

**Todd C. Headrick and Shlomo S. Sawilowsky**  
Wayne State University

Real world data often fail to meet underlying assumptions of parametric models. Conover and Iman (1982) applied the rank transform (RT) to factorial ANCOVA for situations where population normality was violated. Olejnik and Algina (1985) and Harwell and Serlin (1988) echoed support. The current study examined the Type I error and power properties on the 3 x 4 factorial ANCOVA. Results indicated that there was severe inflations of Type I errors (e.g., 0.44 with nominal  $\alpha = 0.05$ ), which increased as (a) the correlation of the variate-covariate increased, (b) the sample size increased, and (c) the effect size of non-null effect(s) increased. The RT demonstrated a loss in power in comparison with the F test, particularly for (a) small sample sizes, (b) large correlations, and (c) severe departures from normality. Thus, the RT should be avoided in this context, despite its support from SAS, IMSL, and other respected sources.

---

## **The Best Test for Interaction in Factorial ANOVA and ANCOVA**

**Todd C. Headrick and Shlomo S. Sawilowsky**

Wayne State University

Sawilowsky (1990) reviewed ten competing tests for interaction in the ANOVA design, and subsequently, other articles reported on the comparison of additional procedures for the factorial analysis of variance and covariance. On the basis of Type I error and power properties, the primary candidates that remain are the (a) adjusted rank transform by Blair-Sawilowsky & Salter-Fawcett, (b) Hettmanmsperger aligned ranks test, and (c) the Puri-Sen rank procedure. These procedures are compared with the factorial ANCOVA for small samples and a variety of distributions. Preliminary results indicate that for small to moderate departures from conditional normality, the Hettmansperger procedure is most powerful. However, for moderate to severe departures, the Blair-Sawilowsky & Salter-Fawcett procedure is the most powerful. All three procedures display similar Type I error rates.

---

## **Modeling Discrete Lifetime Data with a New Distribution**

**David Hitchcock**

Clemson University

I examine the performance of a new discrete probability distribution in modeling ecological survival data which are measured discretely compared to the performance of traditional distributions like the binomial, Poisson, and negative binomial. This more versatile distribution can model data with mean greater than, less than, or equal to the variance. Hence a single distribution could model very different data sets, or data having covariates. I explore reliable techniques of parameter estimation. This study is currently in progress.

---

## **Application of Permutation Methods to the Generalized Linear Model**

**Bonnie LaFleur**

University of Colorado Health Sciences Center

We have applied permutation methods to the generalized linear model. This is a distribution-free approach to nonlinear models where the expected response can

be linearized with a link function. Various permutation schemes are examined as discussed by Kennedy (1995, 1996), as well as test statistics motivated by the exponential family of distributions. The focus of this paper is to describe this methodology, and compare this approach to existing software and methods.

---

### ***M*-Estimation = LAD?**

**Zhijun Liu**

Mississippi State University

The *M*-estimation is used primarily for robust purposes while the LAD (least absolute deviations) method is a well known robust method and a special *M*-estimation method. However, we find that every robust *M*-estimator is equivalent to a LAD estimator in a sense. So the LAD method represents general robust *M*-estimation. Specifically, for a location parameter or a linear model, an *M*-estimator with bounded influence and convex discrepancy/objective function is the LAD estimator of a twisted model. The twisted model is the convolution of the underlying model with another distribution. If the underlying discrepancy/objective function is not convex but it has a finite variation, the twisted model is the convolution of the underlying model with the difference of two distributions. In addition, we find that an *M*-estimation is asymptotically equivalent to a Bayesian estimator.

---

### **Distribution-Free Tests for Ordered Alternatives in Incomplete Blocks**

**Hossein Mansouri**

Texas Tech University

Distribution-free methods for detecting ordered alternatives in randomized blocks with arbitrary pattern of missing observations are proposed. In addition, distribution-free multiple comparison methods under order restrictions are studied.

---

### **Distribution-Free Subset Selection for Incompletely Ranked Data**

**James Pan**  
Oakland University

In market research and some other areas, it is common that a sample of  $n$  judges (consumers, evaluators, etc.) are asked to independently rank a series of  $k$  objects or candidates. As is the case in many surveys, it is usually difficult to obtain the judges' full cooperation to completely rank all  $k$  objects. A practical way to overcome this difficulty is to give each judge the freedom to choose the number of top candidates he is willing to rank. A frequently encountered question in this type of survey is how to select the best object or candidate from the incompletely ranked data. This paper proposes a subset selection procedure which constructs a random subset of all the  $k$  objects involved in the survey such that the best object is included in the subset with a prespecified confidence. It is shown that the proposed subset selection procedure is distribution-free over a very broad class of underlying distributions. An example from a market research study is used to illustrate the proposed procedure.

---

### **Stabilizing Bootstrap- $t$ Confidence Intervals for Small Samples**

**Alan Polansky**  
Northern Illinois University

Since its inception, a major use of the bootstrap methodology has been in the construction of approximate nonparametric confidence intervals. As evidenced by many spirited discussions over the past few years, the best method for constructing these intervals has not been resolved. One promising method is the bootstrap- $t$  method. Both theoretical and empirical evidence indicates that bootstrap- $t$  confidence intervals perform well in terms of coverage error. The method is also second-order correct. However, when applied to small data sets, bootstrap- $t$  confidence intervals can be unusually long and unstable due to the discrete nature of the conditional distribution of the resamples. The purpose of this paper is to present techniques for stabilizing bootstrap- $t$  confidence intervals for small samples. These methods are specifically designed not to destroy the asymptotic correctness and coverage error properties of the interval. The proposed techniques involve adding a constant to the standard error estimate of the statistic of interest and implementing a version of the smoothed bootstrap. The methods are motivated theoretically and are investigated through a simulation study. We conclude with some recommendations for the practical use of these techniques.

---

## **A Quick Distribution-Free Test for Trend that Contributes Evidence of Construct Validity**

**Shlomo S. Sawilowsky**  
Wayne State University

This paper presents a distribution-free quick test for trend that contributes evidence of construct validity in the Multitrait-Multimethod Matrix. Reduce the heterotrait-heteromethod and heterotrait-monomethod triangles, and the validity and reliability diagonals, into a matrix of four levels containing the minimum, median, and maximum values. The null hypothesis  $H_0$  states the values are unordered. The alternative hypothesis  $H_a$  states there is an ordered trend of ascending values. The test statistic is based on the counting function of Mann's test for randomness in a single sample with the logic of the  $k$ -sample test against ordered alternatives developed by Jonckheere. The easily remembered critical values for nominal  $\alpha = 0.05$  and  $0.01$  are 10 and 14, respectively.

---

## **Comparing the Effects of Two Classes of Antidepressants on Children**

**Tracy Thompson**  
Clemson University

The purpose of this study is to statistically compare the effects of two classes of antidepressants on children: SSRI's and Tricyclics. Data was collected from medical records of children who have the following characteristics:

- admitted into Marshall Pickens in Greenville, SC for at least three months
- diagnosed with depression on admission
- prescribed at least one SSRI or Tricyclic
- between the ages of 4 and 11.

Data has been collected from the medical records, organized, and entered onto a spreadsheet. I plan to compare the two classes by using the number of recorded seclusions (a form of punishment for the children) while a child is on a drug in one of the two classes. I can also use a score of behavior evaluation given at the time of admission and discharge.

