

# Introduction to the Special Issue: Nonparametric Statistics

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In recent years, the field of nonparametrics has continued to grow at a rapid rate. This may be partially due to the complementary increase in computing power, but is perhaps more reflective of the need for more flexible and complex models to describe the ever-increasing amount and complexity of data that face us. This unprecedented growth has signaled the need for a special issue on nonparametric statistics, and the Guest Editors were charged with compiling such an issue, one that would serve as an entrance to this vast body of knowledge.

As we know, contemporary nonparametric statistics embraces far more than traditional distribution-free rank tests and their corresponding  $R$ -estimation methods developed for simple analysis of variance designs. Indeed, nonparametric statistics can and should be broadly defined to include all methodology that does not use a model based on a single parametric family.

Now included under the rubric of nonparametric methods are such diverse fields as general linear models (including multivariate data structures, nonparametric survival analysis, nonparametric curve estimation and bootstrap methods), as well as others illustrated in the articles in this issue. The traditional methods are well documented in many good texts and include the Wilcoxon signed rank test and Hodges–Lehmann estimate, the Wilcoxon–Mann–Whitney rank sum test and the Kruskal–Wallis test. Some of these methods date back to the 1940s and 1950s, and much of their popularity is due to the work of Erich Lehmann and others

who developed theoretical properties of rank methods in the 1960s. In particular, they showed that rank methods are almost as efficient as least squares methods for a normal model and may be much more efficient when normality is violated. Similar developments have occurred in smoothing, function estimation, robust ( $R$  and  $M$ ) estimates and many other branches of the subject. Indeed, today doing a Mann–Whitney test or using a default smoother to look at the pattern in your data is a routine endeavor.

Our goal was to gather together a collection of modern topics that could be included in a course on nonparametric statistics or could provide extra reading material for students who wish to explore additional topics within nonparametric methods. Many of the topics can be included in a master's level course; others are appropriate for more advanced courses. Our hope is that instructors will wish to supplement their basic course material by introducing some of the newer topics and that students will see some of the vitality and excitement in the field.

The growth of nonparametric statistics resulted in the creation of the *Journal of Nonparametric Statistics* in 1991, the establishment of the American Statistical Association (ASA) Section on Nonparametric Statistics in 1999 and the endowment of the Gottfried E. Noether Award by the Noether family. These awards include the Noether Senior Scholar Award and the Noether Young Researcher Award, and are presented at the annual meeting of the ASA. Thus, nonparametrics is receiving considerable attention and interest within the profession.

Areas included under nonparametric methods continue to be dynamic fields of research and application. Authors whose articles appear in this issue have contributed significantly to the development of nonparametrics, along with many others who also have made significant contributions, but could not be included here. We hope that these articles will stimulate our readers to go more deeply into nonparametric statistics, reading more widely and encountering the vast array of excellent work in this field.

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