

Preface

Our civilization depends largely on our ability to record major historical events, such as philosophical thoughts, scientific discoveries, and technological inventions. We manage these records through the collection, organization, presentation, and analysis of past events. This allows us to pass our knowledge down to future generations, to let them learn how our ancestors dealt with similar situations that led to the outcomes we see today. The history of statistics is no exception. Despite its long history of applications that have improved social wellbeing, systematic studies of statistics to understand random phenomena are no more than a century old. Many of our professional giants have devoted their lives to expanding the frontiers of statistics. It is of paramount importance for us to record their discoveries, to understand the environments under which these discoveries were made, and to assess their impacts on shaping the course of development in the statistical world. It is with this background that we enthusiastically edit this volume.

Since obtaining his Ph.D. degree at the age of 22, Peter Bickel's 50 years of distinguished work spans the revolution of scientific computing and data collection, from vacuum tubes for processing and small experimental data to today's supercomputing and automated massive data scanning. The evolution of scientific computing and data collection has a profound impact on statistical thinking, methodological developments, and theoretical studies, thus creating evolving frontiers of statistics.

Peter Bickel has been a leading figure at the forefront of statistical innovations. His career encompasses the majority of statistical developments in the last half-century, which is about half of the entire history of the systematic development of statistics. We therefore select some of his major papers at the frontiers of statistics and reprint them here along with comments on their novelty and importance at that time and their impacts on the subsequent development. We hope that this will enable future generations of statisticians to gain some insights on these exciting statistical developments, help them understand the environment under which this research was conducted, and inspire them to conduct their own research to address future problems.

Peter Bickel's research began with his thesis work on multivariate analysis under the supervision of Erich Lehmann, followed by his work on robust statistics,

semiparametric and nonparametric statistics, and present work on high-dimensional statistics. His work demonstrates the evolution of statistics over the last half-century, from classical finite dimensional data in the 1960s and 1970s, to moderate-dimensional data in the 1980s and 1990s, and to high-dimensional data in the first decade of this century. His work exemplifies the idea that statistics as a discipline grows stronger when it confronts the important problems of great social impact while providing a fundamental understanding of these problems and their associated methods that push forward theory, methodology, computation, and applications. Because of the varied nature of Bickel's work, it is a challenge to select his papers for this volume. To help readers understand his contributions from a historical prospective, we have divided his work into the following eight areas: "Rank-based nonparametric statistics", "Robust statistics", "Asymptotic theory", "Nonparametric function estimation", "Adaptive and efficient estimation", "Bootstrap and resampling methods", "High-dimensional statistical learning", and "Miscellaneous". The division is imperfect and somewhat artificial. The work of a single paper can impact the development of multiple areas. We acknowledge that omissions and negligence are inevitable, but we hope to give readers a broad view on Bickel's contributions.

This volume includes new photos of Peter Bickel, his biography, publication list, and a list of his students. We hope this will give the readers a more complete picture of Peter Bickel, as a teacher, a friend, a colleague, and a family man. We include a short foreword by Peter Bickel in this volume.

We are honored to have the opportunity to edit this Selected Work of Peter Bickel and to present his work to the readers. We are grateful to Peter Bühlmann, Peter Hall, Hans-Georg Müller, Qiman Shao, Jon Wellner, and Willem van Zwet for their dedicated contributions to this volume. Without their in-depth comments and prospects, this volume would not have been possible. We are grateful to Nancy Bickel for her encouragement and support of this project, including the supply of a majority of photos in this book. We would also like to acknowledge Weijie Gu, Nina Guo, Yijie Dylan Wang, Matthias Tan and Rui Tuo for their help in typing some of the comments, collecting of Bickel's bibliography and list of students, and typesetting the whole book. We are indebted to them for their hard work and dedication. We would also like to thank Marc Strauss, Senior Editor, Springer Science and Business Media, for his patience and assistance.

Princeton, NJ, USA
Jerusalem, Israel
Atlanta, GA, USA

Jianqing Fan
Ya'acov Ritov
C.F. Jeff Wu

Selected Works of Peter J. Bickel

Fan, J.; Ritov, Y.; Wu, C.F.J. (Eds.)

2014, XLIV, 584 p., Hardcover

ISBN: 978-1-4614-5543-1