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EDITORIAL

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We grieve the loss of Professor Peter Hall on January 9, 2016. Peter was a true scholar who played a major leadership role throughout the statistics profession. For the Institute of Mathematical Statistics (IMS), he served as President and as Co-Editor of *The Annals of Statistics* (AoS). As a mentor and friend of so many in our statistical community, his tremendous support of young scholars was legendary. Approved by the IMS, this issue of AoS is dedicated to the memory of Professor Peter Hall.

With the help of Professors Edward I. George and Tailen Hsing, the Editors of AoS, Runze Li led the organization of this dedicated issue. Starting with five invited memorial articles, this issue consists of fourteen regular papers selected from the more than 70 already accepted AoS papers, but not yet published as of January 31, 2016. These regular papers represent the spectrum of Peter's research and a reflection of the worldwide impact of Peter's work. The authors of the regular papers were invited to add a tribute to Peter Hall as a footnote in the first page of their papers.

Professor Peter Hall made a wide ranging and ground-breaking contribution to many statistical fields including, but not limited to, bootstrap, nonparametric modeling, deconvolution, functional data analysis and high-dimensional data modeling. Song-Xi Chen, a formal Ph.D. student of Professor Peter Hall, was invited to write a memorial article with highlights of Peter's contributions on the bootstrap in [3]. Peter had 80 publications on the bootstrap, with the first paper published in 1985. Peter published a series of important papers that addressed fundamental issues related to bootstrap confidence intervals, iterative bootstrap method and block bootstrap method.

In their memorial article [4], Ming-Yen Cheng, a former postdoctoral fellow of Professor Peter Hall, and Jianqing Fan, one of Peter's close friends and co-authors, present a selective overview on Peter's contributions on nonparametric function estimation and modeling. As indicated in [4], Peter was one of the leading figures in the developments of nonparametric techniques with over 300 published papers on nonparametric density estimation and nonparametric regression including bandwidth selection, boundary issues, shape constraints, residuals variance estimation and applications. Peter's work also addressed fundamental issues related to wavelet estimator and multivariate nonparametric regression. As evidenced in [6], Peter's contribution on nonparametric inference is continuing.

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Aurore Delaigle, one of Peter's colleagues at the University of Melbourne, highlights Peter's main contributions on errors-in-variable deconvolution problems in [5]. Peter wrote a series of influential papers on classical measurement error problems as well as Berkson error problems. Through his interest in photography, Peter made a number of contributions to image analysis, which extensively uses the Fourier inversion techniques employed in the deconvolution problems.

Hans-Georg Müller, one of Peter's colleagues at UC Davis, starts his memorial article [13] with a memory of Peter's life at UC Davis, and presents Peter's major contributions on functional data analysis and random objects. Peter's work in that regard resulted in a deeper theoretical understanding of existing techniques such as functional principal component analysis, functional regression and classification and introduced seminal new concepts such as perfect classification that arise for functional data. Hans-Georg Müller divided Peter's contributions to functional data analysis into three areas: estimation of densities and modes in functional space, theory of functional principal component analysis and function regression, classification and related topics. Peter's research on functional data analysis has a direct influence on [17].

In [14], Richard Samworth, one of Peters co-authors and friends, presents a summary of Peter's contributions on high-dimensional data analysis and classification. In recent years, Peter wrote several influential papers on high-dimensional data classification and modeling including geometric representations of high dimensional data, and variable screening and ranking. Peter's research on this topic has a huge impact on theory development of high dimensional data modeling (see, e.g., [2, 7, 10, 16]).

As pointed out by several authors of the regular papers published in this issue, Professor Peter Hall had a huge influence on their own research. For instance, the approach of combining nonparametric smoothing and spatial statistics in [9] was directly motivated by some of Peter's work, and the paper [1] was inspired by Peter's earlier research. In [11], the authors employed martingale theory developed by Peter to establish their theory in this paper as well as their recent publication at the AoS.

Like many other statisticians, Runze Li (RL) knew Peter's name when RL was a graduate student. Although RL did not write a paper with Peter, RL's research on nonparametric regression and variable screening was motivated by Peter's ideas, and theoretical developments in RL's works certainly were built on theory in Peter's research. In particular, the proposal of using distance correlation [15] for variable screening in Li, Zhong and Zhu [12] was directly inspired by the generalized correlation variable screening developed in Hall and Miller [8].

RL had the great fortune to have benefited from Peter's wisdom through editorial service and personal communication. When Peter was one of the Editors of *Statistica Sinica* from 2008 to 2011, RL served on his editorial board; and Peter and RL were the Editors of the AoS from 2013 to 2015. Peter's speed was unbeatable even when he was very ill. For example, RL asked him for opinion whether

the AoS would publish a paper by Jiashun Jin and Wanjie Wang as a discussion paper on November 25, 2015. Within two hours, RL received Peter's response: "I like the paper and think it deserves to be published as a discussion paper. Reading it through, I thought it would benefit from informing the reader where the KS scores come from." RL totally agrees with what Xiao-Li Meng said in his tribute to Peter Hall: "this must be one of the key reasons that he could be the most prolific scholar of our day—always handling whatever came to his desk (or disk) right away, and always with his quick mind fully engaged."

During their tenure as Editors of AoS, RL and Peter discussed AoS submissions via emails very frequently. Thus, RL had opportunity to learn from Peter and interact with him directly. As a legendary statistician and a great scholar, Peter was an extremely kind, modest and optimistic person. Reading the last message Peter sent to RL on January 1, 2016, it is still difficult for RL to imagine that we lost Peter on January 9, 2016. Professor Peter Hall will be forever remembered as an eminent scientist, beloved colleague, mentor and friend, and his work will continue to have far-reaching impact to the development of statistical theories, methods and applications.

RL would like to thank Edward I. George and Tailen Hsing for proposing this memorial issue and for their help with the organization of this issue. RL is also very grateful to Song-Xi Chen, Ming-Yen Cheng, Aurore Delaigle, Jianqing Fan, Hans-Georg Müller and Richard Samworth for being willing to write their memorial articles, and to all authors of this memorial issue for their strong support. RL is also indebted to Raymond Carroll for advice to the organization of this memorial issue and suggestions to the memorial articles.

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