

Preface to the Third Edition

This book is the third revised and updated English edition of the German textbook “Versuchsplanung und Modellwahl” by Helge Toutenburg which was based on more than 15 years experience of lectures on the course “Design of Experiments” at the University of Munich and interactions with the statisticians from industries and other areas of applied sciences and engineering. This is a type of resource/ reference book which contains statistical methods used by researchers in applied areas. Because of the diverse examples combined with software demonstrations it is also useful as a textbook in more advanced courses,

The applications of design of experiments have seen a significant growth in the last few decades in different areas like industries, pharmaceutical sciences, medical sciences, engineering sciences etc. The second edition of this book received appreciation from academicians, teachers, students and applied statisticians. As a consequence, Springer-Verlag invited Helge Toutenburg to revise it and he invited Shalabh for the third edition of the book.

In our experience with students, statisticians from industries and researchers from other fields of experimental sciences, we realized the importance of several topics in the design of experiments which will increase the utility of this book. Moreover we experienced that these topics are mostly explained only theoretically in most of the available books. Students and applied statisticians generally lose their interest and patience in reading too much theory before they can understand the topic and use it in the applications. So we decided to write and include these topics in the third edition of the book. We have attempted to go into theory only up to

a necessary level. At several places, we have tried to explain the concepts, methodologies and utility of the topics with particular cases of designs of experiments instead of starting directly with a theoretical setup. We would like to remark that this text may not directly appeal to a reader interested only in theory. Some good references are provided which can be followed later to get a theoretical grasp after understanding the text from this book.

We have added a new Chapter 6 on incomplete block designs. This chapter starts with an introduction to the general theory of incomplete block designs which is necessary to understand the analysis of balanced incomplete block design and partially balanced incomplete block design introduced afterwards. More emphasis is given in explaining the setup, concept, methodology and various other aspects of these designs. For the analysis part, the results from the general theory of incomplete block designs are carried over and used directly.

The Chapter on "Multifactor Experiments" is extended and topics on confounding, partial confounding and fractional replications in factorial experiments are introduced. These topics do not start directly with the theoretical setup. We have rather considered particular cases of factorial designs to explain the intricacies of related concepts and have developed the necessary tools stepwise. Once a reader understands these steps and gets familiar with the concepts and terminologies, then all the details can be extended to a general setup.

The derivations of the theoretical results again are put into an Appendix so that a reader interested in the applications is not burdened unnecessarily.

We thank Dr. John Kimmel of Springer-Verlag for his help in the third edition of the book.

We invite the readers to send their comments and suggestions on the contents and treatment of the topics in the book for possible improvement in future editions.

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