

Preface

Three of us are ‘Senior Citizens’ in the context of ‘Statistics Learning’ and we are ever-grateful to our revered postgraduate teachers for highlighting the fundamental and basic contributions of R.A. Fisher and Frank Yates in such areas as Design of Experiments [DoE]. We had the opportunity to read their books, so much so that we went through Fisher’s original book published in the 1930s. These are indeed ‘Treasured Collections’! Our fascination for DoE started from that point of time and it has continued to be intriguing for more than 40 years! We thoroughly enjoy reading, learning and discussing all aspects of DoE—theory and applications.

There are two incidences to be told in real-time experience underlying this project.

First, around 2002 one of the co-authors was trying to make a ‘dent’ into a paper on Optimal Covariates Designs [OCDs] with a colleague of him with very little success primarily because the notations were difficult to follow. Fortunately for the rest of us and for the optimal design community at large, they did not give up altogether. Instead, at the earliest opportunity they approached one of the other co-authors for looking into this paper. That was one positive development indeed and together, they could digest the paper and go forward as a ‘high speed jet’! On another occasion around 2003, again one of the co-authors was struggling with a constructional problem involving OCDs and this time he was accompanied by one enthusiastic graph-theorist and one matrix-specialist. While they were in ‘seemingly deep’ trouble and in a ‘confused state of mind’, one of their colleagues—a design specialist—suddenly ‘peeped in’ and made a very casual observation, ‘it seems ... you are discussing some aspects of Mixed Orthogonal Arrays’ and that was it to give again another big push to this work.

In a nutshell, these two incidences gave a boost to our group and we did not have to look back any more! We have enjoyed working on this project. We have derived much pleasure working in a group discussing, arguing and counter-arguing, till the time that we thought we came to understand enough of this fascinating topic of research to prepare a Research Monograph.

We must hasten to add that the youngest member of our group [GD] kept the others in toe with his frequent ‘claims’ and ‘counter-claims’ and ‘proofs’ and

‘counter-examples’! Working with him was a matter of great pleasure for us. His enthusiastic and provocative statements/claims frequently served as ‘make-belief’ prophecies which were to be verified by the other three; it was not easy all the time anyway.

Finally, we are here with a comprehensive account of what we believe to be a Treatise on OCDs, more from the viewpoint of ‘Idealistic Scenarios’ in different experimental situations. The emphasis all through is about ‘optimal’ choice of what are called ‘controllable covariates’ in continuous domain(s). Only in the last chapter, we dwell on ‘realistic experimental situations’ and provide solutions to some well-posed problems.

Confusion continued to follow us and it gave us a scope for generating arguments and counter-arguments till we reached *Clarity* with our own understanding of the findings.

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Theory and Applications

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