

## **Optimal Discrete Choice Experiments Design over Model Uncertainty**

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### **ABSTRACT**

Discrete choice experiments (DCEs) have been commonly used in marketing, behavior and social science, and many other areas. Many criteria have been proposed to construct optimal DCE designs. A major limitation of the criterion-based designs is that they depend on the model, which are often assumed to contain main effects only. When some interactions among attributes are potentially significant, and the researchers are uncertain at the design stage about which are the significant interactions, it is important to construct the DCE designs that are robust against misspecification of the underlying model. We propose a general methodology for constructing model robust DCE's based on a design criterion called Bayesian Information Capacity. The performance of the proposed model robust DCE design is assessed in terms of the commonly used D-criterion. We study the efficiency loss of a design due to model uncertainty and demonstrate that the traditional D-optimal design based on main-effect only model may have serious flaws when some unexpected two-factor interactions turn out to be significant. We also explore the properties of the proposed design from the perspectives of relative efficiency and minimal level overlap properties.

## **BIOGRAPHY**

Dr. William Li is Professor of the Operations and Management Science Department at the University of Minnesota. He received his B.Sc. in Applied Mathematics from the Tsinghua University in China, and both his M.S. and his Ph.D. in Statistics from the University of Waterloo in Canada. After he graduated in 1995, he worked in the Reliability Methods Department as a reliability engineer at Ford Motor Company and won the 1996 Customer-Driven Quality Award at Ford. In 1996 he joined the Operations and Management Science Department at the University. He has also taught international executive MBA courses in different programs in Austria, China, and Poland and won the 2006 Teaching Award of the Carlson School of Management. He is an invited professor at Fudan University and has taught executive MBA courses for the School of Management at Fudan. His research articles have appeared in journals such as *Journal of American Statistics Association*, *Technometrics*, *Journal of Quality Technology*, *Journal of Statistical Planning and Inference*, and *Neural Computation*. Dr. Li's research interests include the optimal design of industrial experiments, robust designs, quality control, and efficient computer experiments. Among his publications is a textbook "Applied Linear Statistical Models" (with Kutner, Nachtsheim, and Neter), 5<sup>th</sup> Edition, Irwin.

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***All are welcome!***

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