

**Bayesian Analysis and Reliability
Estimation of Generalized
Probability Distributions**

Editor
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Bayesian Analysis and Reliability Estimation of Generalized Probability Distributions

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About this Book

This edited volume entitled "Bayesian Estimation and Reliability Estimation of Generalized Probability Distributions" is being published for the benefit of researchers and academicians. It contains ten different chapters covering a wide range of topics both in applied mathematics and statistics. The points of various theorems and examples have been given with utmost details.

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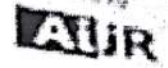
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A New Optimal Orthogonal Additive Randomized Response Model Based on Moments Ratios of Scrambling Variable

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Additional information is available at the end of the chapter

Introduction

The Randomized response (RR) technique was first presented by Warner (1965) mainly to cut down the probability of a reduced response rate and/or inflated response bias experienced in direct or open survey relating to sensitive issues. Some recent involvement to randomized response sampling is given by Fox and Tracy (1996), Singh and Mathur (2004, 2005), Ghorvarg and Singh (2006), Singh and Tarras (2013, 2014, 2018, 2016) and Tarras and Singh (2010, 2017, 2018). We below give the description of the model due to Singh (2010).

Singh (2010) Additive Model

Let there be k scrambling variables denoted by $X_j, j = 1, 2, \dots, k$ whose mean θ_j (i.e. $E(X_j) = \theta_j$) and variance γ_j^2 (i.e. $V(X_j) = \gamma_j^2$) are known. In Singh's (2010) proposed optimal new orthogonal additive model named as (POONAM), each respondent selected in the sample u requested to rotate a spinner, as shown in Fig. 9.1, in which the proportion of the k shaded areas, say P_1, P_2, \dots, P_k are orthogonal to the means of the k scrambling variables, say $\theta_1, \theta_2, \dots, \theta_k$ such that

$$\sum_{j=1}^k P_j \theta_j = 0 \quad (9.1)$$

and
$$\sum_{j=1}^k P_j = 1 \quad (9.2)$$

