RELEVANCE OF THE BAYESIAN PARADIGM
FOR "APPLIED PROBABILISTS"

N.D. SINGPURWALLA*

University, Washington, D.C. 20052, USA

Abstract

This paper is based on an invited lecture given by the author at the ORSA/TIMS
Special Interest Group on Applied Probability Conference on Statistical and
Computational Problems in Probability Modeling, held at Williamsburg, Virginia,
January 7–9, 1985.

The theme of this paper is twofold. First, that members of the above group
should be seriously concerned with issues of statistical inference — they should
not stop short upon proposing a probability model. Second, that inference be
undertaken via a strict adherence to the rules of probability — the Bayesian para-
digm. To underscore a need for emphasizing the first theme, it may be pertinent
to note that an overwhelming majority of the papers dealing with statistical
and inferential issues that were presented at this conference were authored by
members who did not claim to belong to the ORSA/TIMS Special Interest Group
on Applied Probability.

The lecture was followed by a panel discussion, with Drs. Lyle Broemeling
and Edward Wegman of the Office of Naval Research as discussants. Dr. Robert
Launer of the Army Research Office served as a moderator. Discussions from the
floor included comments by Professors D. Harrington of Harvard University, E.
Parzen of Texas A&M University, and R. Smith of Imperial College, London,
England. This paper, and the comments of the panelists, are published in this
volume of the Annals of Operations Research, which is going to serve as a Proceed-
ing of the Conference.

Keywords and phrases

Bayesian paradigm, Bayes, statistical inference, applied probability, uncertainty.

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What we have to say here reflects our own views and biases. However, with respect to the foundational issues on probability and statistics, we have been directly influenced by a reading of, and in some cases, discussions with the following persons:


With respect to what does one mean by "applied probability", we have benefited by conversations with:

Professors Narayan Bhat, Donald Gross, Carl Harris, Douglas Miller, Peter Purdue, and Robert Smythe.

The responsibility for any misrepresentation of the above's views is entirely ours.

1. Introduction

Our aim in writing this paper is to present arguments supporting the following two points of view:

(1) That in order to fulfill their scientific obligation, members of the ORSA/TIMS Special Interest Group on Applied Probability should be concerned with matters of statistical inference.

(2) That the Bayesian paradigm which is not only coherent, but which also fits very well with the mathematical orientation of the group, must be adopted.

The above points of view provoke several questions, the first of which is:

QUESTION NO. 1

Why should the Bayesian paradigm, which in the past has generated a heated debate among statisticians, and which is (to a lay person) associated with the problem of statistical inference, be of any concern to members of the ORSA/TIMS Special Interest Group on Applied Probability?

To answer the above question, we must first come to grips with the following two questions, which at first sight may appear irrelevant to the theme of our paper. These are: