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0521444705 - Symmetry and Its Discontents: Essays on the History of Inductive Probability

S. L. Zabell

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## Symmetry and Its Discontents

This volume brings together a collection of essays on the history and philosophy of probability and statistics by one of the eminent scholars in these subjects. Written over the last fifteen years, they fall into three broad categories. The first deals with the use of symmetry arguments in inductive probability, in particular, their use in deriving rules of succession (Carnap's "continuum of inductive methods"). The second group deals with four outstanding individuals who made lasting contributions to probability and statistics in very different ways: Frank Ramsey, R. A. Fisher, Alan Turing, and Abraham de Moivre. The last group of essays deals with the problem of "predicting the unpredictable" – making predictions when the range of possible outcomes is unknown in advance. The essays weave together the history and philosophy of these subjects and document the fascination that they have exercised for more than three centuries.

S. L. Zabell is professor of mathematics and statistics at Northwestern University. A Fellow of the Institute of Mathematical Statistics and the American Statistical Association, he serves on the editorial boards of *Cambridge Studies in Probability, Induction, and Decision Theory*, and *The Collected Works of Rudolph Carnap*. He received the Distinguished Teaching Award from Northwestern University in 1992.

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*Northwestern University*



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*For Dick Jeffrey, mentor and friend.*

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[More information](#)

## Contents

<i>Preface</i>	<i>page ix</i>
PART ONE. PROBABILITY	
1. Symmetry and Its Discontents	3
2. The Rule of Succession	38
3. Buffon, Price, and Laplace: Scientific Attribution in the 18th Century	74
4. W. E. Johnson's "Sufficientness" Postulate	84
PART TWO. PERSONALITIES	
5. The Birth of the Central Limit Theorem [with Persi Diaconis]	99
6. Ramsey, Truth, and Probability	119
7. R. A. Fisher on the History of Inverse Probability	142
8. R. A. Fisher and the Fiducial Argument	161
9. Alan Turing and the Central Limit Theorem	199
PART THREE. PREDICTION	
10. Predicting the Unpredictable	217
11. The Continuum of Inductive Methods Revisited	243
<i>Index</i>	275

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## Preface

These essays tell the story of inductive probability, from its inception in the work of Thomas Bayes to some surprising current developments. Hume and Bayes initiated a dialogue between inductive skepticism and probability theory that persists in various forms throughout the history of the subject. The skeptic insists that we start in a state of ignorance. How does one quantify ignorance? If knowledge gives rise to asymmetric probabilities, perhaps ignorance is properly characterized by symmetry. And non-trivial prior symmetries generate non-trivial inductive inference. Then perhaps symmetries are not quite such innocent representations of ignorance as one might have thought. That is a sketch of the theme that is developed in the title essay, “Symmetry and its Discontents”, and that runs throughout the book.

In the second section of this book, we meet Sir Alexander Cuming, who instigated important investigations by De Moivre and Stirling, before being sent to prison for fraud. We view Ramsey’s famous essay “Truth and Probability” against the Cambridge background of Robert Leslie Ellis, John Venn and John Maynard Keynes. Fisher’s discussion of inverse probabilities is set in the context of Boole, Venn, Edgeworth and Pearson and his various versions of the fiducial argument are examined. We learn of Alan Turing’s undergraduate rediscovery of Lindeberg’s central limit theorem, and of his later use of Bayesian methods in breaking the German naval code in World War II.

The last section deals with developments in inductive probability, which are still not generally well-known, and that some philosophers have thought impossible. The question is how a Bayesian theory can deal in a principled way with the possibility of new categories that have not been foreseen. On the face of it the problem appears to be intractable, but a deeper analysis shows that something sensible can be done. The development of the appropriate mathematics is a story that stretches from the beginnings of the subject to the end of the twentieth century.

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These essays have appeared, over almost twenty years, in a variety of disparate and sometimes obscure places. I remember eagerly waiting for the next installment. Each essay is like a specially cut gem, and it gives me great satisfaction that they can be brought together and presented in this volume.

Brian Skyrms