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by Persi Diaconis

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### Introduction

**Basics of Representations and Characters** 

Definitions and examples; The basic theorems; Decomposition of the regular representation and Fourier inversion; Number of irreducible representations; Products of groups

### Random Walks on Groups

Examples; The basic setup; Some explicit computations; Random transpositions; The Markov chain connection; Random walks on homogeneous spaces and Gelfand pairs; Some references; First hitting times

### **Probabilistic Arguments**

Introduction—strong uniform times; Examples of strong uniform times; A closer look at strong uniform times; An analysis of real riffle shuffles; Coupling; First hits and first time to cover all; Some open problems on random walk and strong uniform times

### Examples of Data on Permutations and Homogeneous Spaces

Permutation data; Partially ranked data; The d-sphere  $S^d$ ; Other groups; Statistics on groups

### Metrics on Groups, and Their Statistical Uses

Applications of metrics; Some metrics on permutations; General constructions of metrics; Metrics on homogeneous spaces; Some philosophy

### Representation Theory of the Symmetric Group

Construction of the irreducible representations of the symmetric group; More on representations of  $S_n$ 

### **Spectral Analysis**

Data on groups; Data on homogeneous spaces; Analysis of variance; Thoughts about spectral analysis

### Models

Exponential families from representations; Data on spheres; Models for permutations and partially ranked data; Other models for ranked data; Theory and practical details

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# GROUP INVARIANCE APPLICATIONS IN STATISTICS

Morris L. Eaton
University of Minnesota

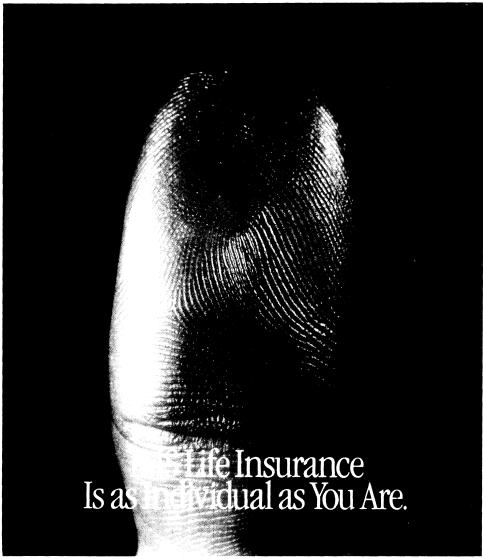
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