Preface

Groups are wonderful mathematical structures that find application in many different fields, including statistics, as exemplified, for instance, by such recent publications as Diaconis (1988) and Eaton (1989). I fell in love with groups while still a physics student and have been fascinated by their beauty and usefulness ever since.

My involvement with the topic of this monograph started way back in 1964 when I was working on a statistical problem in sequential analysis where the invariance group was incompletely specified. That necessitated writing the distribution of a maximal invariant as an integral over the group, and the concept of cross section—local for density ratios and global for the whole distribution—seemed an obvious tool to use. Cross sections as carriers of the distributions of maximal invariants turned out to be very useful, also in the many examples where the group is completely specified. An exposition of this method forms the core of the monograph.

My activity in this field remained dormant until around 1980. By that time I had learned a lot more about topology, groups, and measure from the Bourbaki school and I was ready to attempt a synthesis of group methods and cross sections to represent distributions of maximal invariants. Since this makes ample use of several different branches of mathematics, Michael Perlman, then the Editor of the *Annals of Statistics*, suggested that I expand my paper to include the