

Preface

In his notes on a *Monograph on Non-Experimental Studies*, W. G. Cochran wrote, before he had proceeded very far with the outline, "My plan has been for a short book (e.g., 150 pages) addressed not to statisticians but to subject-matter people who do or may do these studies. Because my experience lies there, the selection of topics and examples will be a bit oriented toward field studies in health, but I'll try to avoid too much of this. . . . I'd like to keep it as simple as seems feasible. It will be more of a reference-type book than a text, but might be the basis of a seminar in a subject-matter department."

He spoke also of the difficulty of choosing an order for chapters in such a work. He thought the reader would have problems because, to prepare to read any chapter, some other chapters ought to be read. He felt this was symptomatic of the topic. The level of difficulty would vary a great deal from part to part, and the reader would find it necessary to adjust to this. He also found the problem that every author of a monograph has encountered: more research is needed in many spots "before I'll have something worth saying. I think, however, that if I pay too much attention to this point, it will never be written." Ultimately, he wrote six and a half of his intended seven chapters, and we present them here.

Cochran wrote his book on observational studies by assembling about a chapter a year, usually writing in the summer. He taught a course on the subject at Harvard using his notes. As the manuscript neared completion, his health suffered a sequence of blows, each of which required substantial time for recovery. His other extensive writings, both new research articles and revisions of Snedecor and Cochran's *Statistical Methods* and of his own *Sampling Techniques*, as well as his teaching, continued at a good pace in spite of these medical setbacks. Nevertheless, he did not get back to the book before his death, although he sometimes spoke of the possibility of getting someone to help complete it.

After his death, Cochran's wife, Betty, edited his collected papers. Mosteller consulted with her on the possibility that the manuscript on observational studies might be publishable. She searched through Cochran's papers and identified the manuscript. Nevertheless, the revision of the papers did not progress until Moses agreed to help with the editing. Since then it has been a joyous enterprise for both of us.

Several considerations encouraged us to undertake the work of editing the manuscript for publication. First, the planning and analysis of observational studies is an important area of statistical methodology. Second, Cochran made many strong contributions to this topic over his career, and he wrote from broad experience and with theoretical insight; surely his book should be published. Third, the manuscript itself was attractive, especially for its characteristic of considering failure of assumptions. Again and again Cochran gives attention to the behavior of a statistical procedure when one or more of the assumptions underlying its mathematical justification is false in some degree. Thus, regressions may not be linear; they may not be parallel; matching may be inexact; variances may be inhomogeneous; and so forth. The manuscript contained, as do many others of his publications, tables indicating the quantitative results of assumptions that failed by various amounts. These analyses both increase understanding of the statistician's tools and facilitate practical planning of studies.

The editors of a posthumous work have an obligation to explain the nature and extent of their interventions. We agreed that we would leave the material as originally written, except when there was clear need to make modifications. Once this decision was reached, we had a fairly straightforward path. Cochran did not write and repeatedly revise as some authors do, and so we felt justified in treating the manuscript as finished prose for the most part.

Cochran had told Mosteller repeatedly that the book was complete except for one chapter, but that the order of the chapters was still a puzzle. We had two candidates for the opening chapter—the slightly technical chapter that we have put first and the more chatty, unfinished Chapter 7. Some readers may wish to read Chapter 7 first. We chose to put it last because opening the book with a fragmentary chapter might give the reader the mistaken impression that much of the work was unfinished. Nevertheless, a completed Chapter 7 probably would have made a beautiful opening.

One topic was treated twice, both in Chapter 1 and Chapter 6. We removed most of this topic from Chapter 1 and placed some of it as the Appendix to Section 6.12. This move had the advantage of substantially lowering the technical level of Chapter 1.

We found occasional errors in formulas and corrected them. We also struggled to unify the notation, whose variety may have stemmed from

chapters being written at disparate times and places. We are sure that Cochran would have corrected this in his own final review of the book.

We have preserved the economy of the technical writing; some brevity was achieved by relying on the reader to provide parallelism, by using implicit definitions, by saying in words what might require several subscripts, or by adopting occasional tricky notation that the reader will need to detect. Using these devices, Cochran avoids many ugly equations and mathematical expressions. We have decided that terms should usually be defined, and so we have added some definitions of expressions where the reader would otherwise have to guess at their meanings.

The references needed attention—their state was mixed from chapter to chapter. They were sometimes complete, or nearly complete, and sometimes were only indicated in the text by author or by author and a dubious date. We have not added new references, except possibly where we may not have understood the source intended. If we have not found the appropriate ones, we apologize and will appreciate having misjudgments brought to our attention. We have included with each reference to Cochran's own work, the number (in square brackets) which refers to the presentation of the referenced work in William G. Cochran, *Contribution to Statistics*, John Wiley & Sons, New York, New York, 1982. For some readers, this will be a more convenient source than the original publication.

Although we had the original outline for Chapter 7, Cochran did not keep to it and so we cannot conjecture what the rest of the chapter would have been like. Because Cochran expresses many personal views based on vast experience, it seemed wise to stop with his words.

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May 1983