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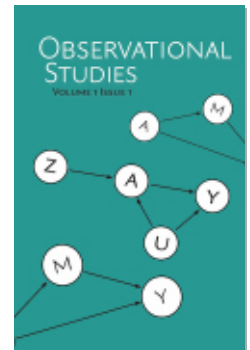
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Comment on “Observational Studies”, by William G. Cochran

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It has been a pleasure for me to reread this paper by Wm. Cochran after a number of years and to see it reprinted in the opening issue of the journal, *Observational Studies*. Although I was a graduate student in the Department of Statistics at Harvard in the 1960s, I never actually took a course from him but I did sit in on a seminar where he described the work that appeared initially as department technical reports and then ultimately in a series of papers on the topic, e.g., see Cochran (1965, 1968) and Cochran and Rubin (1973), and his lectures included early versions of the ideas that ultimately found their way into this paper and his posthumously published book on the topic (Cochran, 1983). I actually still have copies of those technical reports in my files! As I interacted with Cochran over the ensuing decade or so I came to appreciate, more and more, the wisdom of his insights into drawing causal inferences from observational studies.

Although he is often thought of primarily as a sampling statistician or as a major force in the design of experiments, e.g., see Cochran and Cox (1957), Cochran was clearly heavily influenced in his work on observational studies by his experiences with several very large studies, such as the Kinsey Report (Cochran et al., 1953, 1954), and especially by his work as the only statistician on the 10-member scientific advisory committee for the 1964 U.S. Surgeon General’s report (United States Public Health Service, 1964) concluding that cigarette smoking caused lung cancer. In the Kinsey report, Cochran et al. argued that there was no basis for many of the inferences drawn by the authors, although he says this in quite a gentle way in the present paper, whereas in the case of the effects of smoking on cancer the observational evidence was strong and he describes some of his thinking on the topic in Section 6.

Perhaps the most important thing we can take from this paper is Cochran’s clear message: If we really want to draw causal inferences from observational studies then we need to think about their design and how such designs approximate those that we might have developed, had we only been able to design a randomized controlled trial. As methods for dealing with observational studies have developed over the ensuing decades this same philosophy can be found in the books by Rosenbaum (2002, 2010) and the article by Rubin (2008).

This leads me to speculate how Cochran would have viewed the current “Big Data” movement. As others have remarked in recent years, drawing causal inferences from large amounts of data gleaned from the WWW is fraught with difficulty, and this involves both internal validity (to which randomization provides the key) and external validity (our ability

to generalize to a relevant population). If only the proponents of big data for causal purposes would take the time to read Cochran's 1972 paper with care!

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