D. A. S. Fraser

University of Toronto

The issue indicated by the title of Dawid and Stone's paper is substantial and indeed touches on larger questions as to what inference is and what a basis for inference could be. The paper is clearly organized with frequent examples and seems technically correct. The notation is very concise and generally adequate. However, the paper does not touch on the larger questions as to what inference is or what a basis could be, and may indeed be misleading in the pursuit of these questions.

The issue examined in the paper has two parts. The first concerns the particular statistical model, a *structured model* (Fraser, 1971)—although the inappropriate term functional model (Bunke, 1975) is used (Section (ii)). The second concerns an inference procedure, the inversion of the *structural equation* (Fraser, 1966, 1968). This procedure gives a nominal distribution on the parameter space, a *structural distribution* (Fraser, 1966, 1968, 1979; Bunke, 1975)—although the term fiducial distribution is used, and used incorrectly given Fisher's prescriptions (Section (i)). The procedure is examined only for self-consistency and confidence consistency, but not for validity, a primary criterion that should be mentioned and has been examined elsewhere (see Section (ii)). Some comments are given in Sections (i) to (vi).

(i) Fiducial inference. Fiducial probability is clearly the product of R. A. Fisher who gave rules, methods and conditions for its calculation. Fiducial inference is reasonably taken to be the use of fiducial probability as the "inference" from data.

Throughout Fisher's work the fiducial distribution is based on the "sampling frequency distribution" (Fisher's term) or on the "sampling distributions of the data" (Section 4.2). Thus Corollary 4.1 stating that a fiducial distribution is determined by the sampling distribution is presenting what in fact is a premise to fiducial theory. If fiducial is left to be what Fisher attempted and intended, then Corollary 4.1 is a misunderstanding or a mistake.

The key ingredient used by the authors in addition to the sampling distributions is an equation, a pivotal function (Fisher, 1956) for the distribution model or a structural equation (Fraser, 1968) for an error model. Fisher (1956) discusses such an additional ingredient: "It has been proposed that any set of functions having distributions independent of the parameters (i.e., pivotal function) ... can be used to transform the simultaneous frequency distribution of (sample standard deviations and correlation) into the simultaneous distribution of (population standard deviations and correlation)" He then asserts that "the (just mentioned) short cut ... has no claim to validity unless it can be proved to be equivalent to a general fiducial argument: The (pivotal functions) cannot indeed be made to supply such an argument." Fisher clearly rejected the addition of pivotal functions. With fairness to Fisher, the term fiducial cannot be applied to the procedures in the present paper.

The pivotal functions in the preceding example for Fisher embrace those in Example 2.3 which is then excluded by Fisher's criteria as a fiducial example.

(ii) Error models. Fiducial distributions were developed by Fisher in the context of the distribution (classical/traditional) model. Dawid and Stone focus on *error models*—models given in terms of an *error variable*.

Received May 1982.