Berger, James O.
In defense of the likelihood principle: Axioms and coherency. (English) Zbl 0705.62013

Summary: [For the entire collection see Zbl 0659.00012.]
Belief in the likelihood principle was substantially advanced when A. Birnbaum [J. Am. Stat. Assoc. 57, 269-306 (1962; Zbl 0107.365)] showed it to be derivable from the apparently more natural sufficiency and conditionality principles. This axiomatic development subsequently came under attack from a number of directions, among the most interesting being a criticism (by D. A. S. Fraser, G. Barnard and others) of the sufficiency principle for failure to take into account “structural” knowledge of the performed experiment. This criticism is addressed in this paper from two directions.

First, a weak set of alternative axioms for the likelihood principle is developed. Second, ideas of coherency are employed to question the validity of knowingly violating the likelihood principle. In this development, arguments are presented for basing coherency on decision-theoretic concepts, rather than the more usual betting concepts. The basic conclusions of the paper also apply to other theories which can violate the likelihood principle, including many noninformative prior Bayesian theories.

MSC:
62A01 Foundations and philosophical topics in statistics

Keywords:
complete classes; inadmissibility; structural analysis; likelihood principle; conditionality principles; sufficiency principle; weak set of alternative axioms; coherency; noninformative prior Bayesian theories