In his classical exposition of Bayesian statistics, *The Foundations of Statistics* (1954), L. J. Savage defended the “behavioralistic outlook” against the “verbalistic outlook”: statistics deals with problems of deciding what to do rather than what to say. Savage referred to F. P. Ramsey’s and Abraham Wald’s work on decision theory and to Jerzy Neyman’s proposal to replace “inductive inference” with “inductive behavior”. All of these approaches were in opposition to R. A. Fisher’s formulation of statistical estimation and testing in traditional terms as truth-seeking methods of scientific inference. In spite of the prominence of the decision-theoretic approach, some influential Bayesians (like Dennis Lindley) have preferred to emphasize estimation and testing as procedures of inference. A reconciliation of inference and decision was forcefully proposed by Isaac Levi in his *Gambling With Truth* (1967). Levi argued against “behavioralism” that the tentative acceptance and rejection of scientific hypotheses cannot be reduced to actions that are related to practical objectives. According to Levi’s “critical cognitivism”, science has its own theoretical objectives, defined by the maximization of expected “epistemic utilities”, such as truth, information, and explanatory power. As a development of cognitive decision theory, and in the spirit of critical scientific realism, Ilkka Niiniluoto’s *Truthlikess* (1987) suggests that scientific inference is defined by the attempt to maximize expected verisimilitude. This proposal allows us to interpret Bayesian point and interval estimation in terms of decisions relative to loss functions which measure the distances of rival hypotheses from the truth.

### 3.1 Why I AM A BAYESIAN

Let me start with a personal introduction by telling why I am a Bayesian. In 1973 I defended my Ph.D. thesis on inductive logic by applying Jaakko Hintikka’s system to theoretical inferences in science. Inductive logic is a special case of Bayesianism where epistemic probabilities are defined by symmetry assumptions concerning states of affairs expressible in a formal language (for a survey, see Niiniluoto, forthcoming).

My commitment to Bayesianism has a longer history, however. In 1968 I wrote my Master thesis in mathematics “On the Power of Bayes Tests”. My supervisor at the University of Helsinki Professor Gustav Elfving (1908–1984) was one of the first mathematical statisticians in Scandinavia who supported the Bayesian approach (see Nordström 1999). His influence can still be seen today in Helsinki in the lively
interest in Bayesian reasoning and its applications at the Department of Mathematics and Statistics and the Department of Computer Science.

The key text for a young Bayesian was Leonard J. Savage’s *The Foundations of Statistics* (1954) which gives an elegant axiomatic treatment of the subjective expected utility model (SEU). In my attempt to reconstruct Savage’s proof of the representation of qualitative personal probabilities, I found a minor mistake in his Theorem 3 (*ibid.*, p. 37). During the 4th International Congress for Logic, Methodology, and Philosophy of Science in Bucharest in the summer of 1971, Hintikka introduced me to Savage. I was sitting in a park with this admired hero of the Bayesians trying to explain my observations. Savage, who had problems with his sight, was extremely friendly and encouraging. My paper on qualitative probability was published in *Annals of Mathematical Statistics* (see Niiniluoto 1972) after Savage’s untimely death.

In moving from mathematics to philosophy of science, I was attracted by the philosophical position of scientific realism. In my doctoral dissertation, the realist interpretation of theoretical terms was defended by means of Hintikka’s system which assigns positive probabilities to genuine laws and theories. A natural ingredient of the realist view was a dualist account which accepts both epistemic and physical probabilities (propensities). Levi’s and Hintikka’s cognitive approach, which includes truth and semantic information as epistemic utilities, suggested a remedy to the instrumentalist tone of decision theory. When I started to work on the Popperian notion of truthlikeness in the mid-seventies, I adapted the Bayesian framework to the method of estimating verisimilitude by calculating expected degrees of truthlikeness. This idea can then be applied as a special case to statistical problems of point and interval estimation by interpreting the loss function as measuring distances from the truth. This provides a fresh perspective to the traditional debate on inferential and decision-theoretic approaches in statistics.

### 3.2 Behavioralism

Savage’s *opus magnum* made a sharp contrast between “the behavioralistic outlook” and “the verbalistic outlook”: according to the former, statistics deals with problems of what to do rather than what to say (Savage 1954, pp. 159–161). Verbalism treats statistics as a mode of inference, analogous to deduction, where assertions are consequences of inductive inferences. One might think that this difference is only terminological, since assertions are also acts, and decisions are assertions to the effect that the act is the best available. Savage dismissed this proposal and concluded that verbalism has led to “much confusion in the foundations of statistics”.

Savage referred to Neyman’s 1938 article as “the first emphasis of the behavioralistic outlook in statistics”. Neyman argued that statistics is concerned with