Bayesian Statistical Inference
Željko Ivezi, Andrew J. Connolly, Jacob T. VanderPlas, Alexander Gray, Željko Ivezi, Andrew J. Connolly, Jacob T. VanderPlas, and Alexander Gray

in Statistics, Data Mining, and Machine Learning in Astronomy: A Practical Python Guide for the Analysis of Survey Data

This chapter introduces the most important aspects of Bayesian statistical inference and techniques for performing such calculations in practice. It first reviews the basic steps in Bayesian inference in early sections of the chapter, and then illustrates them with several examples in sections that follow. Numerical techniques for solving complex problems are next discussed, and the final section provides a summary of pros and cons for classical and Bayesian method. It argues that most users of Bayesian estimation methods are likely to use a mix of Bayesian and frequentist tools. The reverse is also true—frequentist data analysts, even if they stay formally within the frequentist framework, are often influenced by “Bayesian thinking,” referring to “priors” and “posteriors.” The most advisable position is to know both paradigms well, in order to make informed judgments about which tools to apply in which situations.

A Theory of Presentism
Craig Bourne

in A Future for Presentism

I begin by laying down three conditions which any theory of time should meet: it should accord with our view that certain statements about the past are true; that the truthmakers for those statements should be clear; and should accommodate the truth-value links between various
times. I show how two different kinds of presentism cannot meet these requirements, including that put forward by Prior. I develop a version of presentism, analogous to ersatz modal realism in the possible worlds debate, which does satisfy the requirements.

Bayesian Statistics 9
José M. Bernardo, M. J. Bayarri, James O. Berger, A. P. Dawid, David Heckerman, Adrian F. M. Smith, and Mike West (eds)

The Valencia International Meetings on Bayesian Statistics – established in 1979 and held every four years – have been the forum for a definitive overview of current concerns and activities in Bayesian statistics. These are the edited Proceedings of the Ninth meeting, and contain the invited papers each followed by their discussion and a rejoinder by the author(s). In the tradition of the earlier editions, this encompasses an enormous range of theoretical and applied research, highlighting the breadth, vitality and impact of Bayesian thinking in interdisciplinary research across many fields as well as the corresponding growth and vitality of core theory and methodology. The Valencia 9 invited papers cover a broad range of topics, including foundational and core theoretical issues in statistics, the continued development of new and refined computational methods for complex Bayesian modelling, substantive applications of flexible Bayesian modelling, and new developments in the theory and methodology of graphical modelling. They also describe advances in methodology for specific applied fields, including financial econometrics and portfolio decision making, public policy applications for drug surveillance, studies in the physical and environmental sciences, astronomy and astrophysics, climate change studies, molecular biosciences, statistical genetics or stochastic dynamic networks in systems biology.

The Agrippan Argument and Two Forms of Skepticism
Michael Williams

in Pyrrhonian Skepticism
This essay argues that the Pyrrhonian regress argument presupposes a Prior Grounding conception of justification. This is contrasted with a Default and Challenge structure, which leads to a contextualist picture of justification. Contextualism is said to incorporate the best features of its traditionalist rivals — foundationalism and coherentism — and also to avoid skepticism. It is argued that we should not ask which conception is really true, but instead give up epistemological realism.

Conservatism in a Simple Probability Inference Task
Jie W Weiss and David J Weiss

in A Science of Decision Making: The Legacy of Ward Edwards

This chapter presents three experiments that explore several factors that affect conservatism. Experiment I examined the effects of prior probabilities, amount of data, and the diagnostic impact of the data. In Experiment II, payoffs were imposed on the task, and in Experiment III the effects of different response modes were examined. The experiments showed that payoffs and response modes affected the amount of conservatism found to some extent. But the amount of conservatism found was large relative to the effects of these procedural variables. The failure of Ss to extract from the data all the certainty that was theoretically available was consistent and orderly, and may reflect a general limitation on human ability to process information.

Structural Properties
Alexander Bird

in Nature's Metaphysics: Laws and Properties

Geometrical and other properties that may be labelled ‘structural’ are held up as examples of properties that are not potencies, but are categorical properties. The debate between Mellor and Prior is examined in order to shed light on this question. The problem is then related to the question of whether a true physical theory should be background-free, on the grounds that it is the presence of spacetime as a background in intuitive physical theories that is responsible for the appearance that
spatial properties are categorical, whereas advanced physical theories tend to be background-free.

The Economist’s Oath
George F. DeMartino

Economists alter the course of economic affairs and thereby affect the life chances of current and future generations. They do this through their scholarship and teaching, and through their leadership of and staff-level positions in important government and multilateral agencies, consulting firms, investment banks and other economic institutions. And yet, the economics profession consistently has refused to explore the ethical aspects of its work. There is no field of professional economic ethics. As a consequence, economists are largely unprepared for the ethical challenges they face in their work. This book challenges the economic orthodoxy on the matter of professional ethics. It builds the case for professional economic ethics step by step—first by rebutting the economist’s arguments against and then by presenting an escalating positive case for professional economic ethics. The book surveys what economists do and demonstrates that this work is ethically fraught. It explores the principles, questions and debates that inform professional ethics in other fields, and identifies the lessons that economics can take from the best established bodies of professional ethics. The book demonstrates that in the absence of professional ethics, well-meaning economists have committed basic, preventable ethical errors that have caused severe harm for societies across the globe. The book investigates the reforms in economic education that would be necessary were the profession to recognize its professional ethical obligations; and it concludes with the Economist’s Oath that draws on the book’s central insights and highlights the virtues that are required of the “ethical economist.”

Keeping Up to Date
Ken Binmore

in Playing for Real: Game Theory
This chapter is about Bayesian decision theory. It explains why game theorists model players' beliefs using subjective probability distributions, and how these beliefs are updated using Bayes' rule as further information is received during the play of a game. A skeptical assessment of Bayesian decision theory as a solution to the general problem of scientific induction is then offered, suggesting that we stick to Leonard Savage's view that his theory properly applies only in the context of a small world. The chapter ends with a brief review of the common prior assumption and the idea of subjective equilibria.

BEARING OF INTERPRETATIONS OF PROBABILITY ON STATISTICAL INDUCTION

Shoutir Kishore Chatterjee

in Statistical Thought: A Perspective and History

Published in print: 2003 Published Online: September 2007
DOI: 10.1093/acprof:oso/9780198525318.003.0004

Objective statistical induction may be behavioural, instantial, or pro-subjective (Bayesian), depending on the form of judging inferential uncertainty. In the behavioral case, the unknown parameters are fixed and uncertainty is judged by measures of procedural trustworthiness (like significance and confidence levels, power and risk functions), interpreted through repeated conceptual experimentation. Various principles are invoked for optimizing the procedure in different problems. The instantial approach (likelihood inference, P-value testing, and fiducial inference) remains pegged to the instance at hand without visualizing repetition, and weighs uncertainty in non-standard ways, although often like the behavioural approach, it also has to appeal to sampling theory. In the pro-subjective Bayesian approach, the unknown parameters are subjectively random with a known prior distribution, and inference is based on their posterior distribution. Various kinds of priors (improper/proper, impersonal/personal) fit in different tastes and situations. The subjective approach, based on a fully known subjective probability model, ‘previses’ about future observables, conditionally fixing the observations, often assuming exchangeability to simplify the process. Comparison of the different approaches shows that each has a natural setting in which it is advantageous.
BEGINNING OF THE PRO-SUBJECTIVE APPROACH
Shoutir Kishore Chatterjee

in Statistical Thought: A Perspective and History
Published in print: 2003 Published Online: September 2007
Publisher: Oxford University Press DOI: 10.1093/acprof:oso/9780198525318.003.0007

Around the middle of the 18th century, Bayes conceived the idea of treating an unknown parameter as a subjective random variable distributed according to a prior, and inferring about it from its conditional (posterior) distribution given the observations. He considered the particular case of a binomial parameter subject to a uniform prior, and following the pro-subjective approach used the posterior to derive an interval estimate. Later, Laplace stated the result in its general form and employed it extensively for pro-subjective inference of various types in different situations, often basing his computation on the asymptotic normality of the posterior distribution. In a novel application, Laplace used pro-subjective reasoning and the data from a sample survey to estimate the size of the population of France.

Narrative and Intertextuality
Charlotte Linde

in Working the Past: Narrative and Institutional Memory
Published in print: 2009 Published Online: January 2009
Publisher: Oxford University Press DOI: 10.1093/acprof:oso/9780195140286.003.0008

This chapter investigates the relation between institutional stories and the ways in which members tell their own stories within this field of prior texts. It examines the notions of intertextuality and textual communities, showing how stories are shaped in relation to prior texts: direct citation and quotation, use of similar values in the evaluation of stories, critique of and rejection of prior texts. The chapter shows the relation of this kind of narrative intertextuality within an institution to conversion narratives. This chapter argues that an individuals' story is not only personal, but is shaped as a response to earlier stories, and the appropriate values and actions which those stories teach. This intertextuality of personal narrative means that one's presentation of the events and meanings of one's life is not only individual, but rather is strongly shaped by the stories of the communities of which one is a member.
Facts and Propositions
Michael Dummett

in Thought and Reality

Published in print: 2006 Published Online: September 2007

This chapter begins with an explanation of facts and propositions. It considers the alternative view of Frege, namely that facts, though genuine entities, inhabit a quite special sector of reality. Frege's views are compared to that of Prior, who held that a proposition may be true at certain times and false at others. Finally, the concept of temporal indicators is briefly analysed.

Prior Densities for the Regression Model
Luc Bauwens, Michel Lubrano, and Jean-François Richard

in Bayesian Inference in Dynamic Econometric Models

Published in print: 2000 Published Online: September 2011

This chapter examines prior densities applicable for the regression model. It addresses the question of how to specify precisely the shape and the contents of the prior density in an empirical application and defines the concept of non-informative prior. It explains the restrictive properties of the natural conjugate prior in the regression model and discusses issues concerning the treatment of exact restrictions and exchangeable prior densities.

Can sensation be measured?
Donald Laming

in The Measurement of Sensation

Published in print: 1997 Published Online: January 2008

There have long been psychologists who have asserted that sensation is not measurable. This second chapter looks at philosophical objections to the idea and empirical findings that bear on the issue. These findings include visual illusions, particularly the perception of features that are
simply not present in the stimulus, and prior expectations that influence the individual's judgment. The chapter finishes by setting out a functional approach to the measurement of sensation.

Bayesian Rationality and Social Epistemology
Herbert Gintis

in The Bounds of Reason: Game Theory and the Unification of the Behavioral Sciences
Published in print: 2014 Published Online: October 2017
Publisher: Princeton University Press
DOI: 10.23943/princeton/9780691160849.003.0008
Item type: chapter

This chapter uses epistemic game theory to expand on the notion of social norms as choreographer of a correlated equilibrium, and to elucidate the socio-psychological prerequisites for the notion that social norms implement correlated equilibria. The correlated equilibrium is a much more natural equilibrium criterion than the Nash equilibrium, because of a famous theorem of Aumann (1987), who showed that Bayesian rational agents in an epistemic game G with a common subjective prior play a correlated equilibrium of G. Thus, while rationality and common priors do not imply Nash equilibrium, these assumptions do imply correlated equilibrium and social norms act not only as choreographer, but also supply the epistemic conditions for common priors.

Conclusion
Louis Kaplow

in Competition Policy and Price Fixing
Published in print: 2013 Published Online: October 2017
Publisher: Princeton University Press
DOI: 10.23943/princeton/9780691158624.003.0019
Item type: chapter

This chapter links three arguments offered in favor of the traditional view to the foregoing analysis. One argument asserts a difficulty in attacking purely interdependent behavior because such would involve commanding firms to behave irrationally. Another objection is that making price elevation by oligopolists illegal is inconsistent with the legality of price elevation by monopolists. Third, it is argued that remedies, particularly injunctive relief, directed at price elevation are problematic because they amount to price regulation. The chapter analyzes each of these arguments in turn and provides counterpoints
to these three claims. It also makes further arguments on the direct, economically based approach.

Why Stevens' Law is a power law
Donald Laming

in The Measurement of Sensation

Published in print: 1997 Published Online: January 2008
Publisher: Oxford University Press
DOI: 10.1093/acprof:oso/9780198523420.003.0011

This chapter explains why Stevens' Power Law is a power law, rather than some other kind of relation. If the stimulus values are chosen in a geometric series and participants are induced to judge ratios — that is, to distribute their responses on a logarithmic scale — the great variability of magnitude estimates means that linear regression of log numerical estimate on log stimulus magnitude is the only meaningful relationship to emerge from the experiment. The power law exponent is chiefly determined by the range of the physical variable in relation to the approximately uniform range of numbers used by Stevens' participants. The uniformity of that range is enhanced by instructions. The value of the exponent is, however, modified by prior expectations, which generate a small but systematic difference between the exponents estimated from magnitude estimation and production.

The stimulus range
Donald Laming

in The Measurement of Sensation

Published in print: 1997 Published Online: January 2008
Publisher: Oxford University Press
DOI: 10.1093/acprof:oso/9780198523420.003.0012

Exponents estimated for different stimulus continua are approximately inversely related to the log stimulus range; but that ceases to be true when comparisons are made between different ranges on the same continuum. This chapter looks at some problems arising from comparisons between different ranges within a common continuum, and from very first judgments in an experiment (for which stimulus range is undefined). But participants still have prior expectations about the task they have agreed to perform, and the chapter endeavours to relate the different results to those expectations.
This chapter reviews the role of prior knowledge for the integration of sensory information and discusses how priors can be modified by experience. It shows that prior knowledge affects perception at different levels. First, it often serves as an additional cue at the level of cue integration. Second, prior knowledge of statistical regularities in the world is also important for interpreting cues, because it can provide information needed to disambiguate sensory information and thus determines the shape of the likelihood function. Third, prior knowledge is also effective at a higher cognitive level, where it determines whether and how cues are integrated. The chapter concludes by discussing where prior knowledge comes from and how flexible it is.

Ramsey on truth and meaning
Ian Rumfitt

This chapter develops F. P. Ramsey's theory of truth. Everyone knows that Ramsey had a theory of truth. Rather fewer people know that the theory came in two significantly different versions, and that the later and less famous version is more fertile than its predecessor. The more famous version is, of course, Ramsey's redundancy theory of truth, which he expounded in his great paper of 1927, ‘Facts and Propositions’. The Ramsey–Prior theory, contra Ramsey's original approach, confirms that the word ‘true’ has a determinate sense. It does so by specifying the contribution that the word makes to what is expressed by a statement that contains it. That specification vindicates the common-sense view that ‘true’ is grammatically and semantically a predicate.