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Book Review: *Maximum Entropy in Action*

Maximum Entropy in Action: A Collection of Expository Essays.
B. Buck and V. A. Macauley, eds., Clarendon Press, Oxford, 1991.

Mention of the words "maximum entropy" can bring out both the worst and the best in any practitioner who has used such techniques for processing data. On the one hand, enthusiastic proponents of the subject often lapse into paroxysms of nearly incomprehensible philosophical jargon, and on the other hand, workers in the subject can produce results of great elegance and utility when the technique is applied to the analysis of physical data. Both categories are represented among the eight articles in this volume. The best workers in this area will admit that methods based on maximum entropy are not always the most suitable in specific instances and can pinpoint when it should and should not be tried, while the most fanatic proponents claim that no other technique can be considered defensible on any grounds.

Methods based on maximum entropy tend to fit experimental data with models that contain a minimum number of spurious wiggles, i.e., it is a method to effectively smooth noisy data, which sometimes leads to the possibility of dramatically increased resolution. Maximum entropy techniques have been suggested for processing of data obtained in a number of fields, but it has been most widely explored in the context of NMR. The best articles in this collection are those that are the most specific. In particular, the article by P. J. Hore on the use of maximum entropy in NMR is a most enlightening one that demonstrates both the strengths and weaknesses of the method. Similar material about maximum entropy methods applied to a wider variety of spectroscopic techniques is discussed in a useful article by S. Davies *et al.* An exposition of the application of these techniques to data from experiments in plasma physics is given by Cottrell, and Bricogne outlines the possible utility of maximum entropy techniques as a replacement for the more commonly used direct method for phase determination in crystallography. In this area there has

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been some interest by crystallographers, but not a widespread move to routine use of maximum entropy techniques for structure determination.

To summarize, the reader will get a far better feeling for the advantages and disadvantages of methods based on maximum entropy from the concretely based articles in this collection, and be little the worse for skipping those concentrating on the philosophy behind methodology based on maximum entropy. Aside from this *caveat*, this volume does offer a useful and enlightening introduction to the general subject area and a reader interested in learning about possible applications of maximum entropy techniques could do far worse than to start by reading the concrete subject-centered articles in this volume.

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