BOOK REVIEW

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WILLIAM FELLER, *An Introduction to Probability Theory and its Applications* **2**, 2nd ed. John Wiley and Sons Inc., 1971. xxiv + 669 pp. $15.95.

Review by KAI LAI CHUNG

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Volume 1 of this work has long been established as a classic in mathematical treatises and has gone through three quite different editions. It is elementary in the sense that it begins at the beginning and presupposes little background. [When it first came out it was much used as a textbook for a first course in probability; however, it is becoming increasingly difficult to do so as the audience has widened but its mathematical preparedness has not.] In fact, it deals only with a countable sample space so that all random variables and distributions are necessarily of the discrete type. This of course does not prevent Feller from going off at various deep ends and discussing some of the most up-to-date topics of interest. The restriction was deliberately imposed in order to waste no time on dull generalities (often indiscriminately referred to as "measure theory") and to proceed at once to significant results. It is clear that many basic concepts cannot even be defined in the restricted context, and any serious exposition of stochastic processes in continuous time would be out of the question. But the latter is precisely where the action is at these days. Feller himself made fundamental contributions in the nineteen-fifties to this area called by him "generalized diffusions" and by others "Feller processes" (precursor of Doob–Hunt–Meyer processes); albeit largely in an analytic form, without "paths," or rather with these only lurking in the background. It was therefore the general expectation that he would take this up in Volume 2 as a main theme. This would be a fitting sequel to his extremely successful popularization of Markov chain theory in Volume 1, acknowledged by himself in the Preface to the first edition. It must have come as a surprise to many that this is not what he did in Volume 2. Although there are recurrent and persistent allusions to bigger and better things to come (witness on page 333 "we are not at this juncture interested in developing a systematic theory"), general discussion of such processes is mostly relegated to heuristic descriptions, preparatory material and footnotes—not too copious. When asked why he chose not to expound his own theory of diffusion, Feller had responded by invoking the future promise of Volume 3, 4, $\cdots$. Alas, time has stopped too soon for him and his readers.

What he did here, in his characteristic vigor and verve, may be described in