The Left Atrium

Statistically speaking

Dicing with death: chance, risk and health

Stephen Senn

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Stephen Senn is not the instructor from Statistics 101 who put you to sleep with a dreary monotone delivery and an endless list of formulas and references to tables of critical values of the χ^2 distribution. Senn is a professor of statistics with many years of experience in the pharmaceutical industry designing and analyzing clinical trials — but he's also a storyteller, a wit, an opinionated polemicist and a master at making complex ideas easy to understand.

In *Dicing with Death*, Senn sets out to “explain how important statistics is” and takes the reader on a wild, thought-provoking and always entertaining ride through biostatistics and beyond. Modern statistical science is the product of a long and fascinating history, and Senn delights in recounting the development of important ideas. He makes an art of digression, acknowledging that “the medically qualified reader may detect the symptoms of knight's-move-thought ... and conclude that the author is schizophrenic.” Indeed the journey can be disorienting. What, for example, would be the subject of a chapter titled “Time's tables”? (Survival analysis, it turns out.) Trust Senn, there's a point to everything — just don't forget to hang on tight. Among the topics he touches on are epidemiology, clinical trials, the philosophy of science, meta-analysis, models of infectious disease transmission and law.

Senn starts off with a tour of some paradoxes in statistics to show us that “Probability is subtle and data can deceive.” Not content simply to explain Simpson's paradox, Senn introduces what he calls “O.J. Simpson's paradox.” This sense of humour is a constant

throughout the book, extending even as far as several of the chapter notes in the extensive set collected at the end of the book. Senn is often uproariously funny, which is remarkable in a book that covers so much technical, philosophical and historical ground.

Some effort is required of the reader in following Senn through the twists and turns of quantitative reasoning. Just when the reader is convinced a solution is correct, Senn mischievously quips “Or is it?” and proceeds to further complexities. “Naturally, I am convinced this is all good stuff,” Senn writes, “but some of it, I know, is strong medicine.” Mercifully, Senn marks the more difficult sections with stars, and alternates probabilistic calculations with historical background and his quirky brand of humour. Remarkably, he succeeds in keeping mathematical notation to a minimum, making most parts of the book accessible to anyone not intimidated by careful reasoning.

In a chapter titled “Sex and the single patient,” Senn tackles a sensitive topic: the representation of women in clinical trials. Not one to shy away from controversy, he argues forcefully against a requirement of US congressional legislation, which stipulates that clinical trials be “designed and carried out in a manner sufficient to provide for a valid analysis of whether the variables being studied in the trial affect women or members of minority sub-

groups, as the case may be, differently than other subjects in the trial.” To show how such a requirement would affect the sample size needed in a trial, Senn leads us through the logic of power calculations and standard errors. For those more comfortable with mathematics, he provides a lucid explanation of variance, standard deviation and the standard error of a mean, and shows incidentally how correlation is related to a generalization of Pythagoras' theorem. He concludes, “Nobody wants trials that take four times as long to complete. Life is too short and all of us are dying. And we don't want politicians to make these stupid decisions on our behalf.”

But, like the rest of the book, the chapter has a broader sweep than this might suggest. Senn weaves in references to the work of Bayes, Fisher, Pearson and other pioneers of statistics, the details of which are taken up in other chapters. He wants to convey the historical development and logic of reasoning in the face of uncertainty — and its practical relevance.

The book does suffer from the occasional misprint, and from time to time the digressions are distracting. But these are minor quibbles, and Senn's book remains a most engaging read. This is not a comprehensive survey of biostatistics, much less a cookbook guide to statistics in health research.

Rather, it is an idiosyncratic romp and an affirmation of the centrality of quantitative reasoning in decision-making and scientific inference.

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