The Seven Pillars of Statistical Wisdom

By Stephen M. Stigler

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What gives statistics its unity as a science? Stephen Stigler sets forth the seven foundational ideas of statistics?a scientific discipline related to but distinct from mathematics and computer science.

Even the most basic idea?*aggregation*, exemplified by averaging?is counterintuitive. It allows one to gain information by discarding information, namely, the individuality of the observations. Stigler's second pillar, *information measurement,* challenges the importance of "big data" by noting that observations are not all equally important: the amount of information in a data set is often proportional to only the square root of the number of observations, not the absolute number. The third idea is *likelihood*, the calibration of inferences with the use of probability. *Intercomparison* is the principle that statistical comparisons do not need to be made with respect to an external standard. The fifth pillar is *regression*, both a paradox (tall parents on average produce shorter children; tall children on average have shorter parents) and the basis of inference, including Bayesian inference and causal reasoning. The sixth concept captures the importance of *experimental design*?for example, by recognizing the gains to be had from a combinatorial approach with rigorous randomization. The seventh idea is the *residual*: the notion that a complicated phenomenon can be simplified by subtracting the effect of known causes, leaving a residual phenomenon that can be explained more easily.

The Seven Pillars of Statistical Wisdom presents an original, unified account of statistical science that will fascinate the interested layperson and engage the professional statistician.

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Editorial Review

Review
The hardest kind of scientific thinking concerns what's in a field's basement?and Stigler has brought a bright flashlight to his subterranean investigations of the ever-more-influential field of statistics. (Bradley Efron, Stanford University)

Distilled from centuries of statistical research and garnished with wit, this masterfully prepared seven-course food for thought is a real treat for anyone who wants to reason with data, big or small. (Xiao-Li Meng, Harvard University)

Statistics has a core set of ideas that touch every aspect of our lives. Stigler has tapped into these and brought them to life. (Persi Diaconis, Stanford University)

This lively account of a radically counter-intuitive past at least encourages us to question big data's reputation. Never entrust measurement to a monarch?or judgment to a computer. (Jonathon Keats *New Scientist* 2016-05-21)

Wonderful…Each of the seven pillars that Stigler, in his wisdom, has hewn from the past two centuries of statistical thought provides surprising insights. (Howard Wainer *Science* 2016-05-13)

About the Author
Stephen M. Stigler is Ernest DeWitt Burton Distinguished Service Professor in the Department of Statistics at the University of Chicago.

Users Review

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Victor Willis:

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