

XL-Files: If Statistics Must Die... Let It Go Out with All Its Styles



The styles Xiao-Li Meng writes about here are the styles of the discipline of statistics: not just the traditional “modeling and fitting” but also “statistics as decision-making” and “statistics as consensus,” as Christopher Phillips recently outlined...

“*The Theory That Would Not Die*,” Sharon Bertsch McGrayne’s 2011 chronicle of Bayes’ theorem, tells the tale of a statistical rule born long before statistics became a formal discipline. Our appreciation of its value may vary with our perspective. Some hail it as the key to understanding how the human brain processes information; others—myself included—consider it an overly demanding learning rule due to its reliance on distributional specifications. Nevertheless, few would dispute that Bayes’ theorem has no expiration date, despite continued attempts to extend or generalize it.

Similarly, statistics as a discipline will endure as long as *Homo sapiens* exists—and, quite likely, it has been or will be rediscovered by other intelligent beings across the cosmos, particularly if the universe is as inherently quantum as we think. The rise of machine learning, the advent of large language models, and the flourishing of agentic AI all showcase breathtaking engineering feats and computational ingenuity. Yet these advances are developed and deployed to unleash the might of statistical prediction

and reasoning, not to replace them—nor could they. In fact, the anticipated quantum computing revolution may shine an even brighter light on statistics, given its reliance on stochastic quantum interference and the necessity of controlling inherent statistical errors to acceptable levels.

However, as I noted in my editorial (<https://hdsr.mitpress.mit.edu/pub/shn1mqmm/release/5>) for the Spring 2025 issue of *Harvard Data Science Review* (*HDSR*), a discipline’s intellectual viability does not guarantee its professional vitality. (This XL-Files also serves as a brief introduction to that *HDSR* issue to the statistical community; all articles cited come from it.) Statistics as a scientific subject will always exist, but statistics *as a profession* might not, if we allow our *styles* to fall out of fashion, especially while our sibling disciplines (or rivals?) embrace an increasingly entrepreneurial culture. For fellow statisticians who may bristle at the mere allusion that we need to adapt to trends, I offer a Victorian-style, hat-tipping bow and invite you to examine—and critique—historian of science Christopher Phillips’s article—titled (wait for it!) “Styles of Statistics” [<https://hdsr.mitpress.mit.edu/pub/yen5ysj5/release/1>]*—*featured in the Mining the Past column of *HDSR*.

As a historian who understands well that histories are made and written by different generations, Phillips wisely cautions that “Generalizations about the nature of a discipline as broad as statistics can and should be contested.” I thus hope his delineation of evolving styles of statistical reasoning will spark an inner dialogue by any statistician. My own internal back-and-forth centers on how statistics, as a profession rather than merely a discipline, might cultivate a culture that strengthens our traditional “**modeling**

and fitting” style while embracing significantly more the newer styles Phillips outlined: “**statistics as decision-making**” and “**statistics as consensus.**”

Surely, we should teach and value all three styles (and others). Our strength in modeling and fitting earns us a seat at decision and negotiation tables. Conversely, engaging directly in decision-making and consensus-building can enhance our toolkit and sharpen our modeling efforts. Yet internalizing such a culture as a profession is far more complex than simply talking about its benefits. Anyone who has held a leadership role—and who didn’t pursue it solely for personal gain—can attest to the inner struggles between “getting it right” and “getting it going.” Decisions often demand judgments beyond what data alone can justify. Consensus-building may force compromises, not only on measurable outcomes but on values or even principles.

Statistically inclined readers might rightly point out that modeling and fitting also involve judgments and compromises. Indeed they do. Jeffrey Rosenthal’s article, “An Investigation Into Probabilities of Streaks in Online Chess,” [<https://hdsr.mitpress.mit.edu/pub/ex6vbavk/release/2?readingCollection=da931fd2>] illustrates this well. Determining whether a long winning streak signals cheating requires assessing skill levels and translating them into probabilistic outcomes—a process lacking hard theory, thus judgment and compromise (e.g., bias–variance trade-off) are inevitable for modeling and fitting, as the article carefully articulated.

Detecting cheating in online chess is relatively narrow in scope compared to the high-stakes problems we statisticians regularly encounter. Yet because its findings can have real consequences for the accused and

the platform, the study must be rigorous and defensible including in its presentation. Rosenthal concludes with a careful interpretation, emphasizing that unexpected streaks alone are neither necessary nor sufficient evidence for cheating. Some may find such caution anticlimactic, but it is essential for the credibility of the author and study—and for avoiding misinterpretation in legal contexts. This is the kind of nuance we risk neglecting if we stay within our “back-of-house” modeling comfort zones.

Venturing into “front-of-house” tasks like decision-making and consensus-building pushes us beyond our comfort zones, toward action-oriented leadership anchored in statistical principles. Many of us have lamented that a host of statistical wheels have been reinvented. Yet fewer of us manage to deliver “meals on wheels”—solutions that feed the real-world hunger as quickly as our sister disciplines. Who garners more visibility and appreciation: The meal deliverers or the wheel inventors?

Yes, we can and should warn consumers of the risks of fast food—statistical or otherwise. But unless we help reduce those risks or provide healthier, equally convenient alternatives, our warnings make us look more like troublemakers than wheelmakers.

As a concerned statistician, I therefore take particular pleasure in introducing two more *HDSR* articles aimed at strengthening statistical styles in the era of data science and AI. The first, co-authored by three dozen participants of a June 2023 workshop in Germany, explores the “Challenges and Opportunities for Statistics in the Era of Data Science” (Kirch et al., 2025) [<https://hdsr.mitpress.mit.edu/pub/ufaltur6/release/1?readingCollection=da931fd2>]. It delves into statisticians’ roles in data

science, offering reflections on effective organizational structures, fruitful directions, enabling conditions, and the need for a shared language for the broad data science community.

The second article recounts a webinar held nine months later, co-organized by Stats Up AI Alliance [<https://statsupai.org/>] and the International Chinese Statistical Association [<https://www.icsa.org/>], with a title that reflects the rapid revolution of AI technologies, namely, “Statistics and AI: A Fireside Conversation” (Lin et al., 2025) [<https://hdsr.mitpress.mit.edu/pub/a7kmaq35/release/1?readingCollection=da931fd2>]. The webinar’s three panels tackled timely issues for statistics as a profession, with the aim to build a strategic roadmap for attracting talent, securing funding, reforming publication, modernizing education, encouraging interdisciplinary collaboration, and preserving statistical rigor and foundational values.

In short, Statistics as a discipline will never die. But as a profession, it requires our collective effort to avoid repeating the fate of Operations Research, as I argued

in my aforementioned editorial. Still, if statistics must die... let it go out with all its styles.

Let us be sure to raise an annual toast to celebrate both the immortality of statistics and the diversity of its styles—especially during the Vine to Mind symposium. If you haven’t heard of this symposium before, you can explore its origins and the 2025 program (June 24–25, 2025, in Lausanne, Switzerland) at vinetomind.org, which also links to the special Vine to Mind theme in *HDSR*; also check the December 2024 issue’s XL-Files (<https://imstat.org/2024/11/15/xl-files-vine-to-mind/>). I look forward to seeing as many XL-Files readers as possible at the 2025 gathering, hosted at the world’s leading school of hospitality management. Please help to spread the word, but only after you secure a ticket for yourself—seating is truly limited (by the size of the tasting Lab at École Hôtelière de Lausanne).

Just in case I don’t see you at Lausanne (or JSM 2025), cheers, to statistics’ immortality, and all statistical styles!

This two-day symposium in Lausanne features sessions on Data Science for Responsible Wine Production and Consumption—a deep dive into the latest scientific findings on wine’s role in health, and the studies on the emerging NOLO (no-alcohol and low-alcohol) trend, featuring keynote and presentations by leading experts and practitioners—and on Data Science, AI & Wine, with industry leaders, data scientists, and AI pioneers examining how cutting-edge technology is reshaping the wine industry, from viticulture to consumer experience. For more information see <https://www.vinetomind.org>

