THE "NEW AGE" OF THE LEGAL PROFESSION

Why Quantitative Skills Matter for Lawyers

"*Innumerable are the lawyers who explain that they picked law over a technical field because they have a 'math block'*"
The Honourable Judge Richard Posner[1]

On 18 June 1964 at about 11:30am, Mrs Juanita Brooks fell victim to a robbery as she made her way home from grocery shopping in San Pedro, Los Angeles. A couple were seen running from the scene of the crime, whom witnesses described as man of African-American descent with a beard and a moustache, and a Caucasian woman wearing dark clothing with her hair in a "dark blonde ponytail". They were later seen driving off in a "partly yellow" car.[2]

A few days after the robbery, Malcolm and Janet Collins were arrested on suspicion of having committed the robbery and fitting the eyewitnesses' descriptions. Malcolm was of African-American descent and though clean-shaven when arrested, had evidence of recently having a beard and a moustache. Janet, whose hair appeared to be dark blonde, was wearing it in a ponytail. The couple also happened to drive a yellow car.

As the prosecution had faced some difficulty in establishing the identities of the offenders due to the vague eyewitness descriptions, it called a professor of mathematics as a witness, who suggested that a conservative set of probabilities for the characteristics noted by the eyewitnesses could be summarised as follows:

Man with moustache - 1/4
Girl with blond hair - 1/3
Girl with ponytail - 1/10
Black man with beard - 1/10
Interracial couple in a car - 1/1000
Partly yellow car - 1/10

The prosecution argued that as the probability of a randomly chosen couple meeting these characteristics was the product of the above probabilities, this amounted to a probability of one in 12 million that any couple possessed the distinctive characteristics of the defendants; this, the prosecution argued, represented the likelihood of a given pair of persons in Los Angeles fulfilling all of the criteria set out in the table above, and was proof beyond a reasonable doubt that the defendants were the couple in question.

The jury agreed and Malcolm and Janet Collins were found guilty of second-degree robbery.

On appeal, however, the judgment was reversed by the majority of the Court and a retrial was ordered.[3]

It was held that the trial court had erred in admitting evidence pertaining to the mathematical theory of probability and in denying the defendants' motion to strike out such evidence that was based on the prosecution's extremely erroneous understanding of statistical probability and misuse of mathematics.

As it was later revealed on appeal, the prosecution had put forward arbitrary values for the probabilities summarised in the table, alongside assumptions about the perpetrators that were not grounded on any statistical research or sound evidence.

Various other fallacies in the prosecution's argument were addressed by the Supreme Court of California on appeal,[4] highlighting rather alarmingly how the prosecution's vague and inaccurate estimations and mathematically unsound approach jeopardised the liberties of two individuals who may have been innocent to begin with.

Interestingly enough, it was later revealed that the reversal of the defendants' conviction on appeal rested primarily on the arguments that had been made by a law clerk who was assisting one of the court's judges at the time – Laurence Tribe.[5] Having majored in mathematics as an undergraduate at Harvard, Tribe decided to enter law school. His research memo had flagged all the obvious errors made by the prosecution at trial, as well as other more complex points on statistical probability which the prosecution had erroneously applied.

Tribe's arguments demonstrated a keen and sophisticated understanding of the complexities of statistics and probability and how it ought to have been applied in the case, and led to the defendant's convictions being overturned.

The seminal case of *People v Collins*, summarised above, highlights the dangers of an inadequate evidentiary foundation and more pertinently, a lack of adequate statistical theory.

In criminal cases, where the stakes are undoubtedly higher, a fallacious or mathematically unsound argument can have particularly catastrophic consequences. *Collins* also demonstrates the intersection between two seemingly unlikely bedfellows: quantitative methods and the law.

In just over 50 years since *Collins*, the proliferation and increasing availability of data and analytics, even in the legal sector, inevitably heightens the significance of these issues, particularly when assessing the merits of evidence being presented before the courts.

More recently, in 2013, the Chicago-based 7th US Circuit Court of Appeals affirmed the dismissal of a suit brought by a prison inmate, who alleged that a three-week lapse in his blood pressure medication resulted in a serious medical condition. In its opinion, the Court of Appeals had some choice words for the lawyers, as well as the magistrate and the federal judge who had heard the case, for failing to cite or refer to any medical evidence supporting the inmate's allegation.

What Judge Posner found especially "troubling" was the fact that the magistrate and the federal judge had assumed the inmate could present the relevant evidence to support his claim, while the defence lawyers had "largely ignored the issue".[6]

Noting that lawyers today would have to grapple with scientific and technological issues that figure increasingly in litigation, the seeming discomfort that lawyers and even judges continue to express when confronting such issues remained a cause for concern.

Beyond Theory: Why Quantitative Skills Matter for Lawyers

No longer restricted to traditional fields such as medicine, there have been calls to extend evidence-based thinking and empirical testing to other professional disciplines, such as business.[7]

Yet, empirical and evidence-based approaches have long been a mainstay in other disciplines of the social sciences; for example, courses on quantitative research methods form part of the core curriculum in policy schools.[8]

In recent years, the legal field has witnessed an exponential growth in empirical legal scholarship. Legal articles have started to increasingly rely on empirical research (including computer programmes and data sets) to support their arguments; some even go to the extent of presenting original empirical evidence as part of their submissions.[9]

The field of empirical legal research has steadily gained prominence in the United States; renowned institutions such as Stanford University have even established research centres as well as workshops and courses dedicated to empirical legal research.[10] Leading law schools in the United States have also seen an increase in the number of faculty members who are empirically trained.[11]

Outside of the United States, a number of universities and higher-learning institutions have recently introduced part-time courses on empirical research methods. A university in Amsterdam offers an introductory course on empirical research methods for legal studies.[12] It seeks to equip law students with a background in social science research methods, while allowing social scientists the opportunity to gain a foundational understanding of legal concepts.

Academics have also emphatically called for law students to be trained in empirical research methods and quantitative skills to be adequately prepared for legal practice;[13] such training, they argued, would enhance the students' ability to critically assess and utilise information by gaining exposure across a spectrum of qualitative as well as quantitative methodologies, such as statistics and surveys.[14]

Law students with a strong grounding in quantitative skills would eventually go on to become law graduates boasting a unique

interdisciplinary training that would serve them in good stead for the many possible roles that they might hold, be it as advocates and/or solicitors, judges, legislators, researchers or policy makers.

What has given rise to this trend? Why do numbers seem to matter more so now, than it did before? Commentators have highlighted the transformation of the legal services industry as the primary driving factor behind the push for the legal profession to embrace empiricism.

As early as some six years ago, Daniel Katz described the legal industry as undergoing an "information revolution",[15] with the practice of law gradually being transformed to encompass and integrate areas such as informatics, computing and even quantitative legal prediction (**QLP**). Familiarising oneself with these areas, which stem from the empirical sciences, inevitably means that lawyers need to be cognisant of the economic realities that the new legal labour market is and will be grappling with, and equip themselves with skills beyond just the traditional legal theory.

The apparent move towards advocating for a more evidence-based approach to legal practice demonstrates a strong need for legal practitioners (even the non-mathematically inclined) to master a basic understanding of core quantitative analytical methods and skills.

This is arguably more pertinent as we herald "the new age"[16] of the legal profession where we are witnessing the rapid convergence of law and technology, as well as growing conversations about big data, artificial intelligence (**AI**), coding, machine learning and robot lawyers.

The value of quantitative training is obvious; however, rather than compelling lawyers to be able to produce competent quantitative evidence, the aim instead is to enable lawyers to be "educated consumers" of basic quantitative skills.[17]

Today's lawyers will have to grapple with arguments framed in quantitative terms, and the evaluation and presentation of quantitative data when dealing with increasingly complex matters that often straddle issues beyond just the law.[18]

Concepts such as probability, expected values, sensitivity analysis and risk aversion, as well as the value of obtaining additional information, are useful analytical tools that legal practitioners can consider equipping themselves with to better address clients' needs.

Lawyers who deal with corporate clients and who have acquired a degree of fluency in the analytical skills typically associated with business courses and practice, such as accounting and the interpretation of financial statements, have a competitive advantage and can value-add to their legal practice.

Such fluency is not restricted to corporate practice alone, however: family law practitioners negotiating divorce agreements or child custody arrangements would also need to be able to interpret and critique financial statements in the course of their work.

Lawyers engaged in corporate advisory work – for example, advising non-profits or government agencies, where performance is typically measured in accordance with financial reports and information obtained in discovery is largely financial in nature – would need to be able to understand and interpret key documents such as balance sheets and income statements.

Introductory courses on finance allow lawyers to have a basic grasp of key concepts such as the time value of money; this enables them to better represent and efficiently advise their clients in a range of legal matters, ranging from contract negotiations to litigation settlements; it also promotes a better appreciation of the intricacies and nuances of corporate legal practice.

Even outside the corporate realm, legal practitioners deal with quantitative information on an almost daily basis. For example, civil and criminal lawyers would often have to work with (or against) expert witnesses in the assessment of damages and forensic evidence in criminal cases respectively; anti-trust lawyers frequently work with experts who provide quantitative evidence about market effects.

Lawyers also have to deal with electronically stored information, technology-assisted review and other eDiscovery issues, while antitrust lawyers frequently work with experts who provide quantitative evidence about market effects.

Lawyers who can bring to the table (and courtroom!) quantitative skills that complement their substantive legal knowledge are poised to differentiate themselves from their peers and colleagues. Clients who require expertise in these areas are likely to seek out such lawyers who undoubtedly set themselves apart and value-add to clients with a diverse skill-set that extends beyond knowledge of substantive law alone.

For example, corporate clients in the areas of risk management and compliance may wish to mine their own data for risk assessment – such as using data to predict and detect misconduct, fraud and harassment. Lawyers trained in quantitative skills are thus able to advise their clients more efficiently and expediently; they may even utilise these skills to present empirical evidence before the courts to support the arguments they seek to advance.

To illustrate: a criminal defence lawyer whose client is facing a term of imprisonment for a drug-related offence intends to argue in mitigation for rehabilitation instead. A typical mitigation plea for such cases would commonly highlight the offender's age (for example, if he is a young offender); family background; and prospects for successful rehabilitation, among other considerations.

These arguments could possibly be further strengthened if the lawyer is able to present statistical evidence suggesting a correlation between rehabilitation and reduced recidivism rates for drug offenders.

Lawyers in the "New Age" of Legal Practice

The examples outlined above are of course, non-exhaustive, but nonetheless underlie the argument that today's lawyers inevitably encounter issues that straddle both the law and the empirical sciences.

Further support for why quantitative skills matter for lawyers can be found in a recently published report by LexisNexis Bellwether, where 176 solicitors in England and Wales (across all seniority levels) were surveyed to identify the attributes that solicitors consider to be essential in today's rapidly evolving legal landscape.[19]

Forty-nine per cent of the survey respondents cited a "good understanding of commerce and finance" as an essential skill for a lawyer to thrive in today's legal sector; however, 30 per cent of the respondents took the view that these skills remained a "blind spot"[20] in the legal profession. The survey respondents were keenly aware of the perceived skills gaps within the profession, and suggested that quantitative thinking and skills would be valuable tools for lawyers in this "new age" of legal practice.

Today, the practice of law can be said to be both a profession and a business – this may hold particularly true for large law firms and sole proprietors. Today's lawyers must be acquainted with and apply good business practices, including understanding the drivers of their own costs and the markets in which they operate.

Corporate clients – be it multinational corporations, private equity funds, or even small-medium enterprises – demand that their lawyers understand the commercial realities and value of running a business, including its financial drivers and constraints.[21] The proliferation of start-ups, including legal technology solutions providers, means that quantitative skills and the tools of business, accounting and finance continue to grow in significance.

As the market for the delivery of legal services continues to undergo a significant transition, it would not suffice for lawyers to position themselves solely as doctrinal lawyers or practitioners.[22]

The importance of acquiring the technical skills needed to interpret and analyse quantitative data would better equip lawyers not just for legal practice in the "new age";

more pertinently, the rapidly evolving methods of legal service delivery with the advent of legal technology tools that utilise big data, algorithms and AI undoubtedly necessitate some acquaintance with quantitative skills and analytical methods to understand the underlying technologies behind these tools.

The increasing relevance of quantitative thinking to the practice of law is arguably inevitable in an age where disruptions to the traditional model of legal service delivery have redefined what it means to practice law and to think like a lawyer.

Lawyers who venture out of their comfort zones and begin to take active steps towards equipping themselves with quantitative skills will be well-placed to thrive in the legal practice of the future. A good starting point is the resource list provided at the end of this article.

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Resource List

For further reading and resources on quantitative skills for lawyers, you may refer to the following materials. Do keep a lookout for additional learning materials on quantitative skills which will be made available on the Legal Research & Development's new microsite in the coming months.

Books and Articles on Statistics & Probability

Dilnot A., Blastland M., The Tiger That Isn't – Seeing Through a World of Numbers (Profile Books, 2007).

De Groot, M. H., Fienberg, S. E. & Kadane, J. B., eds, Statistics and the Law (New York: John Wiley and Sons, 1986).

Finkelstein M. O., Basic Concepts of Probability and Statistics in the Law (Springer Science, 2009)

Schneps, L. and Colmez, C., Math on Trial: How Numbers Get Used and Abused in the Courtroom (New York: Basic Books, 2013)

Spiegelhalter, D., The Art of Statistics – Learning from Data (Penguin Books UK, 2019).

Aitken C and Taroni F, "Fundamentals of statistical evidence – a primer for legal professionals" (2008) 12 International Journal of Evidence and Proof 181

Sense About Science, "Making Sense of Statistics" (Sense about Science, 29 April 2010)

Basics of Accounting, Probability and Statistics

Understanding Accounting Basics

Introduction to Probability & Statistics

If you are interested in additional resources on any of the above topics, please write in to the Legal Research & Development department at lrd@lawsoc.org.sg

Endnotes

1. Infra note 4.
2. *People v. Collins*, 68 Cal.2d 319, 66 Cal.Rptr. 497, 438 P.2d (1968). Hereinafter referred to as Collins.
3. See SCOCAL, *People v. Collins*, 68 Cal.2d 319 <https://scocal.stanford.edu/opinion/people-v-collins-22583> (accessed 30 August 2019).
4. Leila Schneps & Coralie Colmez, *Math on Trial – How Numbers Get Used and Abused in the Courtoom* (2013, Basic Books).
5. Today, Laurence Tribe is a renowned American legal scholar based at Harvard Law School. A specialist on American constitutional law, he is also a consultant with a leading law firm on various matters. Notably, Laurence Tribe counts former US President Barack Obama as one of his former students at Harvard.
6. Debra Cassens Weiss, "*Posner: Lawyers bad at math are an increasing concern; inmate's blood-pressure suit shows why*", ABA Journal (29 October 2013) <http://www.abajournal.com/news/article/posner_math_block_lawyers_an_increasing_concern_inmates_blood-pressure_suit> (accessed 1 September 2019).
7. Jeffrey J. Rachlinksi, "*Evidence-Based Law*" (2011) 96 Cornell L Rev 901 <https://scholarship.law.cornell.edu/cgi/viewcontent.cgi?article=3208&context=clr> (Accessed 7 September 2019).
8. See for example Harvard Kennedy School's curriculum for its Master in Public Policy programme, <https://www.hks.harvard.edu/educational-programs/masters-programs/master-public-policy/curriculum> (accessed 10 September 2019) and the University of Oxford Blavatnik School of Government's Master of Public Policy programme, <https://www.bsg.ox.ac.uk/study/mpp/mpp-detail#foundations> (accessed 10 September 2019).
9. To cite an example, the Journal of Empirical Legal Studies (JELS) was launched in 2003 to fill the gap in the legal and social science literature. It publishes empirically-oriented articles featuring a diverse range of legal and legal-related issues such as civil and criminal justice; securities regulation; finance; and healthcare. It welcomes submissions that feature experimental and non-experimental data analysis, including law-related empirical studies from around the world <https://www.lawschool.cornell.edu/SELS/journal.cfm> (accessed 2 September 2019). The JELS also helped inspire the creation of the Society for Empirical Legal Studies which is based at Cornell University in the United States.
10. Notably, Stanford University introduced a programme in International Legal Studies which offers a select group of graduate students with a primary law degree obtained outside of the United States the opportunity to engage in interdisciplinary research that applies empirically based methods adapted from the social science disciplines <https://law.stanford.edu/education/degrees/advanced-degree-programs/spils/> (accessed 13 September 2019).
11. Supra note 4.
12. See VU Amsterdam, Bachelor's Degree Programmes, '*Empirical Research Methods for Legal Studies – An Introduction to Social Science Research Methods*' <https://bachelors.vu.amsterdam/en/summer-school/courses/EmpiricalLegalStudies/index.aspx> (accessed 10 September 2019).
13. Terry Hutchinson, "*Empirical Facts: A Rationale for Expanding Lawyers' Methodological Expertise*" (2013) 3(2) Law and Method 53.
14. Ibid.
15. Daniel Martin Katz, "*Quantitative Legal Prediction – or – How I learned to Stop Worrying and Start Preparing for the Data-Driven Future of the Legal Services Industry*" (2013) 72 Emory L J 909 <http://law.emory.edu/elj/_documents/volumes/62/4/contents/katz.pdf> (accessed 3 September 2019).

16. Menon CJ, 'Mass Call Address 2019: 'A Profession of Learners' (Mass Call Address 2019 at the Supreme Court of Singapore) (27 August 2019) <https://www.supremecourt.gov.sg/docs/default-source/default-document-library/mass-call-2019—a-profession-of-learners.pdf> (accessed 11 September 2019).

17. Yair Listokin, "Why Statistics Should be Mandatory for Law Students", PrawfsBlawg (22 May 2006) <https://prawfsblawg.blogs.com/prawfsblawg/2006/05/why_statistics__1.html> accessed 9 September 2019.

18. Howell E. Jackson, "Analytical Methods for Lawyers" (2003) 53(3) Journal of Legal Education 321 <http://www.law.harvard.edu/faculty/hjackson/pdfs/2003.Jackson.Analytical.Methods.for.Lawyers.pdf> (accessed 9 September 2019).

19. The Bellwether Report Series 2019, The Good Solicitors' Skill Set (LexisNexis 2019) <https://www.lexisnexis.co.uk/pdf/bellwether-2019-the-good-solicitors-skill-set.pdf> (accessed 10 September 2019).

20. Ibid.

21. Michael Legg, "New Skills for New Lawyers: Responding to Technology and Practice Developments" (2017 Academy of Law, Australia) <http://www.academyoflaw.org.au/resources/Legal%20Education%20Conference%202017%20Final%20Papers/Michael%20Legg%20-%20New%20Skills%20for%20New%20Lawyers.pdf> (accessed 9 September 2019) citing Jordan Furlong, Do Law Differently – Futures for Young Lawyers (Canadian Bar Association, 2016) 30-31; Richard Susskind, Tomorrow's Lawyers (Oxford University Press, 2d ed 2017) 75.

22. Ibid. See also Daniel W. Linna Jr, "Why Law Students Should Take Quantitative Analysis: Big Data, Algorithms, Courtrooms, Code, and Robot Lawyers", LegalTech Lever (22 October 2016) <https://www.legaltechlever.com/2016/10/law-students-take-quantitative-analysis-big-data-algorithms-courtrooms-code-robot-lawyers/> (accessed 1 September 2019).