The Great Divorce I: Was Wm. Blackstone’s Investigation of ‘Thirty-Five’ Gradual Improvements (in the Final Chapter of the Commentaries) a Scientific Enterprise?

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2 OCL 266
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ABSTRACT.
1763 is a convenient point to mark both the conclusion of the Third Silesian War and The Great Divorce, by which the men and women of hard science and the practitioners of law, history, philosophy, political science – the polsciences – went their separate ways. In the first article in this series, Our Constitutional Logic, examines the rate of change offered by Blackstone in the Commentaries. How Madison and Jefferson viewed the rate of change in political society in the United States is also brought into the conversation.

KEY WORDS: Great Divorce, rate of change, ‘Gradual Improvements’

A. INTRODUCTION. There was a time when men and women of culture acquired basic skills in the mathematical sciences, which included the facility for manipulating the geometric series, polynomial equations and, most importantly, the differential and integral calculus. These times were good for civil society, opening the way to advances in technology and offering business and employment opportunities.

An advance in symbology or a new conceptual framework boldly outlined would be lettered to a colleague across the Rhine or English Channel, the communication securing proof of priority. Learned societies provided the opportunity for battle-tried investigators to read their papers and for gate-crashers to learn the ropes of presenting accomplishment in maths and sciences. There were social costs to be sure: international facility with maths killed Latin as lingua franca: In this sign \( \int \) not \( \sum \) was Europe conquered, the integral calculus sweeping all before it by supplying the computational engine for the most elegant advances in maths.

B. DE MOIVRE’S DOCTRINE OF CHANCES. These developments came shortly after the settecento buried Sir Isaac Newton with fitting ceremony (1726). In 1738 Abraham DeMoivre sent to press his “effective, feasible way of summing the terms of the binomial … to find the chance that a number of occurrences of a symmetric binomial experiment.”

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Stigler gives DeMoivre’s formula in modern notation as

\[ f(x) = \int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi}} e^{-x^2/2} \, dx \]

Pollard supplies a note that the above formula is “merely a reflection of the Calculus trick of approximating a sum by an integral.”

What DeMoivre simulates is the distribution of events as embraced by the Cartesian x-axis (the horizontal) and above by a bell-shaped-curve. The area under the curve (that is, between the curve and the x-axis) is assigned the value 1, the ‘Calculus trick,’ to which Pollard draws our attention. Therefore, any slice of events, as graphed, may be expressed in this formula as closer or farther from the mean, that is, the averages of the quantities assigned to the patterned events, x-axis and y-axis serving as the cart-horses for over a century by the time Blackstone put pen to foolscap.

The significance of DeMoivre's *Doctrine of Chances* is that for a half-century before Americans ratified their second charter, Europeans were translating patterns of events into graphic representations and then locating or devising polynomial or transcendantel functions that most closely expressed the events as simulated in this representation. OCL will return to this enterprise, expanding the foregoing into the motto 'Look! Graph! Math!' Kant’s *Kritik der Reinen Vernunft* (1781, rev. ed. 1787) supplies the underpinning for this point of departure, for which foundation this celebrated quotation must now suffice:

It is only the principles of reason which can give to concordant phenomena the validity of laws, and it is only when experiment is directed by these rational principles that it can have any real utility. Reason must approach nature with the view, indeed, of receiving information from it, not, however, in the character of a pupil, who listens to all that his master chooses to tell him, but in that of a judge, who compels the witnesses to reply to those questions which he himself thinks fit to propose. To this single idea must the revolution be ascribed, by which, after groping in the dark for so many centuries, natural science was at length conducted into the path of certain progress.

C. **DeMoivre’s Successor-in-Interest.** OCL fixes the dates for the Great Divorce as follows: Richard Price read his revisions (a literal exhumation) of Thomas Bayes’ paper *An Essay Towards Solving a Problem in the Doctrine of Chances* which Price read to the Royal Society of London for the Improving of Natural Knowledge on December 23,

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3 See the c. 7 of David Pollard's webpage at stat.yale.edu/~pollard/Courses/241.fall2011/YaleOnly/notes2011/BinNormal.pdf.
4 Preface to second edition, B xiii; N.K. Smith translation.
This event preceded, by only a matter of months, Blackstone’s publication of the first volume of his *Commentaries on the Laws of England*. To maintain the apples to apples comparison, we proceed by presentations: this times Blackstone’s project to the first of his Vinerian lectures at Oxford (October 25, 1758), five years’ in advance of Price’s reading of his version of Bayes’ paper.

The assignment of the Great Divorce to the outbreak and conclusion of the Third Silesian War seems to embrace all that is pertinent. 1768 will see the appearance of Blackstone’s essay on the *Rise, Progress and Gradual Improvements, of the Laws of England* (appearing as the ultimate chapter in Book IV of his *Commentaries*) bookending Bayes/Price’s. Blackstone, however, fails to supply an answer to the question posed by Bayes/Price: “what reason [is there] to think that such recur- rency or order is derived from stable causes or regulations in nature.” 6 WB moves directly to a related question: ‘what norms govern the rate of change of ‘improvements’? Is Blackstone doing science?

**D. BAYES/PRICE DEPLOY THE INTEGRAL CALCULUS.** The exploitation of the integral calculus allows development of the probability density function. The formula may be expressed as:

\[
f(p) = \left[\frac{(n+1)!}{k! (n-k)!}\right] * p^k (1-p)^{n-k}
\]

Let us say, for example, that the investigator establishes (or guesses) that certain experiments produce results in the range of .2 to .6, that is, within the unit value \(0 \leq p \leq 1\). Let’s take Blackstone’s 35 changes in 77 years. Of course, we don’t know precisely when these events occurred; OCL’s investigation is in progress but incomplete at this time.

Let us surmise that the mean-number-of-years between any one of WB’s ‘gradual improvements’ and the next ‘improvement’ is 2.2 years, a figure obtained from the fraction 77/35. But this surmise can’t possibly be correct. Many of the changes WB recorded occurred at the Glorious Revolution which devolved from 1688 (and thereafter) and so many of WB’s ‘improvements’ gather or cluster around those revolutionary events.

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5 Thomas Bayes, *An Essay Towards Solving a Problem in the Doctrine of Chances*, Philosophical Transactions of the Royal Society of London for Improving Natural Knowledge (1764) 53 at 370-418. The essay appears in a number of locations accessible via the Internet. Americans should not be ashamed of operating under its second charter; the Royal Society also operates as a rechartered organization.

So what is the mean number of years from one ‘gradual improvement’ to the next? Surely seeking the mean in any sample of events is an appropriate inquiry, if calling only upon the lesser arithmetic finding the average.

Now, however, morph the inquiry, but ever so slightly. Pick a range of years, say 26 to 39 of Blackstone’s 77. (We are reckoning from 1688. The 26- to 39-year range embraces the 13 years of the reign of George I, the House of Hanover’s first monarch: 26/77 to 39/77 resolve to the proportions .33 and .51.) Now we can ask ourselves, ‘Can we compute how many “gradual improvements” are likely to have occurred in this interval,’ making some assumptions about the distribution of the improvements?

Since Bayes theorem is based on a continuously distributed variable, the following formula will track ranges of outputs in a variable such as the chances that exactly 6 laws of a total of 35 proposals (over 77 years) be adopted in the interval 1714-1727. The formula which returns the likelihood is:

\[
P(.33 < \Theta < .51 \mid M_{35} = 6) = \frac{36!}{6! \times 29!} \int \theta^6 (1-\theta)^{29} \, d\theta
\]

This point is only made to underline that patterns of ‘gradual improvements’ can be represented in the mathematics of the integral calculus: more precisely, the above formula computes the likelihood of the precise events in question occurring within the interval described.

To further elaborate the settecento’s motto Look! Graph! Math! one need only quote Price on Bayes: Bayes’s solution of the problem of inverse probability (Hald draws our attention to this passage) Bayes shows “with distinctness and precision, in every case of any particular order or recurrence of events, what reason there is to think that such recurrence or order is derived from stable causes or regulations in nature, and not from any of the irregularities of chance.”

This puts any pattern offered by an investigation into the arena of hard science and especially makes any pattern that can be grasped at a glance a candidate for mathematical analysis.

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7 “Bayes invented,” Anders Hald rethreads Price’s Bayes, “a new physical model with a continuously varying probability of success.” Hald, A History of Mathematical Statistics (John Wiley & Sons, Inc.: New York, 1990) at 136. When the investigator’s assistant drops the ball (on Pearson’s/Fisher’s ‘billiard table’; Stigler footnotes their invention of this feature of the virtual landscape) “before any thing is discovered concerning the place of the point o [establishing a line which divides the ‘table’ into two rectangles], it should appear that the event M had happened a times and failed b times in n = a + b trials . . . .” As Bayes explains, P(A) is a belief state that exists delinked from the real world; it is, and must be, entirely in the mind of she who has not yet chanced her throw on the billiard table.

E. **Blackstone’s Identification of a Pattern of Interest.** When an investigator computes, by survey of events, the rate at which political society changes, the effort may be regarded as an invitation to deploy the integral calculus. Wm. Blackstone’s *Commentaries on the Laws of England* (in its ultimate chapter, that is, Book IV, Chapter 33) lists 35 changes in civil polity from 1688-1765. Blackstone lists 16 Acts of Parliament, 4 instances of executive “Acquisition of Force,” 15 instances of judicial reform. This pace computes to 35 changes in civil polity over 77 years or one change every 2.2 years. See *Pace of Change in Civil Polity 1688-1765 As Cataloged in Blackstone’s Commentaries on the Laws of England*, 2 OCL 933.

The reader will note that WB offers (at this time) a linear computation: he does not suggest that gradual improvements are occurring more rapidly than they were in any previous interval or more rapidly than they should be. Or less rapidly than civil society requires.

Blackstone’s ‘Gothic castle’ metaphor (at Book III, Chapter 17) may be regarded as an explicit assertion that change should be slow in coming about: “minute contrivances” are to be accepted, in one of WB’s phrases. Also to be avoided are “great fundamentional alterations” and any “great legislative revolution.”

OCL assumes that, via Stanley Katz, the editor of the University of Chicago’s edition of *The Commentaries*, William Paley’s *The Principles of Moral and Political Philosophy* [1785] has correctly summarized matters: “Therefore the terms *constitutional* and *unconstitutional*, mean legal and illegal.” Chartered arrangements, in any interval lacking in textual amendments to MPT, are the same in civil societies, the pedigree or ascendancy of privileged text dropping out of the analysis.

Is there a scientific enterprise focusing on the rate of change in constitutional arrangements?

F. **Where There is a Recognizable Pattern, Graphs and Maths May Be Exploited.** If there was a divorce, great or not, and men and women of hard science won facility with maths as their due, then the divorce legitimates this paradigm. Investigators identify a pattern – say of the rate of change in chartered political society – and the follow-on effort offers the opportunity for any investigator to simulate and model the pattern.

We don’t care if, in fact, investigators exploit patterns as long as someone in the age is capable of doing so. And, more to the point, the *settecento* didn’t care either.

In analogy: the *ottocento* stopped insisting that keyboard artists perform only works they composed. In advance of this development, there is no reason to suppose that the *settecento* would disoblige a practitioner of statistical analysis from ‘doing’ Blackstone.

There is another way of seeing this point. Let us say someone asserts ‘x’ is universally true; it holds true for all pairs of civil and political societies. Whether or not assertion is valid, the probative value of the assertion is not diminished because the person asserted ‘x’ did not translate ‘x’ into foreign languages.
G. MADISON AND JEFFERSON ON PATTERNS: ANOTHER WAY TO SEE BLACKSTONE’S CONTRIBUTION TO POLYSCIENCES. James Madison assessed the rate of change for constitutional events. Continued public interest in his unpublished Notes of Debates fueled Madison’s appetite for preserving and promoting his legacy. “In general it had appeared to me that it might be best to let the work be a posthumous one; or at least that its publication should be delayed till the Constitution should be well settled by practice.” 9 JM’s declaration matches WB’s “they hesitated at going so far ... through dread of innovation,” which appears in Section 1 of his Commentaries. One may interpret Madison’s assessment as implying computation of the rate of change at zero or perhaps that the rate of change is discontinuous.

Thomas Jefferson asserted that the slope of constitutional change was upward: amendments would become routine to “keep pace with the advance of the age in science and experience” 10 (1824).

Jefferson does not inform us whether some function other a straight line with a modest slope is called for. But that’s the point.

The men and women of the polycliences were unable to do the maths which simulated and modelled the patterns they saw and described in natural language.

Others were able to exploit these patterns.

The fact that Blackstone, Madison and Jefferson identified similar patterns proves them up, at least as worthy of further investigation. Whether or not they exploited them or left them to the likes of Bayes and Laplace and the heirs of statistical analysis is of interest only because it permits us, today, to work backwards and recognize the significance of the patterns.

H. A COMPARISON TO WORD COUNTS. A few word counts may shed some light. The Table Annexed to Blackstone and the Philadelphians, 2 OCL 681, contains graphic representations of the frequency of ‘improve-’, ‘gradu-’ and ‘science’ in works noted therein, in log scale.

As the reader can see, Blackstone’s employment of words based on ‘improvement’ finds Hamilton, Madison and Jay outdoing him, in their 189,827 words. Blackstone’s 676,020 words, at 49% of the words surveyed (WB’s Commentaries, Farrand’s vols. 1 and 2 of the Records of the Federal Convention, The Federalist essays, and Jane Austen’s Pride and Prejudice, the latter serving as ‘control’) gave WB a fair shot at out-writing this competition in employing ‘gradual improvements’ in its various semantic configurations. WB is, however, overwhelmed by The Federalist’s affections for

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9 JM to Thomas Ritchie (September 15, 1821).
10 TJ to Robert J. Garnett, 1824. ME 16:15 "The real friends of the Constitution in its federal form, if they wish it to be immortal, should be attentive, by amendments, to make it keep pace with the advance of the age in science and experience. Instead of this, the European governments have resisted reformation until the people, seeing no other resource, undertake it themselves by force, their only weapon, and work it out through blood, desolation and long-continued anarchy."
'gradual,' ‘improvement’ and ‘science’ and only Jane Austen’s affinity for all things ‘gradual’ puts the Philadelphians to shame.

Patterns are served up by the course of human events.

Human beings may spot, chart, and math these patterns.

They may engage these enterprises in both the hard and the polsciences.

When Kant asserts that nature be put in the dock – ‘sondern eines bestallten Richters, der die Zeugen nötigt, auf die Fragen zu antworten, die er ihnen vorlegt’ – Kant must be, on Blackstone’s account, asserting that the past, that is public officials of days remote or recent, be obliged to answer questions of the investigator’s crafting regarding patterns of official conduct for which they are responsible and which patterns are now, thanks to the court’s calling its own witnesses, standing in for die Natur on trial.

The kinetic is, on Kant’s account read back into Blackstone as OCL has done, the semantic.

I. CONCLUSIONS.

1. An investigator of events in political society (or, seen in larger focus) in civil society, is obliged to recognize and report patterns of events.

2. Further investigation may be left to her contemporaries, that is, men and women with the facility for mathematical and statistical analysis.

3. If exploitation of their tools renders the enterprise scientific, according to Kant’s standards, then the enterprise is entitled to be tested, especially for replicability and falsifiability, with a null hypothesis crafted accordingly.

We leave the last word to Alexander Hamilton, former Captain of Artillery, a military science drilled in the differential calculus: “Constitutions of civil government are not to be framed upon a calculation of existing exigencies; but upon a combination of these, with the probable exigencies of ages, according to the natural and tried course of human affairs.” The Federalist No. 34.

The go-to tool for men and women of the polsciences was Bayes theorem and its adjunct and supporting exploitation of the integral calculus.

Blackstone did all that Kant obliged Blackstone or any settecento scientist to do: identify a pattern in human events and question whether “such recurrency or order is derived from stable causes or regulations in nature ... .”

J. RESOURCES. For on-line access to Peter Aschenbrenner’s articles, tables and charts see purdue.academia.edu/PeterAschenbrenner or works.bepress.com/peter_aschenbrenner/

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