P. J. Daniell of King Edward’s and Beyond

talk for BSHM Christmas meeting 2006
at King Edward’s School Birmingham
(Finished paper by February hopefully!)

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Why remember Daniell *now* and *here*?

- *Now* because he died 60 years ago.
- *Here* at King Edward’s because 100 years ago he was a pupil in this school.
- *Here* at the BSHM because Daniell appears all over the place and you probably know things I don’t know!
Why remember him at all?

- Daniell integral, Daniell window, Daniell-Kolmogorov extension theorem perpetuate the name.

- Who he was and what he did are a bit of a mystery.

- David Kendall speculating on the origins of a British probability tradition
  But you have to remember P. J. Daniell of Sheffield. Daniell wrote his major papers in the US in the South—I think. Who taught him? Sheffield does not have a portrait. When he went to Sheffield he apparently gave up probability and started working on the design of blast furnaces.
P. J. Daniell
Sources

- 5 letters. No autobiography or personal papers.
- Small appearances in specialised histories—Cambridge maths, analysis, control theory...
- Minor role in more famous lives—Wiener.
Percy John Daniell (1889-1946)

- Born 9th of January 1889 in Valparaiso Chile.
- First child of William and Florence.
- Family returned to Birmingham in 1895.
- William's occupation: export merchant's buyer.
Places: education & employment

- King Edward’s 1900-1907
- Trinity Cambridge 1907-1911
- Liverpool 1911-1912
- Göttingen 1912-1913
- Rice Institute Houston 1913-1923
- Sheffield 1923-1946
“Better than most Oxford colleges”

- J.R.R. Tolkien’s lament for the demolished New Street building, designed by Barry (1841)
A “great schoolmaster” Rawdon Levett (W22 1865) was maths at King Edward’s. He retired half-way through Daniell’s time at the school.
Ethos and outcomes

“Systematic preparation for scholarships Levett eschewed and derided. We imbibed from him a contempt for every kind of cram and commercialism in learning.”


Senior wranglers Daniell and A. W. Ibbotson—knighted for work in the Indian Civil Service.
Trinity College for next 4 years.
Littlewood (1905, W1)

- I wasted my time except for rare interludes.
- One had to spend two-thirds of the time practising how to solve difficult problems against time.
- The game we were playing came easily to me and I even felt a satisfaction of a sort in successful craftsmanship.

Hassé (1905, W7)

- the great absence from the teaching—what we now know as analysis.
- The real mathematician ... will survive the effects of any teaching and of any syllabus.
KILLING AN ACADEMIC TRADITION

TRADITIONS are not to be despised in Oxford. In Oxford, college traditions are almost as much a part of the academic life as their existence. Many of them date back centuries, and are as much a part of the identity of the college as the name.

The most famous of these traditions is the Senior Wrangler, who is chosen by a panel of examiners to be the best in the university. The Senior Wrangler is traditionally expected to do well in all their exams, and is usually the student who is most likely to become a successful academic.

However, in recent years, the tradition has been challenged by some who argue that it is outdated and unfair. They argue that it is not representative of the diversity of talents in the university, and that it places too much emphasis on one subject at the expense of others.

One of the most recent challenges to the tradition came in 2010, when the Senior Wrangler was not chosen by the examiners. This was seen as a sign of the changing times, and a move away from the traditional approach to education.

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Part II Natural Sciences Tripos

- Teachers: J J Thomson and ...

- First class degree

- Rayleigh Prize “Diffraction of light for the case of a hole in a plane of perfectly reflecting screen.”
Assistant Lecturer in Liverpool 1911-2: high wrangler’s rite of passage

W. H. Young (1863-1942) part-time lecturer. Possible influence?
To Rice as Ass. Pro. in applied maths.
Sponsor J. J. Thomson

Dear Dr. Lovett: I have no reason to think there is any Jewish strain in Daniel. Yours very truly, J. J. Thomson.
But first to Göttingen for a year on a $1000 travelling fellowship from Rice

“studied under Born and Hilbert”

published a paper on relativity with Ludwig Föppl (one of Hilbert’s physics PhDs)

“On the Kinematics of the Born Rigid Body”
Houston not much more than an overgrown commercial village seventeen hundred miles away from the American metropolis.

It is hard for an Englishman to realise that the civilisation of the whole of the area west of the Mississippi ... is to all intents and purposes the product of the fifty short years since the civil war.

Julian Huxley "Texas and Academe"
Ralph Adams Cram had gone to Illyria for his inspiration and the buildings were in rich, almost Byzantine style, with coloured tiles and marble capitals grotesquely carved among the bricks--and very effective they were. Julian Huxley.
Main colleague
Daniell’s research at Rice

Some applied maths publications in 1915

- The Coefficient of End-correction (out of Rayleigh)
- Rotation of Elastic Bodies and the Principle of Relativity (out of Love and Born)

And then …..

- 1918 A General Form of Integral (Daniell integral)
- 1919 Integrals in an Infinite Number of Dimensions (Daniell-Kolmogorov extension theorem)

Etc., etc. …
A General Form of Integral: wonderful prospectus

- [Earlier theories of integration] are based on the fundamental properties of sets of points in a space of a finite number of dimensions. In this paper a theory is developed which is independent of the nature of the elements.

- They may be points in a space of a denumerable number of dimensions or curves in general or classes of events so far as the theory is concerned.
Where did this work come from?

- Analysis—out of Young, Radon … Strange that Daniell did this work but not strange that somebody did it and did it then.

Two singletons

- Robust estimation—one paper out of nowhere and strange, strange, strange! “at least thirty years ahead of its time, for it took that long for his major results to be rediscovered.” Stigler.

- Probability—one paper out of Biology Economics—Volterra and Evans?
Where did it go? Norbert Wiener (1894-1964)

1919 Wiener appointed instructor at MIT.
1920-22 Wiener writes 4 papers using the Daniell integral—3 on Brownian motion.
1922 and -28 Wiener used Daniell as a referee for jobs.
I wrote to them [London university] my opinion of your suitability for the position and it was partly praise and partly otherwise. That is to say I think highly of your promise as a mathematician but—and, I naturally expect you to disagree with me on this—I feel that you have not yet attained as established a position & have not had as much experience as they try to get for such a position.

A professor in England is not merely a man of professorial rank & ability—he is a very active & sometimes autocratic head of a department.

I doubt it would be good for you if your application were successful. You would be rather loaded down with work and would most likely get stuck in a rut.
Daniell—the 20s

- 1920 full professor at Rice.
- 1922 Cambridge ScD
- 1923 To Sheffield as Town Trust Professor of Mathematics
- Analysis research continues through the 20s
In 1928 Wiener applied for a chair in Melbourne. Daniell wrote to Wiener:

- I've noted the work you are doing on Almost Periodic Functions.
- It's quite time I did some work myself but a Chair in England involves a great deal of business which is done in America by the office.
The 1930s

- One publication
  The Theory of Flame Motion, Proceedings of the Royal Society of London, A, 1930

Related to work for Safety in Mines Research Board in Sheffield.
According to Stewart

- Daniell was a prodigious reader of scientific journals and was conversant with the latest developments in Physics, Chemistry and Biology as well as those in most branches of pure mathematics.

- He seldom gave his undivided attention to the systematic development of particular lines of research and therefore the actual number of his publications does not provide a true measure of his intellectual powers of and activity.

- Much of his time and energy was expended in advising and assisting research workers in many fields and it was only on rare occasions that he troubled to make a permanent record of his own contributions to the problems involved.
Stewart continued

- Lots of university committee work
- Outside interests included the training of teachers, the Mathematical Association, and to the School Certificate Examination.

In one of the 5 letters Daniell writes to Mordell saying he can’t make a meeting with Hadamard because of press of JMB business.
Dear Mordall

I should have come to
Dear XIademont on the 16th if I
could possibly have done so but I have
been at a TEC meeting in Manchester,
If an opportunity should arise I should
be very glad if you could convey
my good wishes to XIademont. Be very
gratefully recall a great kindness towards
me by giving me the right to use the
Institute library in Paris when I was
on the staff at the Rice Institute, Houston,
Texas, and a few days before, and before, I remember
this great interest in the wild flowers of
Texas,

Yours sincerely,

[Signature]
Activities in the War

Teaching continued—intensified in fact.
7 classified papers
  ■ Mainly on fire-control
  ■ Daniell worked with Arnold Tustin and Arthur Porter who became important figures in automatic control after the war
  ■ Daniell translated American work by Bode and Wiener so that British engineers could understand it.
The general method is based on unpublished work of the late Professor P. J. Daniell, who provided an analytical treatment of the effect of backlash of which the present paper is essentially an interpretation in geometrical terms.

Journal of the IEEE 1947
Daniell's subsequent contributions to servo theory, although not widely known because his reports and memoranda were security classified, were of high significance. Indeed, it is probable that Daniell was the first man in Europe to ‘translate’ Norbert Wiener's work on the interpolation and extrapolation of stationary time series, which in turn formed the mathematical basis of Wiener's 'cybernetics'. Daniell's interpretation of the early Wiener papers on control theory are refreshingly elegant and make a noteworthy contribution to the evolution of control-systems engineering in Britain.
My absence from this symposium is a grief to me.

The work done in America has been based on a fundamental study by N. Wiener of integrals in an infinite number of dimensions, corresponding to the values of the fluctuating quantity at various instants. The work is not behind that of the Russian school in time or importance.
Illness and death. Stewart writes

- The strain of the war years became evident during the summer of 1945 when he was attacked by serious heart trouble.

- He recovered to some extent and decided to undertake the work of the session 1945-1946, but there seems little doubt that his life would have been prolonged if he had made a different decision.

- He continued with his many activities in a spirit of great fortitude and determination, but early in May, 1946, he collapsed at his home and died a few weeks later without fully recovering consciousness.
What was he like?

Daniell married Nancy Hartshorne in 1914. They had two daughters, Frances and Mary, and two sons, David and John.

- Daniell impressed all who came into contact with him by his great integrity of character and his sincerity of purpose.

  He disliked publicity and his tastes were simple. He delighted in good music, in books, in friendly discussion, in country walks and in the quiet pleasures of a happy family life.

  Stewart 1947

- I have very fond memories of him. He was charming, delightful, low key, modest.

  Arthur Porter phone conversation 20th October 2006
Stewart: “Daniell was highly accomplished as a pure mathematician as well as an applied mathematician.”

His training was in applied mathematics and physics but his main achievement was in pure mathematics.

Who taught him? He taught himself apparently.

Daniell seemed to do the applied and the pure as separate activities.

Unlike Wiener his pure maths was apparently not motivated by physical applications.
P. J. Daniell (1915) The Coefficient of End-correction I, Philosophical Magazine, 30, 137-146.  
P. J. Daniell (1920) Orthogonal Potentials, Philosophical Magazine, 7, 247-258.  
P. J. Daniell (1921) Functions of Limited Variation in an Infinite Number of Dimensions, Annals of Mathematics, 21, 30-38.  
Production team

People who have helped.

- Birmingham: F. J. Daniell
- Cambridge: Jonathan Harrison, Jonathan Smith
- Göttingen: Ulrich Krengel
- Rice: Lee Hecht, Lisa Moellering
- Sheffield: Helen Mathers
- MIT: Silvia Mejia
- Physics: Scott Walter
- Control engineering: Stuart Bennett
If you enjoyed this.....

- Figures from the History of Probability and Statistics
- The Mathematics PhD in the UK
- Probability & Statistics on the Earliest Uses Pages