The Best Teacher I Ever Had Was …

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May 11, 2004

My first response when approached to write on this subject was "but I remember an anecdote here or there nothing more." On my next plane trip I nonetheless made a mental inventory of my most memorable teachers – gifted and otherwise. As an undergraduate in the late sixties: Peter Fraser, a mathematical physicist at Western Ontario, whose flawless lectures persuaded my second year mechanics class that no effort was required on their part, until a failing grade on the final proved otherwise. My to-be-nameless third year number theory teacher, a non-researcher whose stolid indifference to scholarship could not destroy a for-me magical subject.

As a graduate student in Oxford I was entranced by the distinguished (mathematical and linguistic) philosopher Michael Dummett who taught me about Frege and Heyting, expected me to prove the "Independence of the Continuum Hypothesis" in viva, and lectured seemingly sans notes with a lucidity that provided "camera ready copy". His curiously two-tone hair (bright yellow at the front, silver gray at the back) was limned by my sudden realization half way through a course that each cycle across the proscenium had regular nicotine producing features. Inhale from the cigarette in the elegant ivory holder; exhale, expostulate and excogitate, run fingers through yellow–gray mane; repeat for duration of hour. And Brian Birch the (then and now) leading British number theorist whose elliptic argot left me temporarily reeling. Phrases something like "kill the integral and shove the

function to the left" I eventually decoded as a good prescription for contour integration. Equally, "the zeta function associated with an elliptic curve is exactly what you thought it would be" proved more useful with hindsight than on first meeting.

At that stage, I decided I had taken my brief somewhat too narrowly. Teachers should include my academic mentors. With some sense of relief I added Michael Edelstein at Dalhousie, a Polish–Israeli functional analyst who by example and engagement converted a generation of young analysts into full blooded independent researchers; Dick Duffin, a distinguished mathematician and engineer who was my colleague at Carnegie-Mellon in the early eighties. Dick, who had trained Nash (a future Economics laureate), Raul Bott (himself the supervisor of future Fields medalists) and Hans Weinberger among others, is a man absolutely without pretensions who forcibly taught me that great depth of insight and what Louis Wolpert has nicely termed "a passion for science" had no need of flashy or pretentious packages.

In diverse ways from these teachers and many more (some superb exponents of indifferent subjects, some indifferent exponents of intoxicating subjects, and all other combinations) I learned the myriad skills of a successful academic who must be a teacher, researcher, editor, reviewer, administrator, and all too often in loco parentis. That said, one person emerged from my archival hunt – my mathematician father David Borwein, FRSE, head of Pure Mathematics at Western from 1967 to 1989, President of the Canadian Mathematical Society from 1984-1986 and my frequent co–author.[1]

Both my brother and I ultimately became academic mathematicians and not surprisingly have from time to time mulled over what factors lead us to take up the same vocation. I started University determined to be a historian. Neither of us was in any sense "hot–housed". In my undergraduate career I had precisely one lecture from my father; otherwise he assiduously scheduled classes so as to avoid our meeting. The only exception being a 1957 bet with his colleagues in St. Andrews –for a large quantity of of cheese – that he could teach his six year old son to solve two–by–two simultaneous linear equations by making it into a game. In still recently post–war Britain I was so taught and while conning neither reason nor rationale I loved playing this mysterious game and taught my best friend also to play.

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[1] Ten joint papers, nine of which followed my father's somewhat mis-described "retirement", and still counting.

From then until I was a third year undergraduate David's (Dad's) role in my education was restrained. I was offered very little overt enrichment. Nor, in the politically heated and drug laden late sixties would I have brooked much intrusion. But what I did infuse in confrontational discussions at the dinner table over Johnson and later Nixon, and more quietly as we began jointly to solve problems posed in the *American Mathematical Monthly* [2] was the timbre of a to–the–manor–born academic; a man who nonetheless cared deeply about the external world; a man with a subtle and inexhaustible sense of humor; a man who would happily stay up all night polishing a proof or hunting for the resolution to an obdurately untameable mistake. Above all a man who demonstrated with every fibre that he was doing just what he wanted to be doing, that fads were fads but that scientific knowledge would not ever be entirely deconstructed. And so by 1971 when I graduated from UWO and went somewhat uncertainly as a Rhodes scholar to Oxford, he had helped me become inescapably a mathematician despite James Sinclair's (Trudeau's father in law) offer that if I studied 'PPE' (Politics, Philosophy and Economics) in Oxford he would give me a cement factory to manage on my return!

My father's mentorship did not end in 1971. He offered easy and low risk access to a knowing guide. "Dad, I don't follow much at conference talks." Answer "Neither do I." Consequence: an early realization of the real purpose of mathematics meetings as places to meet, mix and to discover what one wished subsequently to learn. "David, I'm taking a job in the States and so should resign my position at Dalhousie." Answer "Has any one asked you to resign?" Consequence: two years later I moved back to Dalhousie for another decade, easily and I trust to the benefit of both the institution and myself.

Thus was I taught about the *erkensis und praxis* of mathematics: that strange blend of arts and science, of austere Platonic edifice and fallible human creation. I learned of the quiet satisfactions of an intellectual life; but not of a life lived in a vacuum. I was taught to make yet one more revision to a paper and to savour the polish and finish it provided. And finally, my overarching memory is of my father, at frequent parties arranged by my more outgoing mother, playing generously if not exhuberantly the

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[2] The MAA Monthly, the most widely circulated mathematics journal, has for generations published a section of problems, both solved and unsolved, on which researchers, novice and adept, expend considerable effort.

role of host. By mid–evening his eyes would slightly glaze and a stream of cocktail napkins would issue forth covered with formulae and expressions in his careful and concise italic script.

I have been unusually privileged. I have worked intensively with both brother and father as equals and have known my father as an intellectual peer for more than a quarter century. In every sense he has been 'the best teacher I ever had."