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## Brain drain



*There is growing concern about Australia's brain drain. The Gazette is running a series of personal essays by mathematicians who went overseas. Philip Broadbridge is the second author in this series.*

### Looking back from across the Big Pond

Philip Broadbridge

After two years in University of Delaware, I have been invited by the editors of the *Gazette* to recount my reasons for moving from Australia to USA, to compare Australian and U.S. institutions, and to contemplate what it would take to attract me back. Now I am walking in a mine-field. In responding, I could not avoid my perspective on some cultural and subcultural idiosyncracies of academics in the two countries. God knows, I am not a sociologist. I will make some oversimplified and undiplomatic generalizations in a dialect that reflects little formal training in the social sciences. In this manner, I run the risk of being persona non grata in more than one nation, and of offending old friends.

#### 1 Background

I was educated in state schools in the blue-collar suburbs of Adelaide. I am very grateful for the high standard of universal education provided in the 1960s and early 1970s. State and private sectors of education in Australia should be proud of their products of that era. This was also a great era for science education in the universities. I have found that Australian graduates in

general are highly valued. After majoring in mathematical physics and pure mathematics at University of Adelaide, I trained as a teacher at University of Tasmania. I taught in a high school for two years before returning to commence my PhD in mathematical physics. After that, my first temporary lecturing job was at Curtin University, after which I worked for four years on non-linear environmental modeling at CSIRO, followed by a permanent academic position at La Trobe University. From 1990 to 2001, I was a professor of applied mathematics at University of Wollongong. I am very proud of the achievements of my close colleagues, often made with meager material support and in a climate of increasing conflicting demands. These years have passed much faster than I had expected. I changed from being a “young Turk” (someone else’s description) to a custodian of the established order, although I am still pleased when I stir up either radicals or conservatives. During all these times, I worked with some wonderful people, including students, academics and administrators. Then why am I not still living and working in my country of birth? Below, I will raise some of the professional issues. I cannot write about the difficult

personal issues associated with such a decision.

## 2 Withdrawal of support

During and after the second war, Australia was an acknowledged power house not only in sport but also in applied science. It was a recognized leader in many fields including arid-land agriculture, immunology, optical instruments, radar technology, and spectroscopy, to name a few. This could be backed only by a first-rate system of universal education that paid due regard to fundamental science. Over my years of work, I have witnessed something that I and many others have privately described as systematic withdrawal of support for science and education, along with a lowering of the morale of the educated workforce. Government and private industry spokesmen have publicly denied this withdrawal of support. Although they have various degrees of optimism, none of my Australian workmates have disputed the existence of systemic decay to some degree. Australia is now embarrassingly close to the bottom of the OECD national league table of percentage of GDP invested in research and education. In the 1960s, a university lecturer earned about the same as a parliamentary backbencher. Now the lecturers are about 60% in arrears. As a senior tutor (Lecturer A level) in 1982, a median middle-class brick veneer house cost about 2.5 salaries. As a professor in 2001, a similar house was still worth about 2.5 salaries. Academics at level A were facing a housing cost of more than 6 salaries.

The vast majority of Australian University students attend government-funded universities. Since the late 1980's, the running costs of these hamstrung institutions have accelerated at a much higher rate than their recurrent funding. Private support from industries and from individual philanthropists has been negligible on the scale of institutional needs. As government-funded institutions, they were not allowed to increase tuition fees for Australian residents. There were government quotas placed on

student intakes, so that over-enrolments attracted marginal additional income, at the expense of cramming students in facilities that were in some cases outdated and run-down. In the early 1990's we saw a marked increase in enrolments of full fee-paying international students. The fact that higher education became the third highest export-earner, may partly be a reflection of other components of the national economy, as well as a sign of the education system offering relatively good value for money, even under pressure. We were told then that the tuition fees of international students would "add cream to the cake". I didn't believe it, and I correctly predicted that large numbers of international enrolments would become necessary to avoid insolvency. Then the government announced that the university system would receive three successive cuts of 5% to its annual recurrent funds.

In an effort to make the operation more efficient, the government attempted simplistic accounting procedures to measure the productivity of universities. It contracted a management consultant firm to collect and analyze the veracity of publications data. I was embarrassed to be forced to write to the Secretary of the Royal Society of London to ask him to verify that one of my published papers had indeed been approved by referees. Afterwards, I found that several authors with publications in the same journal had been forced to independently provide the same authentication. When I tell this story to non-Australians, they portray looks of disbelief.

Due to the imbalance in cash flow, economic survival has become the first consideration of Australian institutions. The Vice-Chancellor position has become more of a CEO position, than that of an academic leader. Usually, the primary criterion in selection of a Dean is the ability to generate external income. New demands have been passed down to academics. A first-rate academic must be an entrepreneur, an administrator and record-keeper, a public relations expert, a project manager who can make the

best of inadequate library resources and laboratories, a performer, a stenographer and an innovative teacher. All these burgeoning demands have occurred as student-staff ratios have increased, and as the variety of course offerings has escalated, in a frantic attempt to attract more students.

Pure sciences and the humanities are the disciplines that have suffered most in the drive towards commercialisation and corporatisation. Within an academic workforce of static or decreasing size, there is pressure to downgrade traditional liberal arts disciplines in favour of those areas that appear to have additional earning potential. Australia has lost at least 20% of its university mathematics positions over the last 10-15 years. I have seen the academic research-active mathematics staff numbers at several universities drop from a barely viable dozen to an unviable four or five. Many physics departments have been amalgamated with geosciences or engineering. One year, I was told that because my department had been performing so well, we would most likely escape with only 2.5 positions being made redundant. I do not blame university administrators for having to make such terrible decisions when the finances allow no easy way out. However, when the opportunity arose, it made me seriously consider an overseas institution that was not forced into such a corner.

I became disheartened by the threat of further cuts to academic staff positions year after year. This was a major consideration. Another, was a desire to find if I could work with more self-satisfaction in a place with a well resourced research library. Escalations of publishing costs, along with unusual devaluing of the Aussie dollar, hit libraries very hard.

### 3 Response from within our profession

There are some academic mathematicians who have made notable efforts to turn the negatives into positives, always with some benefit to the profession. On the other hand, there are some senior mathematicians

who have contributed to the slide. Some “white carnations” do not want to complain lest they cause embarrassment to their institution and spoil their chances of being given the key to the executive wash-room. Some continue to deny that there is a problem. For them, the halcyon days of science have never ended. They are content to serve out their professional life extending their PhD thesis, receiving public support for what they regard as their precious gift to humanity. They are reassured of the sanctity of their pursuits by fellow members of a mutual admiration society. They are reluctantly drawn in to professional service but they soon find that offices of professional associations give them the opportunity to recommend their old mates for medals, to denigrate any activity of mathematical science that is more than two journal pages away from their own beloved paradigms and interests, and to portray a superior air that is well fitted to alienate members of other fields of human endeavour.

I could write an interesting article on the collection of spiteful or misguided referees’ reports that have been returned to me. Certainly, as an editorial board member of three journals, I would not accept such strange referees’ reports on face value. On one occasion, the ARC office was unprofessional enough to return a report with the anonymous referee’s name still attached. I have reviewed around 50 of these applications, and they have had a better success rate than my own. I am pleased to say that I have helped to achieve funding for some individuals who have knifed me. I do not blame the ARC for these problems. I think that the strategy of keeping administrative costs down, has worked well for the Australian system, even though it increases some risk of error.

### 4 Defeatism and cultural malevolence

Pursuit of academic excellence has become alien to the popular Australian “yobbo” culture. In my long association with state schools, as a student, teacher, parent and

volunteer administrator, I have seen an increasing frequency of psychological and physical abuse perpetrated by students on other students who were targeted only because of their interest in academic pursuits. Neither side of politics is blameless for this sad state of affairs. Some conservatives see little benefit in providing equal educational access for all. This is part of the principle of getting no more than that for which one is prepared to pay, whether or not one is able to pay. Some liberals do not believe in pushing people to test the limits of their abilities. Subjects whose mastery requires self-discipline are viewed as “elitist” or even “bourgeois”. I have heard a senior school mathematics teacher justify removal of the top-level mathematics from subject offerings, arguing that the comprehensive school should not encourage elitism. I regard this as defeatism, rather than anti-elitism. A state minister of education was quoted as making a statement to the effect that mathematics was no longer so important in the curriculum because everything could now be done on computers. It is a sad indictment on our own profession that we have not made the importance of mathematics patently obvious to everybody. Whose fault is it if the vast majority do not see that without mathematics all of us would be materially worse off? The same people who deride mathematics make everyday use of DVDs and of telecommunications systems that could not have been developed without sophisticated mathematical algorithms.

I am pleased to say that there are signs that higher education is now higher on the political agenda in Australia. There have been some noteworthy improvements such as new research fellowships and new funded research centres.

## 5 So, what is different?

The range of motives and behaviours of humans is similar in all nations. The day to day demands are much the same. One important cultural difference in America is the tradition of pride and support for one’s alma

mater. Choice of college is a major talking point and a major reason for families developing college savings accounts. Alumni develop strong allegiances. For example, inter-collegiate sports are followed passionately. I feel that in Australia, the majority of people would regard it as much more important to know which private school you attended than to know which public university you attended.

There are strong similarities in their academic workforces. Perhaps, Americans tend to be a little more sensitive to criticism and they tend to argue a little longer over minor matters. Life tends to be a little more complicated and a little more hectic.

Two of my fellow expatriate Australians have commented that mathematicians here do not feel the pressure to continually justify the meager existence of their discipline. It is only after this pressure is taken off that you realize that its presence in Australia was no mere illusion. It is generally accepted that mathematics is useful. In most major universities, there is a mathematics requirement of all students, no matter what degree program they are enrolled in. When I suggested this in Australia, University Senate colleagues thought that I was joking. Here, I have found unexpectedly high mathematical expertise in such places as the linguistics department. The President of USA proudly announced that the National Science Foundation would be given a massive budget increase specifically for mathematical sciences. This is seen as important for national security as well as technological development. Perhaps in the future an Australian Prime Minister will follow suit.

In USA, the tertiary education system is much larger and within it, there is much more variability. This means that there is a greater variety of job opportunities for PhD graduates, generating more optimism. There are many excellent private 4-year colleges that award bachelors degrees, and who require staff with PhDs. There are many state universities of varying quality and size,

and there is a significant number of private doctorate-awarding universities and institutes of technology.

The location has the advantage of being within a day-trip to the major cities of the mid Atlantic region. There are many institutions of higher education in this region. While this magnifies the opportunity for collaboration, the competition for students is fierce.

I happen to work at one of the few universities that is state-supported but which is private in many of its operations. Salary levels are not prescribed as they are in some state systems, such as the University of California system. My salary is now 0.5 of a house. It has taken me 22 years of work to increase this ratio from 0.4 to 0.5. For many Australians, this ratio has dropped during their working lives, indicative of a poorer standard of living. Only 16% of the university's income is from the state. The rest comes from tuition fees, donations and investment revenue on its one billion dollar endowment. A slab of this comes straight to my department, for uses at my discretion. I must warn that in recent years, the fiscal situation has not been so good in many other U.S. states and institutions. Some have had hiring and salary freezes. The small state of Delaware is the registered headquarters of half of the top 100 companies. This leads to extra entertainment when international business leaders appear in Delaware courts to face the music. Some of the Delaware-registered companies, especially chemical companies and financial institutions, have close ties with the state and with the state's flagship research institution. This relationship is managed very well by the leaders of the state, the companies and the university.

The library collection is very good. We have most mathematics journals and we have even made some added subscriptions

without cancellations. I regret that as a department chair I don't have enough time to properly use the facilities. I have 40 academic staff. Each must be reviewed by me annually and a small percentage of the overall salary budget can be distributed at my discretion. This makes the performance appraisal process more important.

The best American undergraduates are as able as the best Australian undergraduates. Probably, the middle-ranking freshmen are not so well prepared in mathematics. Students here seem to be more polite but they and their parents are more ready to complain about marking and grading procedures. There is a problem with grade inflation. Students and teachers are under pressure to achieve high grade point averages.

Australia is indeed very fortunate that it has a system of commonwealth-funded postgraduate scholarships. Most US postgraduates are funded as teaching assistants, often with a heavy load of teaching on top of their heavy coursework and thesis requirements. I think that Australian postgraduates have an easier time.

## 6 Would I come back?

I am Australian and I do have close ties there. I would be influenced to return if there were signs that the country had bottomed out its anti-intellectual slide, and if the mathematics and science disciplines had regained some of their zeal and pride. This should be reflected in better funding for institutions of higher learning. I would be looking for a position that could use my management experience, with some opportunity for research and/or research management, and a salary approaching half a local median house price, located not too far from people that are dear to me. In the mean time, I am well treated and I am proud to be in a strong department at University of Delaware.