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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. This issue features a contribution by Terry Tao, whose many honours include a gold medal at the 29th International Mathematics Olympiad at the tender age of 13, the 2000 Salem Prize, the 2002 Bôcher Memorial Prize and a 2003 Clay Research Award.*

Terry Tao

In this essay I briefly summarize my personal experience with education and work both in Australia and in the United States, and compare the two.

I completed my undergraduate degrees at Flinders University, and on the advice of my undergraduate advisor, Garth Gaudry, started looking at overseas institutions for my PhD program. Eventually I accepted an offer from Princeton, as well as a Fulbright fellowship to support me. After I finished at Princeton, my primary choices for post-doctoral positions came down to choosing between offers at UNSW and at the University of California, Los Angeles; I accepted the (three-year) offer at UCLA, planning to then apply for more permanent positions in Australia afterwards (when my visa would expire). However, near the end of my post-doctoral position I was offered a tenure-track position at UCLA. I was torn between returning to Australia and accepting at UCLA (which I had become quite happy at); I eventually compromised by spending half the year at UCLA for my new position, and half the year at an Australian institution (UNSW and then ANU) for the next

four or five years (this being partly because of my visa requirements stemming from the Fulbright fellowship). This cycle was finally completed at the end of last year; in the meantime, I have put down roots in Los Angeles, both academically (for instance, I currently have four graduate students at UCLA) and personally (having married an American, and now having a son in Los Angeles). As such I now view Los Angeles as my primary home, and am not seriously contemplating moving to another institution (either in Australia or elsewhere) for a while yet.

At the postgraduate and postdoctoral levels, I feel it is certainly beneficial to experience different institutions, both at home and overseas, both in order to attain as broad and complete a mathematical education from multiple viewpoints, and also to “network” by meeting as many mathematicians in one's chosen field as possible; by artificially restricting one's choices of places to work I feel that one may not achieve one's full potential. One attraction of institutions in North America and Europe in this regard is simply the sheer amount of mathematics

going on in those regions, and the dynamic contact between mathematicians from different institutions from visits, conferences, workshops, etc.; at these early stages of one's career it seems particularly vital to be exposed to as much of this type of activity as possible. Of course, it is also possible that in this process one gets more attached (as I did) to life overseas than in Australia, but this plays an essential part in maintaining mathematical contacts between the Australian and international communities, and is vastly preferable to the alternative of isolating Australian mathematics from the rest of the world. For similar reasons I believe it is important to attract talented international students for postgraduate study in Australia.

The situation with more permanent positions is of course more complex, and many factors, both academic and non-academic, influence one's decisions here. For myself, personal reasons, positive experiences at UCLA, and a certain amount of inertia were the main factors encouraging me to stay in Los Angeles, though of course the situation would vary from individual to individual. Like a number of Australian expatriates, I have found the environment in the US to be more appealing than that in Australia, although the comparison is not wholly one-sided, and several recent initiatives in Australia may restore some balance, notably the Federation Fellowships and the various programs at AMSI, the former of which allows for quite internationally competitive packages for prestigious recruitments (for instance, I have read recently while visiting the UK of some concern there of a brain drain towards Australia, caused by some eminent scientists moving their entire laboratories to Australia based on these fellowships), and the latter of which should serve to raise the level of mathematical activity and access to resources throughout Australia. Somewhat more intangibly, I feel that Australia offers a high quality of life and relatively low cost of living, which helps

offset any disadvantages in nominal salary levels, and the undergraduate student base is quite well educated and motivated, making teaching here more rewarding (at least for me) on the average than in, say, the United States.

There are perhaps two other disadvantages that affect Australian mathematics. One is the lukewarm and fluctuating level of support of mathematics (both financial and rhetorical) from the community, and particularly the state and federal governments, on which the universities in Australia are so highly dependent; this not only limits access to financial resources, but also makes longer term planning (such as new permanent appointments) quite difficult. But the situation here may improve as initiatives such as the ones mentioned above become well established. The other disadvantage is the relatively small population and geographical isolation; this means our universities are few and far between, and that visitor programs and conference activity are thus reduced as a consequence. As mentioned above, this is more of a problem for younger mathematicians than for more senior ones (who may have their own resources to invite visitors), but it does mean that the academic environment in Australia may be seen as less exciting than elsewhere. In the long-term, this isolation might become less of a problem as the mathematical scene in Asia matures, and as increasingly widespread and cheap use of communication technologies (e.g. videoconferencing) become adopted; in the near-term, I feel that perhaps more effort could be made to attract overseas visitors, and pool them between universities (as is done with the Mahler lectureship, for instance), though I am not sure how such an effort could be co-ordinated. The use of AMSI resources to promote conferences within Australia and raise visibility overseas may also help in this regard. This lack of "excitement" in Australian mathematics does lead to a certain vicious circle; it hurts

the universities' efforts to recruit good people for postgraduate, postdoctoral, and permanent positions, which in turn may lower the level of perceived mathematical activity and prestige further, and so forth.

The situation is not irreversible, though; there are certainly many talented and internationally well-known mathematicians in

Australia, and there are a number of internationally recognized mathematical activities here, such as ICIAM. A more aggressive promotion of Australian mathematical activities overseas, and recruiting of overseas talent at all stages of career, may build enough momentum to raise the profile of Australian mathematics, and to attract people who may otherwise by default not have considered moving to Australia.

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