

Scientist or Statistician?

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1: *Introduction about myself*

Before retiring on my 60th birthday anniversary – 1 July 2001 – I was a university academic. Even though I'd held tenured positions at various universities for more than 30 years, for the first time I could please myself with respect to scholarly pursuits.

I always wanted to be a scientist. My first love was geography, but I also enjoyed learning physics and chemistry. Biology was not taught at my school but reading GK Chesterton in our religion classes I knew immediately that evolution was obviously true and his arguments against it were false. My parents were delighted when I won first prize in the state of Tasmania at the university entrance exam, gaining credits in Geography, Physics, Chemistry, and Mathematics A and B. However, meeting the other top students in first-year classes I realized that they were better than me, particularly in Mathematics, although none of them had studied Geography, and that was why I'd beaten them. But the dean of the Faculty of Science refused to allow me to enroll in this subject because you only did four subjects in first year, and the best science students did Physics, Chemistry, Pure and Applied Mathematics.

In third year you could only do two subjects. The Professor of Mathematics was the famous statistician E.J.G. Pitman, and being drawn to Statistics I dropped Physics in third year to major in Mathematics, despite a strong distaste for theorems and lemmas. This was still the pre-computer age. So the die was cast. I did my PhD in Statistics at the Australian National University, and after brief stints at Johns Hopkins and the University of Western Australia and a longer period at Princeton as a tenured Associate Professor, I became Foundation Professor of Statistics at Macquarie University.

2: *Current Activities*

My life now revolves around my students and younger son and his family in Thailand and my wife and our elder son and his family in Sydney, with less frequent visits from our American daughter. I love outdoor activities like building stone walls in our garden in Sydney and landscaping our land in Chiang Mai. I now spend nearly half of my time working at Prince of Songkla University (PSU) in southern Thailand. This work began in 1994, when Dr Kanit Kaimook from PSU's Mathematics & Computer Science Department knocked on my office door at Macquarie University and invited me to visit his campus in Pattani province.

Working in Asia was not new for me. After three trips to Pakistan in 1985 as the statistician in a team surveying family health expenditures from a nationwide household survey of 10,000 families, I was a regular visitor to universities in eastern provinces of Indonesia, running 4-week courses on Research Methods for the International Development Program (IDP). In 1987 Juris Reinfelds invited Robert Elz and me to help him run a course in Computer Science at PSU's Hat Yai campus for prospective PhD students in Computing and Biostatistics. These included an epidemiologist in PSU's Faculty of Medicine, Dr Virasakdi Chongsuvivatwong, whom I visited regularly during stopovers on my way to and from Oxford University for study leave.

Dr Virasak and I share a passion for research in public health and we learnt a lot from each other, running two-day workshops in Hat Yai on diverse topics including logistic regression, relational database and statistical graphics. However, it was Dr Kanit's invitation that resulted in the establishment of an MSc program in Research Methodology at PSU in 1995 (from which 70 have graduated and ten are currently enrolled), followed by a PhD program in 2005 (from which 28 have graduated and 24 are currently enrolled). Many of these students visited Australia as part of their study program, and statisticians who got their PhDs with me at Macquarie are helping to look after them. These include Phattrawan Tongchumkum, Chamnein Choonpradub and Nittaya Chirkiatsakul from PSU Pattani, Halimah Awang and Rohana Jani from the University of Malaya in Kuala Lumpur, and Khairil Notodiputro and Dumaria Tampubolon from Bogor Agricultural University and Bandung University of Technology in Indonesia.

Now that budget air travel is available, I also frequently fly to Chiang Mai, where we built a lodge in the mountains 20 kilometers west of Chiang Mai city. Being an avid bushwalker, I enjoy bushwalking along the many trails in the Opkhan

National Park that borders our property, and kayaking down the local Nam Mae Khan River. I also love exploring the area around Doi Inthanon - the highest mountain in Thailand – just an hour's drive further west.

In Sydney, I now spend mornings in the NHMRC Clinical Trials Centre at the University of Sydney, where my former student Val GebSKI is Professor of Biostatistics & Research Methodology. This Centre provides an ideal intellectual and social environment for scientific research of the kind that we're hoping to reproduce at Pattani campus of PSU.

3: Rewards of being Actively Engaged

If you are lucky enough to be born with creative talents and have developed useful skills, I believe that you have a responsibility to help others as best you can, and that responsibility continues for your whole life.

Although my earlier life was full and rewarding, my most fruitful and enjoyable work is occurring after formal retirement, making my own plans and setting my own challenges and deadlines, in the company of constructively critical colleagues, family members, and students who want to learn. It's wonderful to have lived long enough to take advantage of the amazing advancements in technology that are now taken for granted, such as the Internet, Geographic Information System (GIS) and other powerful data analysis software, and freely downloadable scientific data from everywhere on Earth. And it's a joy to be surrounded by keen students and helpful colleagues working in well-equipped learning centres.

4: Challenges Encountered

It's always a big challenge to work successfully in a foreign country, especially one where one cannot speak the language. Intruders are not always welcomed with open arms, and what obviously seems a beneficial change to an outsider is not necessarily accepted by local people, and always takes a long time to take root and blossom. Progress cannot be imposed from the outside: it can only occur from within.

But such difficulties apply just as much to one's own country. For me, the major challenge was the desire to transform myself from a statistician primarily interested in methods to a scientist primarily interested in results.

It was difficult to make this transformation as an academic statistician. Although many statisticians work collaboratively with scientists and publish their results in scientific journals with high impact factors, these publications are not usually regarded so highly by their statistical colleagues and promotion committees. Statisticians tend to get promoted more quickly when they publish new methods in their own journals, even when these methods focus just on mathematical theory.

Lack of available data was always a problem in earlier years. Perhaps this is why statistical journals still focus so much on developing new methods – even when it's unlikely that these methods will ever be used. And analysis of secondary data is still regarded as of little value in many places. It still amazes me to recall an article on climate change being rejected by *Science Asia* because it used "secondary data" to estimate temperature changes in the past. Not having a time machine, we had to find another journal with less stringent requirements!

5: Immediate and Longer-term Plans

At present our Research Methodology program focuses on applications in Public Health and Environmental Science using data collected from various sources including the Ministry of Public Health and the Department of Lands in Thailand, World Health Organization supported Demographic Health Surveys in Nepal, the Census Bureau, National Renewable Energy Laboratory, and National Aeronautics and Space Administration (NASA) in the United States, and the Australian Bureau of Meteorology. My current plan is to widen these applications areas by including data collected from community surveys in Thailand, as well as time series modeling of financial data. Our hope is to create a strong and sustainable research program that will continue to attract students who want to use scientific methods to improve our world.

Just over a year ago I was lucky enough to meet Professor Alfredo Huete, who introduced me to remote sensing data available from NASA's Earth-orbiting satellites. These satellites provide enough data on surface temperatures, vegetation indexes and other variables to keep many researchers busy developing methods for understanding how climates are changing around the world. Not only does this involve the analysis of images recorded by satellites, but it's also necessary to engage in field work to correlate these data with what is happening on the ground.

This need for primary data collection is providing another important focus for our graduate program, which involves learning how to conduct studies in small rural communities. Recently, one of our new PhD students took me to a small village near

the Budo National Forest in southern Thailand where about 20 local people shared their concerns with us on threats to hornbill birds from poachers. This prompted our desire to develop simple and short questionnaires to assess the well-being of a small community, similar to the widely-used General Health Questionnaire.

I'm also teaching statistics to non-statisticians by starting with the problem and then finding an appropriate method, rather than using the more common approach that involves starting with the textbook method and selecting some problem for illustration. This approach worked well when one of my former students now teaching MBA students in the Faculty of Management Science at PSU invited me to assist her. We used a brief questionnaire cited in Malcolm Gladwell's "Talent Myth" article in his book "What the Dog Saw" to assess management skills, and analyzed these data, using factor analysis, to investigate age and gender differences between respondents.

6: Most Memorable Achievements

Helping to establish the NHMRC Clinical Trials Centre in Sydney. Students graduating and being enriched.

7: Regrets

Not mastering telemarking skiing turns. Not learning about financial modeling at Princeton.

8: Advice to Young People and those about to Retire

Young people: Be confident and grab opportunities. Follow the least-travelled road. In scientific work, start by believing nothing and trusting nobody, but check everything after you think you've made some progress. For your postgraduate study, don't just choose the highest-ranking university you can get into. Instead, find a good supervisor. Work collaboratively in a team with others who are interested in what you are doing.

Those about to retire: Keep going, keep active and look after your health. If you're still supervising graduate students like I am, focus on what your students can do, rather than what they can't do. If you can get them to build on what they already know and want to do, they will gain confidence, and then they will find it easier to fill in gaps. My friend Professor Virasakdi has a good motto: "leave nobody behind".

9: Conclusion

All my life I've had great teachers. The first were my grandma Eileen Orr and my mother Mary who taught me to read and count. My father Roy, a prisoner of war whom I didn't meet until I was four, taught me how to "nut things out", advice that I still find invaluable when supervising graduate students. Sister Mary Celsus taught me Geometry and Algebra in Devonport where I started school, and our parish priest Hugh McMenamin told my parents to send me to St Virgil's College in Hobart for my last four years at high school, where Brothers Williams, Hessian, Rooney and Joyce ably prepared me for tertiary study. Bruce Scott and Mac Urquhart, my undergraduate teachers in Biophysics and Applied Mathematics, respectively, inspired me to become a scientist, Jesuit chaplain Peter Green taught me to be a whole person, and David Elliott helped me to finish an MSc after an earlier supervisor had given up on me. I assumed that an error had been made when Pat Moran accepted me as a PhD student at the Australian National University, but he gave me a doable PhD problem that other members of his department, notably Warren Ewens, helped me to solve, and then arranged a post-doctoral position for me in Geof Watson's Statistics department at Johns Hopkins University. Geof generously looked after me after that and offered me a job when he moved to Princeton, where I learnt data analysis from John Tukey, population science from Ansley Coale, and ecology from Robert MacArthur. Back in Australia, John Forbes and Alan Coates fostered my growing interest in biostatistical research, and trips to Marvin Zelen's Biostatistics department at Harvard and Virasakdi's Epidemiology unit in Thailand helped my development in this field.