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A Russian Study of Federation Australia

Kriukov, Nikolai Abramovich, **Avstraliia: sel'skoe khoziaistvo v Avstralii v sviazi obschim razvitiem strany. [Australia: the rural industry in the general development of the country.]** Moskva: Glavnoe upravlenie zemleustroistva i zemledeliia. Department zemledeliia. [Moscow: Chief Administration of Land Organization and Rural Industry. Department of Rural Industry.] Pechatnia A.I. Snegirevoi [A.I. Snegirova's Printery.] 1906. With map + 188 illustrations. Summary Tables.

This publication of the Tsarist government (the title page bears the imperial double-headed crowned eagle) is centred on a seven-month sojourn, from November 1902 to July 1903, in Australia by Kriukov. The book (DG 11163) is held in Storage at the University of Sydney Library, in whose catalogue I discovered it when searching for writings by another Kriukov. This copy was apparently obtained on exchange after passing through the libraries of one or several Higher Party Schools (of the Communist Party). There is another copy at the National Library of Australia in Canberra, but none (it seems) in several of the western libraries (Library of Congress Catalogue, University of Helsinki) with extensive holdings of pre-revolutionary Russian materials.

The book is a meticulously researched and copiously illustrated snapshot of Australia just after Federation in 1901. There may not be a unified study as extensive in English. In this centenary year, although the book is not primarily about official statistics, my purpose is to bring its existence to the notice of readers of the *SSA Inc.Newsletter*, in recognition by statisticians of Federation.

The language of the book will pose a problem; but even so almost all of the 91 sources cited are local publications in English, and the illustrations (on plates inserted between the numbered pages) include many photographs of the then urban and rural Australia. At the time this country, where 4 out of 5 inhabitants lived on the land, was a leader in rural industry and in particular in its mechanization, so there are also detailed illustrations of agricultural machinery. Among those which particularly caught the attention (facing pages 128-129) were ones detailing the nature, structure, and construction of rural wire fences, surely a novelty to the then-Russians.

Since all 6 State capitals were visited, readers will find photographs of familiar institutions with industrial connections, as they appeared at the time; for example (facing p.576): "The Institute of Technology and Museum in Sydney"; and (on a full page facing p.97) "The Institute of Technology in Adelaide" (a building standing at the corner of North Terrace and Frome Road). A listing (in Russian) of all illustrations occurs on pp.V - VIII, following a detailed listing of the contents of chapters. There is an alphabetical index, mostly in Russian, on pp. 643-648.

The motivation and context for the book is given on pp. 6-7 under a subheading "Our rivals" as follows: "On the world market where Russia is a provider of products of the rural industry we have competitors who bring . . . to world markets the products of their lands. Chief among these are: Australia, Argentina, New Zealand, United

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States, Canada, Denmark. From Australia world markets gain the following chief products: wool, frozen meat (beef and mutton), hides and skins, butter, fruit. . . . It is with mainly these countries that our homeland has to compete. Out of this arise the very actual and unavoidable questions: what is the nature of these countries, . . . , what are their resources and what ways and means are used in the promotion of rural industry? To study and describe these countries fell to me. Occupied since 1885 with the study of world-wide rural industry, I have succeeded in visiting them personally and spending time speaking with farmers." There is a footnote on p.7 which reveals the author as an indefatigable and voluminous writer and researcher, as if this was not revealed by the massive amount of work for the Australian volume (no collaborators mentioned). The footnote begins "Up to the present time, the following works have been produced by me and published by the Department of Rural Industry: 1) Canada 2) Denmark 3) Norway 4) Lectures on Quickly Perishable Products of Rural Industry. [This last seems to relate mainly to the preservation of meat. The author reveals an unusual interest in refrigeration. - E.S.] . . ."

Further bearing on Australia's then-place in the world is Federation, with a brief discussion of which Kriukov concludes his Chapter 1, which is entitled: *Discovery of Australia and its short history* (pp. 30-42). The following is from pages 41-42: "The strengthened trade between the colonies and the ease and convenience of communication gave rise to the idea of a unified Australia. This idea arising in 1899 at a specific meeting in Melbourne (Federation Conference) proceeded to gather ever more support. After exhaustive consideration of the question in all six State parliaments, the matter was put to a referendum of all the people with the outcome that the majority of the population of New South Wales, Victoria, Queensland, South Australia, Tasmania and Western Australia was for Federation of these colonies on the pattern of Canada. [Kriukov's footnote: New Zealand did not join the Federation and remained a separate colony.] This Federation under the name of Commonwealth of Australia was promulgated with pomp and ceremony on the first day of the XXth century, i.e. 1 January 1901. From that moment, Australia enters the arena of world trade as a single, powerful and wealthy nation, the internal cohesion of which is built on the voluntary agreement of its whole population and the realization that such a union will serve the exceptional progress of the country."

On p.21 (within his extensive: *In place of a Preface*, pp.13-29) he gives the population of the various States according to the 1901 Census: Western Australia: 184,124; South Australia [which then included the Northern Territory]: 362,604; Victoria: 1,201,070; New South Wales: 1,354,846; Queensland: 498,129; Tasmania: 172,475; with a total of 3,773,248. These figures, as presumably all the official Australian statistics with which the

book is heavily laced, were taken from a list, headed *Official Publications* of 63 items grouped by State, with his annotations. Among these, five statistical ones by T.A. Coghlan stand out: 33) *A statistical account of Australia and New Zealand. 1903-1904.* 34) *The Seven Colonies of Australia. 1901-1902, 1900-1901.* 35) *New South Wales Statistical Register for 1900 and previous years.* 36) *Annual Statement of the trade of the Commonwealth of Australia for the year 1903.* 37) *The Wealth and Progress of New South Wales. 1898-99, 1900-1901.* There is also an authorless 38) *From Colony to Commonwealth Sydney, 1901.* The last has Kriukov's annotation "A historical review of the different aspects of the rural industry in New South Wales, composed by specialists of the Ministry of Agriculture."

There is an interesting footnote relating to Coghlan on p.441 of Kriukov's book: "In Sydney, among the government institutions of New South Wales there is a Statistical Department (Statistician's Office). Its head is T.A. Coghlan, an energetic and conscientious statistician. Thanks to him, this Statistical Department is the leading one in Australia. The parliament of the Australian Commonwealth entrusted to Mr. Coghlan the analysis of all statistical data relating to the entire Commonwealth."

Timothy Augustine Coghlan (1856-1926) was appointed (first) NSW Government Statistician in 1886. He was appointed Agent General for NSW in London in 1905, which was a serious loss for Australian statistics and item 33) above seems to be the last within that context, although his 1918, 4-volume *Labour and industry in Australia: from the first settlement in 1788 to the establishment of the Commonwealth in 1901*, testifies to his continued activity, and has been reprinted in 1969. Coghlan, while Agent General in London for NSW, had been asked to accept the position of Commonwealth Statistician, but declined at the request of the NSW Government, and when the Commonwealth Bureau of Census and Statistics was formally created in 1906, its head was George Handley Knibbs (1858-1929). See Heyde (1988). Coghlan was knighted in 1914. As with Robert E. Lee and Virginia, service to his home State took precedence over command of the Union Army.

It is clear from the dates of Kriukov's Australian sojourn and item 33) that some contact with Coghlan continued after Kriukov's return to Russia. The period round Kriukov's visit saw a considerable efflorescence in the methodology of agricultural official statistics in the Russian Empire due to the *zemstvo* statisticians such as Fyodor Andreevich Shcherbina (1849-1936) whose historical and statistical study of 1900 marked a culmination. It is tempting to hypothesize some interaction of statistical methodology between the two rurally competitive countries.

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Eugene Seneta

01.01.01

Innovative Statistics Workshops

At the annual Queensland DPI Client Services Awards 2000 the three-day basics statistics workshop, developed for research and extension staff by DPI Biometricians Kerry Bell, Vivienne Doogan and Angela Reid, was awarded a meritorious award in the Innovation in Service Delivery category. These awards recognise teams and individuals for their outstanding client service achievements. The workshop was considered innovative due to the application of adult and action learning methodology in the teaching of statistics to staff. The workshops help to enhance the statistical rigour of DPI research hence improving the quality of their RD&E.

The aims of the workshops were to make biometrics interesting, relevant to our clients and to increase statistical rigour of DPI research (without falsely simplifying the statistical concepts). The workshop consists of 9 modules: Basic concepts, Hypothesis Testing, Sampling, Contingency Tables, Regression, Experimental Design, Analysis of Variance, Managing Experiments and Presenting Results. A variety of data was used in examples to target the different research disciplines of the audience (which may have ranged from fisheries to field crops).

To gain a thorough knowledge of the concepts in adult education, Kerry Bell completed a Graduate Certificate in Rural Systems Management at the Rural Education Centre, Gatton, Queensland. The workshop material was then designed and documented so that different biometricians across Queensland could run the course effectively even if they have little knowledge of adult or action learning.

Components of the action learning cycle are: plan, act, reflect and generalise. Presenting the content through these four methods cater for a wide range of preferred learning styles. (This diversity of learning styles of staff was evident from analysing responses from questionnaires given to the staff prior to the workshop.)

Adult learning concepts applied in the workshop allowed participants to:

* set their own learning goals
* participate actively in the learning process
* build on and use, the participants own experience
* see that their learning has been successful.

Learning goals were established by having the class say what they expected to learn over the three days at the start of the workshop.

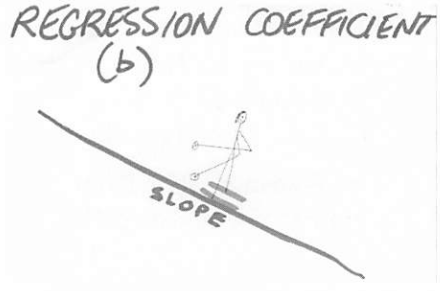
Activities with high visual impact had an amazingly successful influence on helping participants understand the theoretical concepts. Some of the activities included:

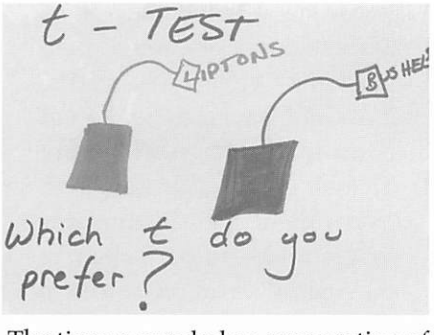
* investigating the relationship between the pull back of a rubber band and the distance it travels so participants establish their own data set which is plotted on the floor and then analysed using regression.

* marking out the different components of a graph on the floor for a completely randomised design to understand the components of a model and the source of variation in analysis of variance.

* using paper cut outs to design field crop, glasshouse and feedlot trials.

To allow participants to reflect on the module content, at the end of each module they were encouraged to write or draw something to prompt their memory of a term or concept learnt in that module. This was done on A4 pieces of paper which were then put on the wall to act as memory jogs throughout the workshop.





The time expended on preparation of the workshop was well rewarded by the positive feedback from participants (giving the workshop an average success rating of 8.6 out of 10, based on data from 14 workshops surveyed (of the 17 run) and 157 participants). Having the Department officially recognise our efforts to improve the statistical education level of DPI staff was also a great reward.

Statistics and Nursing: Unlikely Bedfellows

Alice Richardson and Lexie Brans, University of Canberra

Introduction

Alice Richardson is a lecturer in Statistics and Lexie Brans is a registered nurse and Senior Lecturer in Bioethics. We have been working for the past two years on a variety of projects, including a study of the links between Florence Nightingale, statistics and evidence-based nursing, and development of courses in Clinical Trials Management for the National Health Sciences Centre at the University of Canberra.

In the course of these projects we discovered that there were many links between our respective professions. We offer the following dialogue as preliminary results of our discussions and reflections.

Use of evidence

AR: Statisticians like to say "In God we trust: all others bring data".

In other words, they make decisions on the basis of data not on the basis of anecdotes.

LB: Nurses once based their practice on anecdotes and a rigid hierarchical system between medicine and nursing. Now they have a rapidly growing body of evidence-based research to validate their practice. This evidence is both qualitative and quantitative.

Code of conduct

AR: The Statistical Society of Australia recently adopted a code of conduct. It describes the duties which members should aim to discharge in the day to day pursuit of their profession.

LB: Nurses in Australia also have a Code of Professional Conduct. This is complemented by a Code of Ethics for Nurses in Australia. The two Codes are regarded as being complementary. There are also many laws, standards, competency statements, rules and precedents governing the day to day practice of the professional nurse. In addition there are international codes and standards.

Accreditation

AR: Statisticians have a (voluntary) process by which they can become accredited members of the Society. If they do so they agree to abide by the code of conduct.

LB: All nurses (and all statisticians) are bound by laws such as duty to care and negligence. They are also expected to abide by the professional standards referred to above. Codes reflect these expectations to a certain extent. Nurses can also voluntarily join professional nursing organizations such as the Royal College of Nursing Australia. Being accepted implies adherence to standards of conduct and of ethical behaviour as set out in the Codes and other professional documents such as articles of association and formal Memoranda. All this material has usually been debated and discussed at length within the profession prior to its acceptance and adoption by the profession.

Relationship to another profession.

AR: Mathematics is an older profession than statistics, and the two are closely related because of common material (numbers) and common methods (e.g. manipulation of equations). There is, of course, much that is in mathematics but not statistics and vice versa. Statistics is frequently paired with mathematics, but is frequently seen as the lesser of the two.

LB: Likewise nursing is closely associated with medicine, historically at least, and the work that doctors and nurses do is in many respects very similar. There is, however, much in nursing that is not medicine and vice versa. The tensions here can be captured in the phrase, "nurses care, doctors cure". There is also a common perception that medicine is "better" than nursing.

Monkey on the back

AR: Statisticians labour under the image of belonging to the profession that is one step worse than "lies and damn lies". They therefore can find it difficult to be taken seriously.

LB: Similarly nurses labour under the image of the "lady with the lamp". Even worse is the idea that nursing is a vocation. This leads to the view that nurses are born not made and so education is a waste of time - learning on the job is better. This view arises despite approximately 30 years of higher education in nursing in Australia.

One person to link two professions

AR: It could only be "the lady with the lamp", Florence Nightingale herself. In 1858 she was elected a fellow of the Royal Statistical Society and in 1874 an honorary member of the American Statistical Association. (see N.L. Johnson & S. Kotz, 1997, Leading Personalities in Statistical Sciences, p.314). She might be somewhat less taken by the idea of accreditation, judging by her attitude towards registration of nurses towards the end of her life. In 1900 she wrote to William Rathbone, a trustee of the Nightingale Fund, "I cannot help regretting the present rage for certificates and badges.... Some of our best nurses are without either". (see M. Baly, 1997, As Miss Nightingale Said ..., p.99).

LB: Statistics and nursing face challenges that are alike - we look forward to drawing further on each others' experiences in the process of facing these challenges.

Alice Richardson

NEW SOUTH WALES

Statistical Squirrel's

Days of Wine and Roses

Hello All, Statistical Squirrel here, reporting to you from the Le Montage Reception Centre in Leichhardt. We're here to witness the birth of Fred Osman's pride and joy, the culmination of months of hard work, solid planning and way too much worrying.

As we basked in the overwhelming opulence, divine decadence and gratuitous grandiloquence (with just that hint of Italian spice) of Le Montage, it was worth remembering what we were there for. The day marked the inaugural Postgraduate Awards Day for the NSW Branch. Featuring the best statistical talent that NSW had to offer, this promised to be a day packed with more passion than a Young Liberals National Conference, more intrigue than the St Clair Community Centre Bingo Night and more action than the Over 80's World Croquet Championship. Oh what joys to savour, what heavenly delights! I was almost overcome with anticipation.

It was a stormy, sweaty, steamy, sultry day in Sydney. Tension ruled the air. The afternoon kicked off just after the big hand swept past 12 with the little hand at 2, a huge, buzzing crowd in attendance for what promised to be a memorable occasion. The esteemed Rodger Robertson, Branch President and all-round good guy, was to have kicked off proceedings. However, due to having a voice that sounded like he'd swallowed some sulphuric acid in an attempt to win Marlon Brando's role in a remake of The Godfather, he was unable to fulfil his role. In his place stepped effusive Fred, bursting at the seams with enthusiasm as he introduced to the reverently hushed audience his treasured event. After introducing the Awards Day judges (the aforementioned Marlon Brando impersonator, the inestimable Murray Cameron and the scintillating Simon Sheather), and amidst much clapping, cheering and hurrahing, Fred bade the afternoon begin.

The first speaker for the day was Robert Doyle, elder statesman of the UWS Nepean campus. Presenting a talk about "The Use of Extreme Value Models in Evaluating Sporting Data Analysis with Reference to Training Programmes" (phew!) the distinguished Mr Doyle began by referring to the recent big sports carnival to which that Sydney had recently played host. At this sporting carnival the highlight was only on extreme performances. But what about average performance? asked the mature scholar. And can this average performance be used to estimate extreme performance? It seemed that we were to be shown that it could.

For any athlete, their performance has an endpoint. It was this endpoint that Robert, in his yet to be introduced or discussed study, was trying to estimate. Looking at the data from the top 40 times of the Men's 50 m swimming event at the 1996 Olympics, Robert showed that by considering the times as if they were from a squad of 40 swimmers, an endpoint, and hence the extreme performance time could be estimated.

Next on the agenda was the hip, young Andrew Hagan. Hailing from the University of Sydney, Andrew proved himself to be a snappy dresser, a bit of a dudes dude. Bravo!

Beginning with a short background on Poisson Point Processes (the bane of any squirrel's existence) Andrew launched into his talk on Voronoi Tessellations. Now, I've always been a big fan of talks about tessellations because you get to see some lovely pictures, and I must admit that Andrew did not disappoint. Picture after picture of closed, convex cells of finite area made this little squirrel shiver with delight. Could there be anything better? Well, in fact there was.

Dipping into a mysterious plastic bag by his side, Andrew produced two stage props – three dimensional tessellations, beautifully hand crafted from finest cardboard and sticky tape, put together with the skill and attention to detail one would expect from a master craftsman (although he did apologise that they were not quite convex as they got a bit damaged on the way to the reception centre). Well, that was it for me. A good tessellation and I'm done for. The rest of Andrew's talk, covering the use of Voronoi tessellations in the telecommunications industry and touching on Palm Theory, Palm Calculus and the Palm distribution, passed me by as I marvelled at the workmanship of the tessellations before me. Ahhhhhhhhhhh.

As the beloved tessellations slipped away, never to be seen again, Peter Howley from the University of Newcastle strode to the stage. Smooth and business-like, the well-groomed young man spoke on "Using Hierarchical Models to Report Clinical Indicators". Indicators, quoth the suave, sophisticated Lothario, measure quality - the aim of his work was to account for sampling variation within and between hospitals when reporting these indicators.

Previous reporting of clinical indicators relied on the league table ranking – highest at the top and lowest at the bottom. Peter, using the in excess of 200 indicators currently available, was trying to produce a new method of reporting using shrinkage estimators to correct for sampling variations.

Peter then discussed the use of hierarchical models to estimate systematic and sampling variation, and showed the captive audience how to model them using method of moments, MLE, and a firm favourite of mine, BUGS (especially if they're nice and juicy).

The big crowd then broke for afternoon tea, before being bedazzled by the boldly breath-taking and beguiling Cathy Rytmeister. Hailing from Macquarie University, Cathy began the post-afternoon tea session with a talk on "The Effect of Body Mass Index (BMI) on Intermediate Outcomes in the Treatment of Infertility". Cathy, the first of the speakers to actually introduce their talks, gave a rundown of IVF procedures, and explained that her study was examining just one part of the big picture.

Asking, and the answering, the question of "Why BMI?", Cathy explained that BMI is a known risk factor for many diseases as well as being a known risk factor for infertility. The question needing to be answered though was whether BMI was a risk factor for the success of treatment.

Cathy's research question focussed on intermediate outcomes. Using the CityWest database (it was explained at the time but I didn't take it down as I was trying to figure out what was my BMI. Conclusion: fat squirrel) Cathy looked at various subsets of the data and different analysis methods. These methods included classical linear models (which seemed a bit simplistic to her), GLMs and others. Discussing covariates and analysis types, Cathy concluded that further research was still required.

Following hot on the heels of Cathy was Kishti Mohan Sen from Sydney University. Kishti, presenting himself as the scientific type (he had some pens in his shirt pocket – it's only a small leap from there to using a pocket protector), gave a talk on "An Empirical Examination of the Volatility in Australian Foreign Prices". Now I must admit that economics tends to turn me off, and Kishti didn't really hold my attention too well. When he mentioned the famous (?) General Auto Regressive Conditional Hierarchical Models I was lost. Very sorry Kishti, but this was one confused squirrel.

Qiying Wang from the University of Wollongong was next on the stage. The cool and calm Qiying appeared as a statistical Jackie Chan, presenting his talk with an authority and assurance that was not to be trifled with.

I have to admit, that this was a talk that I enjoyed, with Judge Sheather also displaying his enthusiasm for the talk afterwards. Unfortunately, the topic ("Asymptotic for general fractionally integrated processes with applications to unit root tests") and content were too much for this little squirrel. Being a big fan of the late and lamented Benny Hill, any talk that featured Root tests and the Dickey-Fuller test was never going to have my complete attention. Several mental cold showers were required which left me unable to take comprehensive notes. It is with great sorrow, my dear readers, that I admit that I am unable to provide any detail of Qiying's talk. I beg your forgiveness.

The roguish Ed Cripps was the final speaker for the day. Sporting the scruffy look, with sleeves rolled up and open shirt, promising much but revealing little, the swashbuckling Ed spoke on "A Spatio-Temporal Model for Hourly Wind Fields on Sydney Harbour".

Exuding raw sexuality from his every pore, Ed, currently at the University of New South Wales, spoke on the development of generic space-time regression models for local weather forecasting, focussing on one day ahead forecasting of surface wind fields at several locations in Sydney Harbour.

Ed had several sources of data – ten minute averages of wind speed and direction and temporal as well as topographical effects. As an example, Ed showed how spatial variation could affect wind around the Harbour, with one wind possibly being measured as coming from different directions depending on the location of the recording station. For this reason, North Head is used as the point for reference winds as it is not affected by topographical factors.

The dashing Ed then presented the Bayesian Hierarchical model being used for the forecasting, detailing the spatio-temporal model for the wind process (adjusting for topographical variables) and the predictive and temporal structure for daily variation.

Finishing to much applause, the judging panel retired to commence their deliberations. Who would be the winner? Would it be the debonair Cripps, last to speak and last to leave an impression? Or the smooth Peter Howley, very business like in manner but certainly very knowledgeable as well? Or would the lone female speaker, adrift in a male dominated field, take the ultimate prize? It was not ours to know until after dinner.

The audience also made one last gesture of thanks to the speakers for their fine contribution to a splendid afternoon, then mingled and drank whilst waiting for the annual dinner to commence. The one highlight of this time was the NSW Branch council meeting, at which John Rayner claimed that he was both younger and better looking than the esteemed Rodger Robertson (happily absent). This claim was the cause of much merriment in the meeting, and threatened to bring a halt to proceedings (well, would you be able to concentrate after something like that?). I know I couldn't so I promptly left.

Dinner started at 7pm, fine food combined with fine wine and even bet-

ter company. It was a pleasant evening all round, capped off by a corker of a talk from Simon Sheather on "Determining the Factors that Impact on the Quality of Henschke's Hill of Grace". Simon's talk was very well received by the audience, not least because they had imbibed some of Simon's favourite drink. This scintillating talk was followed by the presentation of the prizes for the best talk, an excited Ed Cripps taking home the award. All of the other speakers were honoured as well.

Ahhh. Well that's it. A long day, a fun night and one tired squirrel. Till next time...

Statistical Squirrel

VICTORIA

Estimating Covariance Matrices when the Number of Variables is Relatively High

The Victorian Branch was addressed in November by Prof. Robert Kohn, of the Australian Graduate School of Management, who covered an approach for estimating covariance matrices when the number of variables is relatively high. Such situations arise in time series that arise from longitudinal data collection where the results for individuals may be affected by common influences and therefore be inter-correlated. Generally, analysis of such data is strongly focused on achieving a good model for the means of the series but it must not be forgotten that estimation of the variance is often almost as important. Realistic confidence limits can not be constructed without some structure being assumed for the covariance matrix which will have $p(p+1)/2$ elements.

Robert started the exposition by claiming that it is more efficient to contemplate estimation of the elements of the covariance matrix rather than covariance matrix itself. At first, this seems a little strange but he showed that a zero element in the inverse covariance matrix corresponds to a zero partial correlation between the two variables given all of the others. Thus, a rather full covariance matrix can be approximated by a fairly sparse parameterization of the inverse covariance matrix. Analysis of the structure of the covariance matrix was tackled by using a Bayesian approach with relatively uninformative priors and then using MCMC simulation methods to estimate posterior distributions for the elements of the inverse covariance matrix. Such an approach lets the data drive the selection elements are likely to be non-zero and tackles the situation where unlikely combinations of data and parameters are not given too much emphasis.

Robert presented three examples involving longitudinal data in biometry, electricity load forecasting and returns from S&P 100 portfolio management. A lively discussion ensued about the influence of data selection on the robustness of the outcome, particularly in the situations that could be influenced by one-off events and subtle changes in the underlying structure of the problem. The examples demonstrated that the methodology was indeed potentially very useful and the discussion highlighted that robustness of the models generated was an issue that warranted further effort, not because of flaws in this particular methodology but because the approach had flushed out these underlying issues that are present in many such modeling situations.

Robert was thanked for a very stimulating talk and we all adjourned to a nearby restaurant for dinner.

Neville Bartlett

QUEENSLAND

-Using simple black and white overhead slides, the esteemed Bill Venables of CMIS, CSIRO, entertained a large audience of statisticians for a full hour on his viewpoints of the use of elementary linear models.

Bill began with a little history and the admission that the title of his presentation is based on a book by Felix Klein (1849-1925), *Elementary Mathematics from an Advanced Standpoint: Arithmetic, Algebra, Analysis*. This fellow studied analytic geometry, systemised non-Euclidean geometry, worked on the development of group theory and collaborated with Lie in the *Erlanger Program*, is known in topology for the one-sided Klein bottle and wrote a classic history of mathematics. [from B. Venable's slides]

A view of regression models was introduced where a first order Taylor series approximation was made to a general, but content-free model. Bill highlighted that simplifying the algebra did not necessarily lead to fewer problems for the less knowledgeable users of software. Problems that many less experienced users face (sometimes unknowingly) are curvature in the main effects, linear´linear interactions, variance heterogeneity and mixed effects. Examples were given for each of these with solutions including many practical options.

For curvature in main effects, fitting generalised linear models instead of quadratic models to improve model fit was suggested, transforming data (Bill suggests that the model-building process should be *invariant* to these transformations). The problem of linear´linear interactions is knowing "certainly that the variables have no interaction, but at the same time being unsure of what the main effect terms are like" – Bill illustrated this with Draper & Smith's Iowa wheat data applying smoothing splines to a number of variables. He also dis-

cussed the choice of variables for additivity with application to splitting prawn species appropriately. Variance heterogeneity was next on the agenda and Bill highlighted two issues here: (1) variance heterogeneity is considered a "non-problem" for greater than two samples and (2) the choice in statistical packages encourages the belief that the problem can be solved using fancier mathematics! (SAS's "Type III" sums of squares encourages this thought process of being able to ignore annoying problems of interactions – this was illustrated using rat genotype data (Scheffé, 1959)). Comments on the problems of mixed effects, multistratum models and variance components were illustrated using the petroleum data of Nilon H Prater.

So from an elementary standpoint, Felix Klein and Bill Venables have a common goal – turning the naïve into better readers of reality whilst maintaining simplicity.

Accreditation

For our June meeting Dr. Tony Swain of the Department of Primary Industries, who finished his term on the Accreditation Committee in 2000, discussed the accreditation process of the SSAI.

Tony gave a very informed talk on accreditation, why a statistician would want to become accredited, a general overview of where accreditation is at within SSAI, issues and developments the process faces next and finally, how do you apply?

Firstly, a statistician would want to become accredited if they are working as a qualified statistician, are a member of SSAI and need professional recognition for furthering their career. A person with these attributes would apply for an AStat level. GStat refers to Graduate Statistician and is aimed at Young Statisticians who are serious about statistics as a career.

The accreditation process is relatively new within SSAI, the first application being approved only three years ago. As of June 2000, SSAI had received 150 applications resulting in 130 accredited members of the society. Marketing of accreditation to members of SSAI and industry at large is the next hurdle to be faced. Clearly, there is a circular argument here, some members won't want to become accredited until it's a requirement of employment and employers won't require it until they know about it, and so it goes... The next step then, is to have accredited courses / degrees that universities can use as a marketing tool – this will expose students (potential statisticians and potential employers of statisticians) and their employers to the idea of accreditation for statisticians. Another development within SSAI on accreditation is to provide professional activities so that accredited members maintain appropriate accreditation standards – just what form this will take is still under discussion.

So, applying... The first issue most people baulk at is confidentiality – be assured that confidentiality agreements are signed and you can nominate for a member of the Accreditation Committee to not see your application if you feel this may be an issue. Referees can be members of the Accreditation Committee. The second hurdle is providing supporting material which assesses your professional competence, shows an appropriate use of statistics and reports the work and findings in a professional manner. Tony listed some useful and unhelpful material that may help when you apply.

Discussion of the pros and cons of accreditation and the pitfalls of applying continued through dinner and a most enjoyable evening ensued.

Useful Material

Consulting reports to clients

Project reports

Journal papers involving application of statistical techniques

Methodology papers addressing applied problems with real data

Variability – a collection of material which shows your competence over a range of methods

Unhelpful Material

Theoretical papers, conference abstracts

Most theses; anonymous material (supervisor must state percentage of work performed by you)

Most software or software documentation

Methodology papers without data

Papers on the same topic or where the material only covers basic methods

Errors in Variables: problems from the WHO MONICA Project

In early August, Professor Annette Dobson of the Faculty of Health Sciences, University of Queensland presented the problems faced by a statistician when working on a longitudinal, international study, the World Health Organisation project to MONItor trend and determinants of CArdiovascular disease (WHO MONICA).

In the 1970's it was found that death rates from cardiovascular diseases in the US, Australia and other countries

were declining. Some questions that were asked were: Is this real? Or artifact of diagnosis or coding? Are rates of non-fatal Myocardial Infarction declining? Are changes in rates due to changes in risk factors? Are changes in rates due to changes in treatment? Since these questions refer to populations, not individuals, it was determined that a longitudinal study of populations was necessary, and hence the WHO MONICA project commenced. Its aim was to run for 10 years, starting in 1984, covering 40 populations and only considering people under 65 years of age. (One of the pitfalls of a longitudinal study is that the boundaries can and do change, for example 65 is now considered "young" although it wasn't in the late 70s!)

The design included having geographically defined populations (although it was concentrated in Europe), 3 risk factor surveys of independent random samples, monitoring all cardiac deaths continuously over 10 years and monitoring of hospital treatment (sometimes).

Statistical issues faced by the project were that there was a continuous improvement of the data quality, only 40 populations (units of analysis), only a short time period to estimate trends, how to estimate standard errors for most variables and then how to weight analyses to include these, and how to combine effects of different risk factors. Another problem faced by longitudinal studies is being prepared to change as the technology does!

Some interesting results were over the 10 years the number of men smoking decreased whilst the number of women increased (there was a pronounced targeting of women by tobacco companies). Systolic blood pressure performed similarly (although we can probably not put this down to the tobacco companies!). The Body Mass Index (Weight/Height) increased in all countries except the Eastern Bloc where food is scarce. The number of heart attacks in men decreased more than women which is in line with smoking variable but this in populations not individuals.

Techniques applied to this data were ordinary and weighted least squares and maximum likelihood estimation. Ordinary least squares underestimated the regression coefficients and correlation, and overestimated standard errors. Whilst both weighted least squares and maximum likelihood estimation provided much more accurate and reliable estimates sometimes there were numerical difficulties to overcome.

Queensland Branch Careers Forum

We decided to hold a Careers Forum at our September meeting of the Branch but due to the mid-semester break the September meeting was actually held in the first week of October! Two parallel sessions were given, one at the University of Queensland, St Lucia and the other across the Brisbane River at Queensland University of Technology, Gardens Point, with students (and staff) from Griffith University and the University of Southern Queensland travelling to one of these two venues.

Representatives from ACNeilson, The Australian Bureau of Statistics, Queensland Treasury, Department of Primary Industries and CSIRO enlightened groups of approximately forty students about the roles, career paths and potential earnings of statisticians. (The latter of course being of primary interest to the students!!!) Afternoon tea was served afterwards giving students the opportunity to collect brochures and chat with the presenters. I would like to take this opportunity to thank those people who took the time out to present at this forum. I have received many positive comments from students and some requests from lecturers/supervisors that it be repeated in 2001!

Assessing the impact of prawn trawlers on seabed organisms of the Great Barrier Reef

For our October meeting we decided to be a bit adventurous and change the timing from a usual after work meeting to lunchtime. We joined the speaker for a pleasant lunch beforehand and then we went to learn about prawn trawling in the Great Barrier Reef from Charis Burridge of CSIRO Marine Research.

CSIRO Marine research conducted a five-year study of the environmental effect of prawn trawlers in the Great Barrier Reef Marine Park. The impact that prawn trawlers have on the seabed communities was assessed in three ways: a survey comparing benthic communities in a zone closed to trawling with those in adjacent areas; a Before-After-Control-Impact (BACI) experiment in the closed zone; and a repeat-trawl experiment. The outcomes of these studies were outlined with emphasis placed on the design and analysis of the third study.

Before the first study even a single trawler was considered to have an important effect on seabed communities. However, in the first study there was a distinct lack of detectable effects and after much discussion and investigation this was determined to be due to a lack of contrast between the zones closed and open to trawling, i.e., trawlers were in zones they weren't supposed to be! Now clearly, a lack of statistical significance does not necessarily mean that trawling has no effect, it may be a consequence of lack of robust data. Hence, the BACI experiment was designed to address this issue and again assumed that each trawler had a huge impact. This study also involved a comparison of different types of instruments and a surprising conclusion was that

the prawn trawler was not in fact picking up the species for which the study was aimed!

So a third study was initiated, by which time the actual impact of a single trawler was in doubt. The aim was to estimate the rate at which benthos is depleted by trawling repeatedly on six different tracks. The depletion rate was assumed to follow a beta-distribution, and the parameters were estimated by maximum likelihood, for some species this was around 15% and for others 5% with the general consensus being that about 10% of benthos is removed during a trawl.

A simulation study was performed to assess and correct for the undesirable but unavoidable effect of successive trawls covering slightly different ground, an issue that is often neglected in removal studies. The depletion estimates from this experiment are being incorporated into sustainable management of the Queensland East Coast Fishery. Another project is underway to monitor the recovery of sessile benthic organisms from the repeat-trawl depletion experiment.

BUGS Workshop

The November meeting was incorporated with the BUGS workshop held at Queensland University of Technology, where Nicky Best and Clare Marshall. As I was unable to cross the river for this event I have provided the abstracts of both these presentations.

Joint mapping of spatial variation in multiple diseases

Nicky Best
Imperial College, London
(in collaboration with Leo Knorr-Held)

The study of spatial variations in disease rates (disease mapping) is a classic epidemiological technique, where location is used as a surrogate for the mix of lifestyle, environmental and possibly genetic factors that may underly geographical differences in risk. The purpose is both to describe such variations and to generate hypotheses about the possible 'causes' which could explain them. The last decade has seen an enormous development in the statistical methods available to carry out such analyses, including the use of realistically complex models to account for over-dispersion and spatial correlation. These developments have focused almost exclusively on spatial modelling of a single disease; however, many diseases share common risk factors (smoking being an obvious example) and hence a joint formulation which simultaneously models spatial variations in the risk of two or more related diseases may be a more powerful design for detecting geographical patterns in the underlying risk surface.

This talk introduces various Bayesian formulations for the joint spatial analysis of two diseases. The proposed methodology can be divided into two classes: multivariate models, which focus on the correlation structure between the diseases; and shared component models, which aim to identify shared and disease-specific spatial-varying latent risk factors. The methodology will be illustrated through various examples. All models are estimated using the WinBUGS software.

Strategies for Inference Robustness in Model Exploration

Clare Marshall
Imperial College, London
(in collaboration with David Spiegelhalter)

Advances in computation mean that it is now possible to fit a wide range of complex models to data, but there remains the problem of selecting a model on which to base reported inferences. Following an early suggestion of Box and Tiao, it seems reasonable to seek 'inference robustness' in reported models, so that alternative assumptions that are reasonably well supported would not lead to substantially different conclusions.

We propose a four-stage modelling strategy in which we iteratively assess and elaborate an initial model, measure the support for each of the resulting family of models, assess the influence of adopting alternative models on the conclusions of primary interest, and identify whether an approximate model can be reported. The influence-support plot is then introduced as a tool to aid model comparison. The strategy is semi-formal, in that it is embedded in a decision-theoretic framework but requires substantive input for any specific application.

This talk joins the strategy in stage III and, assuming the presence of a family of plausible models, shows how the robustness of the inferences of interest and the potential to approximate a model may be determined through the consideration of a single plot. The ideas are illustrated by two examples.

Biostatistics Workshop: Analysis Of Longitudinal/ Repeated Measures Data In Health Studies

The Queensland Branch also supported the Biostatistics Workshop held at the Gold Coast. In the evaluation of the workshop the best aspects were reported to be the location, beach, cocktail party, food, friendly relaxed atmosphere, networking and of course on the business side of things... "Presenters describing a range of health studies and drawing out statistical issues." The three topics voted most valuable were Bayesian and MCMC methods, survival analysis and hierarchical modelling – communicating statistical/technical and results.

SOUTH AUSTRALIA

Titbits from SA

Over the past 2-3 years there have some departures from the statistics fraternity in SA but 2000 had increased activity in certain quarters. In particular BiometricsSA (a collaborative statistical group drawn from South Australian Research Institute and Adelaide University based at the Waite Research Precinct) has increased in staff and number of postgraduates. Under the directorship of Ari Verbyla, an Associate Professor as of January 2000, the staff numbers have increased from four at the start of BiometricsSA in 1998 to eight full-time and three part-time by the end of 2000.

Post-graduates number four full-time and one part-time with more to follow. The visitors' office is regularly occupied with occupants in 2000 such as: Dianne Cook (Iowa State University); Gordon Smyth (University of Queensland) whose blood isn't quite thick enough for the Adelaide winter that lingered well into spring and addressed the September Branch meeting. Ken Russell spent three months away from the University of Wollongong at the hotter end of the year and provided continual professional development, entertainment and guidance on the finer art of office housekeeping. He gave a stimulating talk to the members at the Christmas meeting (see further on). Janine Jones from Monash University was awarded a summer vacation scholarship from Adelaide University to review sampling methodology in citrus crop forecasting. The early part of 2001 will see more visitors: Sue Welham (Rothamsted) and Bev Gogel (Qld DPI) in February and March and John Nelder also in February.

Gary Glonek, formerly of Flinders University, became full-time in the Department of Applied Mathematics at Adelaide University from the start of 2001. Another new senior lecturer will join that department, Andrew Metcalf, the author of Statistics in Engineering (a book in the Chapman and Hall, now CRC Press, red series).

Cognitive Interviewing and Evaluation

A joint talk was given by Sharon Wibrow and Jenny Dobak of the Adelaide ABS office to the October meeting. Jenny outlined the concept of cognitive interviewing, when to apply it in the data acquisition process, what equipment is needed, how it is conducted and the prevalence in the ABS. The value as a pretesting tool was emphasized and that it would replace one field test. Cognitive interviewing has advantages such as flexibility (can use when needed), cheaper, quicker, provide greater insight into the response process, motivated subjects and targetting specific sample. The disadvantages of this method include labour intensive, laboratory conditions don't replicate field conditions and the inherent small sample. Some on going issues with cognitive interviewing include recruitment practices, archiving of the many video tapes, maintaining the appropriate skills, setting standard practice across ABS development areas and the treatment of ABS standard modules.

Sharon shared her experience of data already collected and how the quality could be improved. The well known ABS survey, the Population Survey Monitor (PSM) was highlighted. The evaluation of particular surveys was shown and the subsequent strategies for improvement. A number of examples were cited: satisfaction levels for users and non-users of a service; collected and derived household income from two sources - PSM and National health Survey; interview the person with next birthday in a household and compare the distribution to a random sample; self versus proxy reporting. The practical nature of the content was greatly appreciated by the audience as many questions arose throughout the talk.

The consultant who came in from the cold

Ken Russell addressed the December meeting on an oft overlooked sector of the statistical profession - consultants. He was determined to challenge our perceptions by drawing upon years of experience in consultancy, arousing the audience with wit, philosophical dissertation, prophesies and the odd rapier gibe at those who inadvertently (or deliberately) ignore those professionals some consider at the coal face of statistics.

Many in the audience strongly related to his list of frustrations with consulting especially those clients who came too late in the process, the endless cycle of retraining students, the occasional lack of integrity with supervisors and the unwillingness to acknowledge the consultant's contribution. The misconception of clients that the keyboard of the consultant is equipped with an additional button, press that and all problems can be solved drew great mirth. Ken's frustrations were not limited to clients but also to the profession or attitudes with some academics, unrealistic job criteria, lack of promotion opportunities, ignored at conferences and even the SSAI locked into the research mindset.

Suggestions of how to overcome some of these annoyances were offered. Consultants would have more opportunity to influence the profession if members of SSAI Councils were elected, making contact with conference organisers, continuing education courses, support consultants web page. At the client level: keep it simple as clients are afraid you will lapse into jargon, explain how the experiment could have been improved had they come earlier, sell

yourself and ask for joint authorship. Of course, Ken finished on the undeniable pleasures consulting brings and included a Yuletide limerick, which put us all in a jovial spirit for the Christmas dinner that followed.

WESTERN AUSTRALIA

Statistics and Human Rights

Dr John Henstridge, Managing Director of Data Analysis Australia Pty Ltd, spoke at the October 2000 meeting of the Western Australian Branch. In September 2000 John attended a meeting of the International Association for Official Statistics in Montreux, Switzerland. The meeting was organised by the Swiss Federal Statistics Office and the Swiss Development and Co-operation Agency. The theme of the conference was "Statistics, Development and Human Rights", with sub-themes including (i) statistics and the rights of the child, (ii) measuring development, (iii) statistics in the demographic process, (iv) the measurement of violence, (v) literacy and education, (vi) the administration of justice and (vii) the protection of personal data. Statistical reporting of human rights often has shortcomings: It highlights the *existence* of a problem but does not necessarily indicate the *nature* of the problem and may not be useful in finding *solutions*. This problem can be overcome by more detailed statistical collections led by process structure, but these are substantially more difficult to compile and generate major privacy and integrity issues.

John spoke at the conference on recent work by Data Analysis Australia on measuring justice systems. The largest single human rights issue in Australia is the treatment of the indigenous population. Aboriginal and Torres Strait Islanders are over-represented in our prisons (comprising 2% of the general population but are 20 (males) to 50 (females) times more likely to go to prison and comprise 40-50% of prison deaths), partially explained by the very different age distribution (predominance in younger age groups due to reduced life expectancy) between aborigines and the general Australian population. Thus aboriginality is a major factor in any attempt to model and forecast demand for justice facilities. Some of the problems with justice data, particularly the coding of offences and the complex nature of sentencing, were discussed. John outlined a process model that follows defendants through the system, with statistical collection to understand reasons for transition between stages. The process is circular in that recidivism dominates. There is a need to follow persons over time and through potentially different parts of the system, which suggests the need for unique identifiers and the linking of datasets across time and systems. John raised a number of questions about the confidentiality of linked data: Who holds the data? Is it used for policing? Sentencing?

"Old MacDonald had a Pharmacokinetic Model"

Modelling Insulin Response to Glucose Challenge in Sheep

Dr Lyle Gurrin, of the Women and Infants Research Foundation at King Edward Memorial Hospital, spoke at the November 2000 meeting. Lyle spoke about his experiences working with researchers from the Department of Obstetrics and Gynaecology

Dr Lyle Gurrin measures the birth weight and length of two newborn lambs who form part of a cohort of animals that received antenatal corticosteroids

at the University of Western Australia and the Department of Physiology at the University of Toronto analysing data generated from a post-natal cohort of sheep treated antenally with a variety of different regimens for the administration of glucocorticoids, or corticosteroids.

These drugs are used routinely in clinical practice when the mother is experiencing preterm labour, promoting rapid lung maturation in the fetus and enhancing survival *ex-utero*. Corticosteroids are, however, potent biological agents and the long term consequences on the offspring of mothers who receive steroid treatment are far from understood. One particular goal of developing an animal cohort was to compare the long term effect between offspring where the steroids were administered to the pregnant ewe and those where the injections were administered directly to the fetus under ultrasound guidance. At this point in the talk the audience was treated to pictures of sheep attending the local "antenatal ultrasound clinic" for their routine check-up!

At both 6 and 12 months postnatal age each of the sheep in the cohort participated (consent was implied rather than written!) in a glucose tolerance test. Blood samples are taken 30 minutes, 15 minutes and immediately before the administration of an intravenous bolus (single dose) of glucose. Further blood samples were collected periodically over the next four hours. Glucose and insulin concentrations were measured in each of the blood samples. In order to analyse the resultant concentration profiles, Lyle proposed a simple isolated rise and exponential decay for the glucose profile, and outlined a couple of derivations of the single compartment model with first order absorption and elimination, which provided a suitable model for the insulin concentration curves. The resultant population pharmacokinetic model, essentially a non-linear mixed model, was implemented using the Markov chain Monte Carlo technique Gibbs sampling in the freeware package BUGS (**B**ayesian inference **U**sing **G**ibbs **S**ampling; www.mrc-bsu.cam.ac.uk/bugs).

The resulting models were used to show that at 6 months postnatal age, sheep treated with antenatal corticosteroids had raised insulin concentration in comparison to controls after the administration of excess glucose. However, this effect persisted to 12 months postnatal age only in the sheep that received *multiple* doses of glucocorticoids. Moreover, the raised insulin concentration in sheep that received direct fetal injections of glucocorticoids is accompanied by improved glucose clearance, a phenomenon that is not observed in the animals that received maternal injections. Lyle was keen to point out to the audience that although physiologists and clinical scientists tend to view any statistical model as hopelessly complicated, those on the current research team had appreciated the need to use models when faced with highly structured data, and in this case were impressed with the clear interpretation that could be attached to the fitted models.

Australasian Conferences

CONFERENCE SUMMARY

Clunies Ross National Science & Technology Award 2001, 28 March 2001, Hotel Sofitel, Melbourne.

Information: Mary Bolger on (03) 9854 6266, email: icr@crnet.com.au or visit our web site at http://www.cluniesross.org.au

Symposium in honour of Emeritus Professor David Vere-Jones, 19-21 April 2001, Victoria University of Wellington, New Zealand.

Information: Peter Thomson, web site www.statsresearch.co.nz

International Conference on Statistics,Combinatorics and Related Areas and The Eighth International Conference of the Forum for Interdisciplinary Mathematics, 19-21 December 2001, University of Wollongong.

Information: http://www.uow.edu.au/informatics/maths/statconference

There is a list of Australasian statistics conferences for 2001 and 2002 at:

http://www.maths.uq.oz.au/~gks/webguide/conf.html

Overseas Conferences

Sixth International Conference on Mathematical Population Dynamics, 3-8 June 2001, Marrakech, Morocco.

Information: Department of Mathematics, Chalmers University of Technology, and University of Goteborg, S-412 96 Goteborg, Sweden; tel. +46 31 772 35 30; fax +46 31 772 35 08; email: mpd6@math.chalmers.se; http://www.math.chalmers.se/~ziad/popdyn/Mpd6/index.html.

Bayesian Nonparametrics (BNP) Workshop, 27 July - 2 August, 2001, University of Michigan, Ann Arbor.

Information: Contact Paul Damien (pdamien@umich.edu) in Canada and the USA, Stephen Walker (s.walker@is.ac.uk) in Europe.

Fifth International Chinese Statistical Association (ICSA) International Conference will be held at the University of Hong Kong, Pokfulam Road, Hong Kong, 17-19 August 2001.

These dates are chosen with the purpose that potential participants can easily make arrangements to attend the International Statistical Institute meeting to be held in Seoul, South Korea, on the following Wednesday.

Keynote speakers will be Professor Peter Hall and Professor Tze-Leung Lai.

Information: Professor W.K. Li <hrntlwk@hku.hk> or visit website at <http://www.hku.hk/statistics/ICSA2001/>

New Web Site

The new SSAI web site based on a template design from Education Image is now running at the address http://www.statsoc.org.au

Many of the pages remain under construction at this stage and others contain fairly minimal information which we hope will be supplemented with contributions and information from members.

For the moment any corrections, submissions, news items, etc can be forwarded to james@prodigal.murdoch.edu.au for incorporation.

In the future it is expected that this activity will move to central office.

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