

Volume 9    Number 1

**25th ANNUAL CONFERENCE**

**the  
NEW  
ZEALAND  
STATISTICIAN**



*Published by*    **The New Zealand Statistical Assoc. Inc.**

# THE NEW ZEALAND STATISTICIAN

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Editor: R.B. Davies

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## **NOTICES**

### **Annual Conference**

The twenty-fifth annual conference of the New Zealand Statistical Association will be held in the Shell Theatre, Shell House, The Terrace, Wellington, on Tuesday and Wednesday, the 9th and 10th of July, 1974. The program and abstracts of the papers appear elsewhere in this issue.

### **Annual General Meeting**

This will be held in conjunction with the conference at 11.30 a.m. on Wednesday, 10th of July, in the Shell Theatre.

### **Conference Dinner**

To celebrate the 25th Anniversary of the Association a Conference Dinner is being held on the evening of Tuesday, 9th of July. Tickets may still be available at this time and application should be made to the Secretary of the Association.

### **Notice to Corporate Members**

Corporate members of the association are invited to send representatives to the 1973 Annual Conference. However any such representatives who are not ordinary members are not permitted to vote at the A.G.M. except in the election of the corporate representative on the Executive Committee. The corporate representative, who must also be an ordinary member of the Association, is elected by the official representatives of the corporate members present (one representative per corporate member, the official representatives need not be ordinary members).

### **Statistics Seminar**

Conference Delegates are invited to a mathematical statistics seminar, organized by the Applied Maths Division of D.S.I.R., to be held on Thursday, 11th of July, in room 730 of the Rankine Brown Building, Victoria University of Wellington. One of the speakers will be Professor Maurice Bartlett of the University of Oxford. He will speak on Stochastic Spatial models in biology. Other speakers will be Dr R.B. Davies (Applied Maths Div.), Dr A.J. Scott (Univ. of Auckland) and Prof. D. Vere-Jones (VUW).

### **Model Answers**

This year the Association is bringing out Model Answers for the 1973 T.C.A. examinations for the subjects: Mathematics III, Elements of Statistics, Systems and Data Analysis, Applied Statistics II, and Computer Methods. They will be available shortly, the five papers being sold separately for 25 cents each. Back numbers (1970 and 1972) are also available. We ask members to bring this to the attention of all interested.

### **Situations Vacant**

As a service to our readers, the N.Z. Statistician will list situations vacant for statisticians, free of charge. Listings should be sent to the editor.

### **The New Zealand Statistician**

The next issue of the **Statistician** is to be issued in October. Copy should be in by the first of September. Send it to—

The Editor,  
New Zealand Statistician,  
P.O. Box 1731,  
Wellington.

### **Subscription Rate for Libraries**

Libraries may subscribe to the **New Zealand Statistician** at the rate of \$4.00 per year. Subscriptions should be sent to—

The Business Editor,  
New Zealand Statistician,  
P.O. Box 1731,  
Wellington.

### **Correspondence**

The association has its own post office box. Correspondence should be sent to—

The Secretary,  
N.Z. Statistical Association,  
P.O. Box 1731,  
Wellington.

# TWENTY-FIFTH ANNUAL CONFERENCE

Shell Theatre, The Terrace, Wellington

9–10th July, 1974.

## PROGRAM

### Tuesday 9th July:

- |            |                 |   |  |
|------------|-----------------|---|--|
| 9.30 a.m.  | Mr H.S. Roberts | – | Accuracy of the Gas Chromatograph Method of Alcohol Analysis of Blood. |
| 11.00 a.m. | Dr. J.H. Darwin | – | Regression Models in the Valuation of Houses.                          |
| 2.00 p.m.  | Dr G.A.M. King  | – | World Models.  |
| 3.30 p.m.  | Dr R.L. Allen   | – | Models for Fisheries Management.                                       |

### Anniversary Dinner (at James Cook Hotel):

- |           |                      |
|-----------|----------------------|
| 6.00 p.m. | Pre-Dinner Cocktails |
| 7.00 p.m. | Dinner               |

### Wednesday 10th July:

- |            |                             |   |  |
|------------|-----------------------------|---|--|
| 9.00 a.m.  | Dr C.A. Cannegieter         | – | Old and New Ways of Measuring Economic Progress.                           |
| 10.30 a.m. | Mr L.C. Neilson             | – | Integrated Economic Censuses.  |
| 11.30 a.m. | 25th Annual General Meeting |   |  |
| 2.00 p.m.  | Mr P.L. Collins             | – | The Validity of Correction Curve Procedures Applied to Radiocarbon Dating. |
| 3.30 p.m.  | Dr R.B. McCammon            | – | Pattern Reconstruction From Sample Data.                                   |

## **TWENTY-FIFTH ANNUAL GENERAL MEETING**

11.30 a.m. Wednesday 10th July

Shell Theatrette

### **AGENDA**

1. Apologies.
2. Confirmation of Minutes of twenty-fourth Annual General Meeting.
3. Matters arising therefrom.
4. Presidential Report.
5. Treasurer's Report.
6. Subscriptions.
7. Election of Officers (President, Secretary, Treasurer, 4 Committee Members, Corporate Representative and Auditor).
8. General.

### **ACKNOWLEDGEMENT**

Yet again the Committee wishes to thank Shell Oil (N.Z.) Ltd for allowing the Association free use of The Theatrette, Shell House, for the Annual Conference.

# NEW ZEALAND STATISTICAL ASSOCIATION

## PRESIDENT'S REPORT FOR THE YEAR ENDED 31 MARCH 1974

### Membership

At 31 March 1974 there were 241 ordinary and 43 corporate members of the Association, as against 211 and 36 respectively a year earlier. There were also 7 library members subscribing to the "Statistician".

### Committee

The committee met 5 times during the year. Officers for 1973-4 were:

President:	H.R. Thompson
Secretary:	T. O'H. Papps
Treasurer:	Mrs P.A. Walker
Committee:	S.S.R. Kuzmicich J.H. Maindonald K.J.A. Revfeim H.S. Roberts
Corporate Members Rep:	C.W. Walker
Editor:	R.B. Davies
Hon. Auditor:	O.J. Ball

### Conference

The Annual Conference was held at the usual venue on July 3 and 4, 1973, with papers on social, economic, socio-economic, biometrical and geophysical applications of statistics. Attendances were high, averaging over 60 a paper, and a full house was posted for Mr Murphy's entertaining talk on opinion polls. The Association is most grateful to Shell Oil (NZ) Ltd for allowing us to use the Theatre free of charge, and for the assistance of their Social Club in running a successful cocktail party.

### Calculator Display

The second display to be held by the Association took place at the Hotel St. George on July 5, 1973, two rooms being necessary to accommodate the fourteen participants. The Hon. W.E. Rowling opened the display and it is estimated that, due to wider advertising (including a newspaper supplement) about 1000 people attended. The resulting interest from firms in the continuation of this activity led the Committee to arrange this year for a two-day display, which it intended to coincide again with the Conference. Unavailability of suitable facilities unfortunately made this impossible. It has not yet been possible to arrange displays outside Wellington.

### Educational Activities

The Committee decided to proceed with production of a further set of Model Answers to the 1973 Technicians Certification Authority Certificate in Statistics Examinations, and

has budgetted for a loss of \$170 on these for the coming year. It nevertheless feels on balance that the exercise is a worthwhile educational activity.

It is currently investigating the feasibility of a Statistical Essay competition for secondary school pupils, to be run in 1975.

#### **"New Zealand Statistician"**

Three numbers were published during the year, the cost being about \$1 a copy for the larger number 3. Contents comprised nine papers, notices, letters, conference reports and abstracts, the membership list, calculator appraisals, and reports on the 1972 and 1973 calculator displays. There has been continued difficulty in obtaining suitable copy other than papers presented at the Conference, and there will only be two issues this year. The time that Robert Davies has put in as Editor is much appreciated.

#### **Regional Report**

Activity in Christchurch consisted of one general meeting on 27 June 1973 at which the following five papers were presented:

- Bayesian Statistics Applied to Horse Racing (J.J. Deely)
- Evaluating Bird Performance (R.A. Clements)
- Statistics Teaching And Secondary Schools (B. Werry)
- Statistical Analysis in Biochemical Analysis (H. Taylor)
- The New Zealand Wealth Distribution (B.H. Easton)

In the words of our agent Brian Easton: An instructive and merry evening was had by all, and it is planned to make such an evening an annual event.

#### **Royal Society**

Following the resolution at the last AGM, the Association affiliated with the Royal Society of NZ, hard on the heels of the Computer Society and the OR Society. The voice of mathematics should thus now be heard more strongly in scientific circles in this country.

#### **Finance**

The Association's financial affairs remain in a healthy state, thanks largely of course to profits from the calculator display.

Although the individual subscription is very low, the Committee recommends that no change be made this year. With rising costs, however, members should be prepared for a rise to a more realistic rate in the future.

#### **Appreciation**

My thanks go to members of the Committee for their support during the year.

H.R. Thompson  
President



**FINANCIAL REPORT**  
**FOR YEAR ENDED 31 MARCH, 1974.**

**FINANCIAL STATEMENT FOR THE YEAR ENDED 31st MARCH 1974.**

**RECEIPTS & PAYMENTS**

Receipts		Payments	
Balance at 1.4.73		Annual Conference	
In Hand	3.55	Guest Speaker (travel)	45.00
In Bank	<u>464.67</u>	Hall & Teas	20.00
	468.22	Cocktail Party	<u>49.96</u>
Subscriptions			114.96
Individual	378.00	NZ Statistician	
Corporate	<u>224.00</u>	Vol. 8 (1)	226.00
	602.00	(2)	147.75
Annual Conference		(3)	417.30
Cocktail Party	36.00	Reprints	28.25
Profit on Teas	<u>0.82</u>	Postage etc.	<u>33.00</u>
	36.82		852.30
N.Z. Statistician		Calculator Display	
Subscriptions	32.00	Hire of Room	98.75
Advertisements	10.00	Printing	91.80
Reprints	<u>15.00</u>	Advertising	<u>18.00</u>
	57.00		208.55
Calculator Display	703.00	Model Answers	297.00
Model Answers	145.07	Postage etc.	<u>15.00</u>
Interest (BNZ)	<u>16.12</u>		312.00
	1560.01	Stamps, Stationery	42.88
		Miscellaneous	<u>70.06</u>
			1600.75
		Balance at 31.3.74	
		In Hand	17.67
		In Bank	<u>409.81</u>
			<u>427.48</u>
	<u>\$2028.23</u>		<u>\$2028.23</u>

## INCOME AND EXPENDITURE ACCOUNT

Expenditure		Income	
Annual Conference	78.14	Subscriptions	602.00
NZ Statistician	795.30		
Model Answers		Calculator Display	494.45
Sales of Answers	145.07		
Less cost of Sales	<u>307.00</u>	Interest	16.12
Loss on Answers	161.93		
General	<u>112.94</u>	Excess of Expenditure over income	<u>35.74</u>
	<u>\$1148.31</u>		<u>\$1148.31</u>

## BALANCE SHEET

as at 31 March 1974

Liabilities		Assets	
Accumulated Funds (1.4.73)	708.22	Cash at Bank & on Hand	427.48
Less Excess Expenditure	35.74	Stocks of Model Answers valued @ lower of cost or selling price	<u>245.00</u>
	<u>\$672.48</u>		<u>\$672.48</u>

## AUDITOR'S REPORT

To the Members of the New Zealand Statistical Association (Inc.) –

I have examined the Receipts and Payments Account and the Income and Expenditure Account for the year ended 31 March 1974 and the Balance Sheet as at that date. I have received all the explanations I have required and in my opinion proper books of account have been kept. The annual accounts and balance sheet, in my opinion give a true and fair view of the results for the year and of the financial position of the Association at the year end.

O.J. Ball, A.C.A.N.Z.

## **ABSTRACTS OF PAPERS**

### **ACCURACY OF THE GAS CHROMATOGRAPH METHOD OF ALCOHOL ANALYSIS OF BLOOD**

**H.S. Roberts, Applied Maths Division, D.S.I.R.**

In the routine testing of blood samples from car drivers who have been suspected of drinking alcohol, the Government Analysts have been concerned with the problem of the size of the correction factor which should be applied to the analysts' results to allow for analytical error. In 1969 a number of surveys were carried out at the four analytical laboratories, and it was apparent that there were variations in the measurements both between and within laboratories. A series of planned surveys were instituted to determine the accuracy of the measurements and to locate the source of the variations. The surveys discussed in this paper were completed in September, 1971, but work is continuing.

### **REGRESSION MODELS IN THE VALUATION OF HOUSES**

**J.H. Darwin, Applied Maths Division, D.S.I.R.**

The Valuation Department undertakes quinquennial assessments of all properties in New Zealand. The biggest group of properties is urban single family dwellings, and the valuation of this group lends itself to the application of regression methods. The advantage of this approach is more rapid assessment for the same accuracy. Complications that must be considered include the effects of inflation and the area over which formulae are valid.

### **WORLD MODELS**

**G.A.M. King, Physics and Engineering Lab., D.S.I.R.**

Models of the whole world differ in several ways from the models we usually encounter. The very purposes for world modelling require that we think about the philosophy behind the modelling process. There are also special problems arising from the size of the job, from the inadequacy of data, from changes in the meanings of variables and from the difficulty of validation. There will be a brief discussion of the computer models developed at the Massachusetts Institute of Technology.

### **MODELS FOR FISHERIES MANAGEMENT**

**R.L. Allen, Ministry of Agriculture and Fisheries.**

This paper will review some of the mathematical models used in Fisheries Management. The paper concentrates on those methods in which an attempt is made to identify and estimate basic processes of growth, mortality, and recruitment which are then combined to produce a yield model. Some consideration will be given to problems of parameter estimation and the interpretation and use of these models will be discussed.

## **OLD AND NEW WAYS OF MEASURING ECONOMIC PROGRESS**

**C.A. Cannegieter, N.Z. Institute of Economic Research.**

This paper will deal with the following points:

1. The Old way of measuring G.N.P. per capita in real terms with all its drawbacks.
2. The same, but corrected for differences in purchasing power.
3. This applied for 1970.
4. The system of non-monetary indicators of the O.E.C.D.
5. The system of the social indicators of the U.N.R.I.S.D. (Geneva)
6. This system worked out for Cuba in comparison with the other Latin American countries.

## **INTEGRATED ECONOMIC CENSUSES**

**L.C. Neilson, Dept. of Statistics.**

New Zealand's main Economic Censuses of Manufacturing, Building and Construction, Distribution Mining and Quarrying, and Agriculture, have been developed piecemeal over many years. There are also many gaps in their coverage e.g. the whole Transport Industry, the distribution activities of Manufacturers, and the whole area of professional services.

Present plans in the Department of Statistics are to revise and extend these censuses so that they cover on an integrated and consistent basis, the whole economy, using as a key the revised System of National Accounts (SNA).

As part of this process a change from the "Establishment" (individual factory, shop, mine, etc.) to the "Enterprise" (Company, partnership, industrial trader, etc.) as the unit from which information is collected is also envisaged.

## **THE VALIDITY OF CORRECTION CURVE PROCEDURES APPLIED TO RADIOCARBON DATING**

**P.L. Collins, Peter Collins & Associates, Dunedin.**

The radio-carbon dating of archeological samples is basically a process of measuring the rate at which radioactive decay, associated with the C-14 isotope, occurs for an appropriately prepared sub-sample, and inferring from this, in order: the present ratio of the isotopes of carbon within the sample, the time required for the ratio to reach that level from some other level under the usual exponential decay assumptions, and the chronological date at which the sample was created under the assumption that the isotope ratio in new samples is time invariant and can thus be determined for past eras by modern measurement of new material.

Many archeologists question the assumptions in such age-fixing procedures, and assert that age-dependant systematic errors of estimation are introduced by the assumptions.

Correction curves have been drawn up by various authors, and these curves are often used to transform laboratory age estimates so as to reduce the strength of the assumptions on which the reasonableness of the estimates depends.

Such transforms may well reduce systematic errors, but can raise other problems. For instance, under some circumstances the distribution of transformed age estimate can be strongly bimodal. This being so, should not the practice of merely transforming the means be discouraged, given the nature of the application? Other problems related to the correction curves are discussed, and a computer program which performs a modified transformation, and provides some interpretative aid, is described.

## **PATTERN RECONSTRUCTION FROM SAMPLE DATA**

**R.B. McCammon, N.Z. Geological Survey.**

There are two main sampling considerations which relate to mapping in general and to pattern reconstruction based on qualitative data in particular. The first consideration is that of deciding on the number and arrangement of sampling sites in which to take recorded measurements. As expected, non-systematic sampling becomes more attractive as the level of prior knowledge increases. Some recently conducted sampling experiments indicate however that the resultant gain in map accuracy is not as great as might be expected, potential gains being offset by greater losses due to non-uniform coverage. The experiments suggest it is difficult to improve, if at all, upon systematic sampling. The second consideration is that of choosing an appropriate estimate of the accuracy of qualitative maps. By defining the mismatch area, it is possible to approximate the accuracy by defining a measure which remarkably enough can be estimated even when the underlying error-free true map is unknown (Switzer, 1973). Thus it is possible to predict the gain in precision one could achieve by augmenting existing data for an estimated map whose precision has already been calculated. These considerations are of value in planning future surveys in such diverse fields as soil science, forestry, ecology and geology.

## THE BEGINNINGS OF THE ASSOCIATION

*It is appropriate, in this 25th Annual Conference Issue, to recall the genesis of the Association. Much of the following is reprinted from an article by Dr K.J.A. Revfeim in the first issue of the Statistician in April, 1966.*

The first record of a move to form a statistical body in New Zealand is contained in a letter dated 27 November 1947 from E.A. Cornish (Australian Council for Scientific and Industrial Research, Section of Mathematical Statistics based at the University of Adelaide) to I.D. Dick (Biometrics Section, D.S.I.R., Wellington). Enclosed in the letter was a copy of literature "being circulated to persons in Australia likely to be interested in the formation of a local region of the International Biometric Society". The result was the following circular which was sent to 39 persons or bodies within New Zealand.

"This circular is sent to you in the hope that you will be sufficiently interested to attend a meeting to be held at Victoria University College, Wellington, sometime between 21st August and 6th September, of those interested in mathematical statistics and their applications to experimental data. This period has been chosen as it seems to clash least with other meetings, University sessions, etc.

"The reasons for convening this gathering are several—

- (a) To stimulate discussion on the various applications of statistical methods that are used or may be used in New Zealand.
- (b) To explore the desirability, or otherwise, of arranging annually such gatherings whereby experience may be pooled and both problems and theory of interest discussed.
- (c) To promote, in a general fashion, the correct application of statistical methods as required.

"The meeting will last for two days and will be under the chairmanship of Dr J.T. Campbell, Senior Lecturer in Mathematics at Victoria College. The emphasis will be more on discussion than on the reading of prepared papers. You are cordially invited to suggest either types of papers to be read or topics for discussion.

"I would appreciate if you would inform me of what two days in the above period you would find most convenient giving, if possible, a second preference and whether you would prefer me to arrange hotel accommodation in Wellington. Finally, I would like to suggest that you mention the intention of holding this meeting to any of your colleagues or friends who may be interested in attending and whom I may have inadvertently or unknowingly neglected to circularise.

"You will be notified later as to the exact date and topics of discussion.

Yours faithfully,  
I.D. Dick  
Convener"

Reactions of those approached may be gauged from the following replies:

"... I appreciate very much your invitation to attend a gathering of statisticians and other fowl like myself. ..."

"... If you are doing hotel bookings I should like you to make mine for me; but you had better wait until my wife makes up her mind whether she is coming. ..."

"... I trust there will be time on the agenda for some discussion on the teaching of statistics in Universities. Such would not only be useful in itself, but would help convince the University Council that their money was being well spent. At the moment there is a rider attached to their agreement to meet my expenses—namely that the grant is for this year only. ..."

"... Ever since first hearing about it I had intended to be amongst those present at the gathering of statisticians in Wellington but the lambs have beaten me. Instead of the trickle we were expecting around this time there has been a flood, and as I have to make acquaintance with them as soon as possible after arrival I will be tied to these parts over the conference. I am very sorry. To adapt from Stephen Leacock, 'I don't know as I should have understood the speakers, but anyway I very much wanted to see them'. ..."

"... This is just to confirm that I shall be attending the conference. It is a little later than I would have wished; however it gives me a good excuse for missing the first two days of term. ..."

Unfortunately no record of the content or speakers at this 1948 conference has survived the years, although from a letter of appreciation to the organisers the dates can be confirmed as 31 August and 1 September. It can be assumed, with reasonable confidence, that the matter of affiliation to the Biometric Society would have been raised.

However nothing concerning the Biometric Society was filed after the end of 1948, New Zealand statisticians seemingly having little enthusiasm towards membership of an Australian-based region of the society. Indeed, at the 1952 Annual General Meeting of the later formed New Zealand Statistical Association, a move that a New Zealand group of the Biometric Society be formed lapsed through a lack of interested members.

Early in 1949 notice was sent out to interested persons of a conference to be held at the Carter Observatory on May 10th and 11th. The notice included a draft constitution of the New Zealand Statistical Association (Incorporated) which was duly adopted at a business session held during the conference. An Executive Committee was elected at the same business session and empowered to finalise the legal aspects of the constitution which was subsequently registered on 26 April 1950. The subscription for the session was fixed at five shillings. Since this is a statistical history it can also be recorded that the charge for hiring a room at the Carter Observatory in 1949 was 5/- and that the profit made on morning and afternoon teas was 9/6.

The list of papers and speakers for the 1949 conference was as follows:

Some statistical aspects of pasture experiments	P.D. Sears
Symposium on sampling	
Line transects in high country vegetation studies	I.D. Dick



Sampling problems in pasture	Jean G. Miller
Sampling problems with insect populations	A.A. Rayner
Factorial treatment of psychological tests	C.J. Adcock
Confluence analysis with application to statistical problems in economics	M.R. Fisher
Extreme value problems in meteorology	C.J. Seelye
Statistical methods in climatology and meteorology	N.G. Robertson

The foundation members of the Association were:

Dr J.T. Campbell	Victoria College, University of N.Z., Wellington. (President)
Mr I.D. Dick	Applied Maths Laboratory, D.S.I.R., Wellington. (Secretary/ Treasurer)
Mrs C. Marshall	Applied Maths Laboratory, D.S.I.R., Wellington.
Dr R.M. Williams	" " " " "
Mr P.J. Armstrong	Rongotai College, Wellington.
Mr A.C. Glenday	Grasslands Division, D.S.I.R., Palmerston North.
Miss O.M. Castle	N.Z. Dairy Board, Wellington. (Committee Member)
Miss E.J. Currie	N.Z. Dairy Board, Wellington.
Mr K. Cottier	Dept. of Agriculture, Wellington.
Mr E.R. Dearnley	" " "
Mr P.B. Lynch	" " " (Committee Member)
Miss J.G. Miller	" " "
Mr N.S. Mountier	" " "
Dr E.M. Ojala	" " "
Mr J.V. White	" " "

## STATISTICAL FILMS

J.H. Maindonald, Victoria University of Wellington.

### ELEMENTARY STATISTICS

We give below a list of titles, together with comments, for films in the BBC Maths in Action: Statistics Series which are now available from the National Film Library. Anyone wishing to show any of these films should, if in an organisation which is not already a member of the library, contact its nearest office for conditions of membership.

Sixth and seventh formers studying statistics should find these films especially helpful. At Victoria University they have been used, and well received, in the teaching of applied statistics to Stage II Economics students and to Stage II and III Biology students.

Each film runs for 20-25 minutes.

1. **Statistical Inference (Cat. No.B4955).**

Squirrels are caught, marked, and released; the proportion of marked squirrels in some subsequent sample will then be used in estimating the number of squirrels in a wood. An experiment with beads is used to simulate the biologist's investigation—"marked" beads are simply beads of a different colour. From the simulation with beads an idea of the possible error in the biologist's estimate of population size is obtained. A variety of other examples of the use of sampling techniques are discussed more briefly.

2. **Probability (B5004)**

This is the most elementary of the ten films; it might well be shown first. Examples range from tack and die-tossing to the problem of designing a completely reliable aircraft guidance system. "Independent" events and "mutually exclusive" events enter at a late stage of the film.

3. **The Binomial Distribution (B5005)**

General audiences may find this film a little technical.

4. **Hypothesis Testing (B5006)**

The first part provides an admirable introduction to classical ideas of hypothesis testing. The latter part of the discussion becomes too technical for general audiences; both Type I and Type II errors are treated.

5. **Sampling Variables (B5007)**

I have not seen this film yet.

6. **Normal Distributions (B5008)**

This film comes close to making the Normal distribution the distribution which one usually expects to find; in class use this should be countered with a more realistic view. Otherwise an excellent introduction to the Normal distribution.

7. **Samples and the Normal Distribution (B4953)**

The Normal distribution is presented as the sampling distribution of the mean. The main feature is a demonstration experiment in which the sampling distribution of the mean weight of coins taken 25 at a time is built up on a graph which shows in the background the distribution of weights of individual coins. The film explains how " $\sigma$  divided by root  $n$ " allowed banks to weigh up £ 5 bags of sixpences.

8. **Experimental Design (B5009)**

Two somewhat disparate topics are treated:

(i) Confidence Intervals

(ii) Randomisation and the use of tables of random numbers.

These two topics are, individually, well presented, and the film has some useful teaching ideas. But the title is inept—the topics treated do not together constitute anything which would ordinarily be called experimental design.

9. **Correlation (B4952)**

Does the correlation one finds between numbers of crimes committed and sales of TV sets establish a casual connection? What of refrigerators and crime, or salary and incidence of coronary thrombosis? A rough justification is given for the form of the formula used in calculating the correlation coefficient.

The final part of the film may not appeal to all tastes; the rank correlation is used to measure the extent of agreement between two judges in a beauty contest.

10. **Statistics and their Distribution (B5010)**

To use the type of technical jargon which these films eschew, we have here a discussion of the manner in which the null distribution of the appropriate sample statistic relates to a test of hypothesis. The rank correlation coefficient serves as the prime example; the discussion then harks back to examples used in earlier films.

**QUALITY CONTROL & RELIABILITY** (*British High Commission, Reserve Bank Building, P.O. Box 1812, Wellington.*)

**According to Specification** (*British Productivity Council*) (30 mins):

Produced in 1959 and now therefore somewhat dated. Nonetheless it provides a useful general introduction to quality control. There is perhaps a tendency to caricature a certain old-fashioned type of management attitude toward anything which smacks of statistics! Be careful what you say about statisticians; maybe there's one sitting next to you.

**Reliability—An Introduction (*British Productivity Council*) (30 mins):**

Statistical and mathematical aspects of quality and reliability get minimal attention. The film provides useful general orientation, and incidentally a panegyric for many things British.

This second film is being kept available in N.Z. until August; anyone wanting to use it might contact the author in the first instance.