With Compliments from

CEY-NOR

KARAINAGAR

Manufacturers of
FISHING BOATS
FISHING NETS

and Exporters of
MARINE PRODUCTS
Stabipss Annual
1976

MAGAZINE OF THE
SCIENCE STUDENTS' UNION
UNIVERSITY OF SRI-LANKA
JAFFNA CAMPUS

EDITORS
J. THRUKUMAR (Tamil)
D. DE ROSAIRO (Sinhala)
S. THIRULOGANATHAN (English)
SCIENCE STUDENTS' UNION
UNIVERSITY OF SRI-LANKA
JAFFNA CAMPUS
EXECUTIVE COMMITTEE 1975-1976

PRESIDENT — D. T. KINGSLEY BERNARD
VICE PRESIDENT — R. RANJAN (Till March 1976)
T. PONNAMBALAM (From May 1976)
SECRETARY — S THIRULOGANATHAN
ASSISTANT SECRETARY — P. R. ALWIS (Till March 1976)
E. S. SELVENDRAN (From May 1976)
JUNIOR TREASURER — A. THAVARAJA
EDITORS — D. DE ROSAIRO (Sinhala)
R. RAJKUMAR (Tamil; Till March 1976)
J. THIRUKUMAR (Tamil; From May 1976)
COMMITTEE MEMBERS — A. ANANDESWARAN (From May 1976)
A. PARAMESWARAN (Till March 1976)
H. C. W. PERERA
A. L. RAJAPAKSE
SARATHA VISVALINGAM
E. A. SELVANATHAN (Till March 1976)
S. SIVANESAN
N. SIVAPALAN (From May 1976)
R. B. VASANTHAKUMAR

SENIOR TREASURER — Dr. J. B. SELLIAH
PATRON — Prof. P. KANAGASABAPATHY
(Dean of the Faculty of Science)
CONTENTS

1. Message from the President of the S. S. U. .................................................. .............................
2. Editorial .............................................................................................................. ..........................
3. Be careful .......................................................................................................... ..........................
4. Econometrics as a disipline of Science ............................................................... ..........................
5. என்று காலை, தியாகியலன் ........................................................................................................
6. Pocket Calculators & the Mathematician .............................................................. ..........................
7. Random Numbers & Simulation ........................................................................ ..........................
8. Fisheries & its development in Sri Lanka ............................................................ ..........................
9. கைவெளியை வடிவீட்டு ..............................................................................................
10. How for dose the power of the Simpex Method ................................................ ..........................
11. Atomic power what it is & how it can be used ..................................................... ..........................
12. நூற்புரையின் குறியீடுகள் பரிபரிய குறியீட்டு சுவரின் விளக்கம் .................. ..........................
13. Do you know ...................................................................................................... ..........................
14. பல வழிவிளை ......................................................................................................
15. Dye ...................................................................................................................... ..........................
16. சமூகத்து சமூகத்து சமூகத்து சமூகத்து ................................................................
17. முக்கியமான, முக்கியமான ..................................................................................
18. சமூகத்து சமூகத்து சமூகத்து .............................................................................
19. காலை ................................................................................................................
20. New Discoveries in Space .................................................................................. ..........................
21. இருந்ததே! .............................................................................................................
22. இன்வைலியல் மற்றும் இன்வைலியல் .............................................................................
23. இந்த குறை பிரொஸ்ஸா அமைந்தது ..........................................................................
24. Imperialism knows no law beyond its own Interest ........................................... ..........................
25. காலை விளக்க ....................................................................................................
26. சிறை விளக்க என்று .........................................................................................
27. செயற்கையா என்று .............................................................................................
28. பல சிறை விளக்க என்று ..................................................................................
29. Annual Report .....................................................................................................
30. Hiroshima — The Modern Peace City ................................................................. ..........................
Message from the President of the Science Students' Union

The birth of the Sixth Campus of the university of Sri Lanka in Jaffna marks not only the beginning of a new chapter in the history of the growth of higher education in this country but also a new era for the Sri Lankians.

"We are a university community in the true sense of the term, and irrespective of the languages we speak and the religions we have come to adopt, we are one." It is in this spirit that the science students have so far taken part in the day today activities of the campus.

One accusation levelled against the undergraduates of Sri Lanka is that they don't move with the rest of our community. Every undergraduate should think seriously on this matter and take immediate action to fill the gap existing between us and the common man. There are vast changes taking place in our society today and as young children of mother Lanka we should all unite with the rest of the community in their struggle towards liberation. We should see that our education is geared to fulfill the needs of our society. Keeping in mind that "Education is for the Sake of Society and not for the Sake of Education" It was fortunate that the Jaffna Campus was born in the present times and not during the colonial period, so that the important task of modelling it to suit the needs of our society is wholly in our hands. I believe that our campus can play a major role in achieving national unity. In this respect, considering the unfavourable atmosphere in which this campus was born, we can be very happy because we have taken a number of steps along the correct path.

Some reactionary elements attempted to use the unfortunate incidents that took place in our campus recently, as a weapon to sow seeds of communal disharmony within the students body, but we were able to meet the situation with confidence and success. Such reactionary threats have yet not been totally removed among the student body. Just as much as liberation struggles gained success through contradictions, it is certain that through such incidents our unity will be strengthened further.

Man's primeduty is to demonstrate to society through his way of living that he is a man if history some day will consider our actions adopted and plans taken during our University career as correct, we will be more than satisfied.

D. B. Kingsley Bernard
This issue of Stabipss is gratefully and respectfully
dedicated to our first Patron

the Late Professor

Perampalam Kanagasabupathy,
M. Sc. (Cey.), M. A. (Cantab)

who as

the First Dean of the faculty of Science

and

the Head of the Department of Mathematics and Statistics

unsparingly devoted his energies, his talents and his zeal
to the building up of the faculty of Science

and the Department of Mathematics and Statistics

of the Jaffna Campus of the University of Sri Lanka.
Professor Perampalam Kanagasabapathy
— An Appreciation

The late Professor P. Kanagasabapathy was one of the finest mathematicians produced in this country. He was a first class honours graduate from the University of Ceylon (in the very first year of award of the local degree) and a wrangler in mathematics from the University of Cambridge. He made several original contributions to the subject of Mathematics, mainly in the field of number theory.

Professor Kanagasabapathy will find a place in University history for his pioneering work in several areas of university life. In the fifties, during the transition of the University of Ceylon to Peradeniya, when the major portion of the department of mathematics remained behind in Colombo, Professor Kanagasabapathy single-handedly took charge of the teaching of mathematics at Peradeniya. The fully-fledged department which stands at Peradeniya today is a monument to his untiring efforts and devotion to duty. At the time that the department at Peradeniya was getting into a full programme of activity, Professor Kanagasabapathy chose to go to the Jaffna Campus, where he was entrusted with the responsibility of setting up an entire faculty of Science. It was indeed a great tragedy that though he had made good progress, he did not live to see the completion of the task. However, in the first two years of its existence, the Jaffna science faculty, with him as Dean, had begun to function smoothly, offering not only the traditional courses in science but also a useful new course involving only the department of mathematics. Further, in his short term of office in Jaffna, he was able to initiate postgraduate courses in Mathematics.

As a teacher Prof. Kanagasabapathy was dedicated and considerate. It was usual for him to take on those courses which others would prefer not to handle. In fact, he would normally teach more courses than would assign to any other teacher. He was always glad to tackle much more than a fair share of any difficult task. Inside the classroom he was painstaking and thorough. His lectures were well prepared. While solving a problem in class he would not move from one step to another until he was convinced that almost everyone was with him at that step. He was alive to students' difficulties and always ready to help. By nature he was compassionate and lenient. He was also an outstanding research supervisor. When the postgraduate school in mathematics at Peradeniya had been established, in the short space of two years before his departure to Jaffna, he stimulated and guided a small group of students to produce a relatively large output of research of high standard in number theory.
The Late Professor
PERAMPALAM KANAGASABAPATHY

Born: 1- 7- 1922  
Died: 23-1-1977
Besides his contribution to the academic side of university life Prof. Kanagasabapathy took an interest in the social and religious life of the Campus. He was the prime mover in the establishment of the Hindu temple at Peradeniya. He did much the spadework necessary for its construction. When the temple was built he managed its day to day affairs until he left for Jaffna. His untiring efforts raised funds sufficient not only for the construction of a magnificent temple but also for maintenance and repair for some time to come.

Also, from its inception, he associated himself with the movement to establish a university in Jaffna (once referred to as Ramanathan University) and when the Jaffna Campus was being set up he had no hesitation in going there to help in whatever capacity required of him.

Prof. Kanagasabapathy was a modest, shy and unassuming man. He had many friends but no enemies. His life was guided by the highest principles. He worked selflessly for the general good of the community, always staying in the background. He shunned publicity and fame, and would not talk about his achievements. He worked tirelessly, often neglecting his own health. His passing away is a tragic blow to the university and the country at large.

Prof. M. Maheswaran
Peradeniya Campus
WE ARE GROWING UP

We are proud to present to our members and to our well -wishers the second issue of our magazine - STABIPSS. Its publication marks a further stage in the growth of our union and of our Campus. It announces to the outside world that we are growing up.

Yes - we are growing up. Our Union is entering its third year and has now a membership of 355. In terms of numbers our campus has also grown up. But, has there been a real growth in every respect? Has our Campus really grown up? These are questions that face us as we go to press with this second number of our magazine.

The fact that we started the Campus with only some old buildings belonging to two schools has been stated so many times in different places. The Science Faculty in particular had to function with resources that were not enough for a University Faculty. But we patiently put up with the limitations, mainly relating to buildings and equipment, and extended our fullest co-operation to the authorities with the hope that the situation would improve before long.

Two years have passed since the Campus started to function and, as stated earlier, the number of students has increased manifold. The academic and administration staff has also increased considerably. (In fact, it is interesting to note that the non-student population of the Campus is nearly as large as the student population ) But the facilities on the Campus have not increased proportionately. The building project begun in 1975 have not been completed and no new buildings have been made available. There is an acute shortage of lecture rooms and this frequently causes confusion in working out the time-table. Although the Campus population has increased, we still donot have an organised Health Centre with a permanent medical officer. (We understand that a medical officer is to be appointed shortly and he would have probably assumed duties by the time this magazine is out.) Sports activities have increased but the facilities are woefully inadequate. While a large percentage of the students are from outside Jaffna, lodging facilities are far from satisfactory.
Looking back, therefore we seem to have grown mainly in numbers. Other areas, except the administration and possibly the library, remain underdeveloped. It is in this background that there is some student unrest— or shall we say restlessness— on our Campus. This is not just a symptom of the teething troubles that we have to inevitably go through. It stems mainly from the failure on the part of the University authorities and of the Government to make the necessary capital expenditure for providing the basic facilities for a Campus. In view of the circumstances under which the Campus was founded, the students as well as others were willing to put up with the many limitations that were there at the start. But with the growth of numbers as well as of courses, the students (and even the staff) cannot be expected to remain satisfied with facilities that were not originally intended for a University Campus. We have co-operated with the authorities and have reached a point at which our patience is being taxed. Anyone paying a visit to the Campus can see that we need buildings and lodging facilities.

We therefore take this opportunity to earnestly appeal to the Government and the University authorities to treat our problems as urgent and to make available the necessary funds for the basic facilities to be provided in the quickest possible time. These facilities are urgently needed for the healthy development of the Campus.

We are growing up. We ask for the basic things that are essential for our healthy growth. We are sure that no one will want us to be undernourished.

EDITORS
Seated: (L. → R.) Messrs E. S. Selvendran, J. Thirukumar & S. Thiruloganathan (Secretary), Prof. K. Kailasapathy (President, Jaffna Campus), Mr. D. T. K. Bernard (President), Prof. P. Kanagasabapathy (Patron & Dean of the faculty of science), Messrs T. Ponnambalam, A. Thavaraja and D. de Rosairo


Absent: Dr. J. B. Selliah (Senior Treasurer), Messrs A. Parameswaran and R. Ranjan.
For

First Class Printing
and
Photographic Works,
Attractive Stationaries,
Legal Advice
Financial Problems
and
Medical Advice
Consult
The **
of
JAFFNA CAMPUS
புத்தத்த்துறை பாடல்கள் கல்பந்து சான்றன்
புத்தத்துறை.

பாடல்: 566

அம்பவி புனை துளிகி
துஷைப் புனை துளிகி

சி. நா. நம. பிஜின் தாவு
தார்பாட்டு இலக்கணங்கள்

சான்று — பாட்பாடல்
With Best Compliments

of

Autos Limited
190, Hospital Road - Jaffna.

Telephone No. 496

ARASCO MANGO NECTAR
READY TO DRINK
The most delicious and nourishing Fruit
drink with food value in Sri Lanka
ARABIAN'S DELIGHT
WHY NOT YOURS?
Produced from handpicked well ripened
selected varieties of Jaffna Mangoes.
Taste once and you will always want it
It is not only a Fruit drink but a Food too.

We also manufacture: -
Mango Cordial, Mango Slices in Syrup, Mango Cream, Mango Jam.
Papaw Cream, Jak Fruit in Syrup, Jak Fruit Cream,
Tomato Sauce, Chilli Sauce, Ketchup etc.

Arasco Industrial Exports Ltd.
163 KANDY ROAD. - JAFFNA.
Telephone: 7537
Kalkisons

Distributors for:

- The Maharaja Organization Ltd.
  (Consumes Products, S-Lon building Materials, Superlite Paints)
- Tungsram Bulbs
- Agro Chemicals.

147, Stanley Road,
Jaffna.

VISIT

E-A-STATIONERS

For Your Requirements in:
Paper & Printing Materials Printing Inks
Fountain Pen Repairs of all makes.

Authorised Dealers in:
Eastern Paper Mills Corporation

Stockists:
Exercise Books and School Requirements

ESMALJEE AMIJEE STATIONERS
128, HOSPITAL ROAD – JAFFNA.

T'Phone: 266
PURITY IS DIVINITY

Gnanams Studio

- Photographers
- Block Makers
- Photo Stat Printers
- Picture Framers
- Dealers in Glass Wares

Dial: 7067

23, Clock Tower Rd., JAFFNA.

81, Stanley Rd., JAFFNA.
Be Careful

By

Prof. N. Kodagoda

Professor of Forensic Medicine, Colombo Campus.

"Be very careful when you are looking for a thing, or, you will be sure to find it."

— Louis Pasteur.

"It is with a scrutinising eye that you should look at anything. Observation is the first step towards accumulation of knowledge, and for observation, use all your five senses. Above all, THINK..."

It was a scientist who addressed his students with these words. His name was Bell, and he lived in the city of Edinburgh, in Scotland.

Dr. Bell had a test tube in his hand. It contained a fluid which he wanted examined. He wanted its properties observed. He thrust the specimen towards his eager students, and said,

"Before subjecting the contents of this test-tube to chemical analysis, let us make accurate observations—using all five of our senses. Observe its colour... take some of it on your finger, and feel it... smell it..." He carried out each of the steps, and smelling it, puckered his nose and mouth, suggesting a foul odour.

"Do not stop at that," he said, "taste it" and he put a finger in his mouth.

The pupils were aghast. Dr. Bell handed them the test-tube, and it was passed round. Each student, in turn, made his observations. Each one, no doubt much against his will, even tasted the fluid.

Dr. Bell supervised his pupils, with great interest. He saw each of them place the finger in the mouth, and taste the fluid, and wore a mischievous smile. The students appeared satisfied that they had carried out the teacher’s instructions to the very letter. The container, with its offensive contents was now returned.

Dr. Bell broke the anxious silence. "It is because you did not observe how I examined this fluid, that each one of you had to taste the offensive stuff."

The pupils were, naturally, confused. Dr. Bell continued, "I did not taste it at all. Into the test tube, I inserted my forefinger; it was the middle finger I put inside my mouth!"

The importance of accurate observation in all spheres of knowledge cannot be over stressed. It is the
basis of the scientific method. If observations are wrong, deductions made from them are also bound to be wrong. The more observant one is, the more interesting life turns out to be.

Is it sometimes possible for one to make correct observations, but make wrong deductions from them? Of course, one could. In fact Bell himself did so on some occasions.

Once, Dr. Bell was examining patients in his out-patient department. He made attentive observations on a patient that came into the room, and addressing his students, made the following deductions.

"Here is an interesting case. This patient must have been a soldier. He would have served in the Royal Scots. He would have served in the East, and would have been released from service only shortly. In the army, he has served in the band. Certain, he played a wind instrument.

The students gazed, in half bewilderment and half admiration, as to how their teacher made such deductions, by merely looking at this man who walked into hospital, barely a minute ago.

Dr. Bell continued, and explained the bases of his deductions.

"As soon as this patient came in, he stood to attention. That was his army training. Most people said this habit some time after release from the army, and that is why I concluded that he had not been long released. He was grossly sun-tanned; so, he must have spent a considerable time in a sunny warm part of the world. The tattoo mark on his forearm was an Eastern pattern, and what more is necessary to deduce that he would have served in the East. The buckle of his belt is of the variety used in the Royal Scots Regiment." Dr. Bell stopped.

A particularly brave student ventured, "But sir, how did you come to the conclusion that he was in the army band?"

Unflustered, Dr. Bell continued. "He is small in build; such men are not made use of in an infantry, and besides, his lung disease, emphysema, is commonly found in people who blow a wind instrument over a long period of time."

The students nodded wholehearted agreement. Came the moment of proof. Dr. Bell, totally satisfied with himself, and radiating confidence, turned to the patient.

"You were a soldier, weren't you?"
"Yes, doctor."
"In the Royal Scots?"
"That is correct, doctor."
"You probably served in India?"
"Indeed."
"Were you not a member of the band?"
"Of course" said the patient, and he could not hold back his surprise any longer; but, Dr. Bell did not allow an interruption. He spurted out the final and winning question.

"And, no doubt, you played a wind instrument in the Army, did you not?"

The patient's face fell, and he showed obvious embarrassment. He would have liked to remain unresponsive, had it not been for the pensive, but pressing silence of the students.

"It was the DRUM I played." doctor, he stammered!
Econometrics as a Discipline of Science

By
Dr. R. Mahalingasivam
Ministry of Planning & Economic Affairs

Science is defined as an organised body of knowledge that has been accumulated on a subject. The three basic requirements in science are that the body of knowledge is testable, reproducible and does not vary according to research workers. According to Oscar Lang econometrics is the science which deals with the determination by statistical methods of concrete quantitative laws occurring in economic life. But Econometrics is perhaps more of a scientific tool rather than a science itself. This discipline was developed to deal especially with estimation of structural parameters, empirical testing of economic hypothesis, making inference on economic parameters and for predicting economic variables.

In order to apply econometric techniques to economic problems the variables should, in general, be quantifiable. Most of the hypothesis are the result of what we observe. The observation lends themselves to scientific analysis if they are quantifiable. Quantitative economic study involve formulation of economic hypothesis, collection of data and confrontation of hypothesis with data. For a long time economics was a non-quantitative discipline and policy decisions were made on a trial and error basis.

We all know that the main purpose of economics is to understand and to regulate the functioning of the economic system with a view to confering maximum social welfare on our people. It is difficult to trace the causal effect of instrument variables on target variables as most economic variables interact. Thus it is difficult to figure out, mentally, the effects of policy changes on economic variables. Ricardo, for instance, was greatly troubled when he wanted to discuss the theory of wheat profits when land, labour and capital all varied. To simplify his analysis he reduced this number of variables by combining capital and labour in composite dozes in fixed proportion and adopted several other devices. His habit of using over simplified abstractions to solve practical problems of the real world was labelled by Schumpeter as "The Ricardian Vice". One cannot blame Ricardo. He had to innovate this technique because knowledge regarding quantification and use of mathematics in economics was not developed at that time.

When you can measure what you are speaking about, and express it in numbers you know something about it; when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts' advanced to the stage of science said Lord Kelvin.

A revolution in economic thinking is claimed to have resulted during the middle of the 19th century due to the
efforts of Von Thunen, Dupuit, Cournot, Gossen and Jevons in introducing mathematical analysis into economic thinking. This could be considered as the first stage in the evolution of economics into science.

Alfred Marshall was one who strongly advocated that economics should be developed not merely as a quantitative science but even as a numerical science that would enable one to calculate the numerical changes in relevant economic variables due to given causes.

It is the introduction of probability into economic measurements which made it possible for research workers in economics to perform empirical testing of hypothesis in economics. Now economics has received the full recognition as a scientific discipline.

In late 1930's Jan Tinbergen, a pioneer econometrician, constructed econometric models for Dutch and American economics incorporating several single equations. It appears that Keynes was one who was unsympathetic to Tinbergen's pioneering effort. But, Tinbergen did not stop with his innovations, but pursued further and made use of Keynes' criticisms and even his theory of employment and expanded the area of econometric research.

Development of our national accounting systems and advances in data collections are the outcomes of the efforts of Tinbergen's work. The technique of putting together the relationship among economic variables in compact form and in a logical manner through mathematical equation also sprang from his work. It is now possible to formulate more sharply the structure of the economic system and thereby to gain added simplicity and accuracy.

Economic variables are random variables in the same manner as variables in experimental sciences. The stochastic nature of the observed data are to a large extent the result of stochastic non-observable variables (random errors). The error component in models arises due to various factors. Among them are error of measurement of dependent variables, approximation of one structure by another, omitted variables, and aggregation. The experimenter on physical sciences can avoid this problem to some extent by replacing the natural conditions by laboratory conditions whereby freeing all variables other than the one to be explained, from influences of error and shocks. In this respect the problems facing social scientists is unique.

We are aware that the forces acting on the economic system are numerous. It is not possible for an individual or a group of individuals to take account of all such forces and determine the economic structure. Even if the collection of data in respect of all variables is possible and electronic computing facility available, there are various other constraints (especially degrees of freedom) which stands in our way. It is often sought to develop complex econometric models and estimating techniques to eliminate such difficulties but complicated models are not necessarily the most efficient ones. It is easier to understand and gain insight into problems through simple elegant models.

Simplification of models without losing the characteristics of problems needs skill and dexterity on the part of the research worker. He should possess a
sense of imagination insight knowledge of the subject in choosing the most crucial and appropriate variables to be introduced into the model. Thus different analysts may arrive at different results. The efficiency of the model will have to be judged in terms of how it interprets history and its ability to make forecasts about the future.

Econometric models have in general three sub-sets of structural relations: Behavioural (statistical equations), Identities (definitures) and Technical equations. The variables used in these models may be classified under endogenous, exogenous or endogenous predetermined. As we know the behavioural equations are not exact. These behaviours relations are made equations by adding what we call random variables. The introduction of these random variables results in our seeking necessary econometric tools to handle them.

One aim of the whole exercise in econometrics is to determine the structure of the economy by estimating structural parameters, often referred to as population parameters. In physical sciences controlled experiments are possible and therefore the population parameters can be estimated with ease. But, in economics and other social sciences controlled experiments are not possible and we have to rely on the data that has been generated by the economic structure in the past. The economist's objectives may be similar to those of an engineer but his data are like those of a meteorologist.

The data generated with such shortcomings would inevitably cause bias and in some cases the estimates do not turn out to be efficient. Some of the shortcomings are errors of measurements, autocorrelation, multicollinearity, omitted variables, serial correlation and non quantifiability of variables (such as war and peace). The most crucial shortcomings in econometric models is the problems of estimation of single stochastic relations ignoring other relationships as though they have no part in determining the size of the variable to be explained. This is one of the important aspect to which much attention was paid in econometric theory. We are not fully equipped to overcome these shortcomings.

In econometric analysis, economic history, economic theory, Mathematical economics, statistics and mathematics each have a part to play. Economic history helps in making objective observations, Mathematical economics with the help of economic theory and mathematics helps to formulate the hypothesis and specify the model to be evaluated. Econometrics (as a specialised field of statistics) helps in estimating the structural parameters, testing them for reliability, making inference and hence in predicting economic variables. The economic structure so obtained can be used to formulate policies to achieve the desired targets. No parameters are accepted if they do not approximate theoretical values or values obtained from other sources. If the discrepancies are too large or are systematic and or does not interpret history reasonably well the hypothesis are revised and retested. The model is tested further in other ways. The one important test is to determine the extent to which the explanatory variables are able to explain the variation of the variable to be explained. The other test is to make projections and to study to what extent the projected values differ from the actual. Usually the last few years data
are left out in estimating the parameters in the first round. If the predicted values approximate the observed data, the left out observations are pooled and reused in re-estimating the structural parameters.

No econometrician however reputed can say that his model is the appropriate model. He could only say that the particular model is best (in terms of fit, sign and size of co-efficient etc.) among all his alternative specifications. It may be best to build models on research undertaken by a team of competent men rather than by an individual if the model is to be used for practical purposes. They should discuss their assumptions, methodology and results widely before they are used for policy decision. Econometric models will have to be put forward in a scientific spirit, because these models if fully developed and properly used would eventually lead all investigators to the same conclusions irrespective of their personal whims and could therefore be suitable for decision making.

We often hear, even from knowledgeable men, that econometrics is not of much practical use. This impression may possibly be the result of familiarity with papers claiming to be econometric studies. There are several works published carrying the label “an econometric study,” by those who have little knowledge of econometrics. These so called econometricians contribute to the school of thought; lie, damn lie and statistics.

Klein envisaged a situation of this nature to arise and therefore made the following observation in 1940s.

Econometricians do not operate in a vacuum, their methods are not purely mechanical in the sense that they do nothing but substitute in formulae. Any information of a qualitative nature that is available should be used by the econometrician in drawing inferences about the real world from his models. The non-statistical economist has only qualitative information from which to make judgements. The statistical economist has the same quantitative information plus a through knowledge of historically developed behaviour patterns, hence it may be said that the latter is better-equipped.”

You cannot befool God and win his love by calling yourselves sinners and slaves.  
Rama Tirtha
பார்க்க வட்டம் நேரந்த என்னுடைய 

பார்க்க வட்டம் நேரந்த என்னுடைய நூறு பெருமாள் பார்க்க வட்டம் நேரந்த என்னுடைய நூறு பெருமாள்

கால் என்னுடைய நூறு பெருமாள் பார்க்க வட்டம் நேரந்த என்னுடைய நூறு பெருமாள் பார்க்க வட்டம் 

நூறு பெருமாள் பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வட்டம் 

பார்க்க வ�...
திக்கவும் இத்தன்னாலே இதை கேட்டதும் என்று வெளிப்பட்ட கூற்றுகளும் குறை அஞ்சும் காட்டுகளொட்டு, குறித்துத் தெரியும். தீர்வு விளையாட்டு முற்பாட்டு என்று பேசுகிறோம். தொடர்பானவை பெறுவதால் குறைந்து என்று போஸ்டரில் இந்த முறை இல்லை. இதன் நூற்றீடுகள் குறைந்து என்று குறிப்பிடுகிறோம். வருவாக அப்போது எந்த வகையில் அதிகமான புரோமைட்டுகளும் காணப்படுகின்றன. இதன் காட்டுகளும் மட்டும் அம்சமான போல வங்காளத் தொடர்களில் பெறப்பட்டுள்ளது. காலை அலா, நேரலைகள் என பாதித்தினால், குறித்துத் தெரியும் குறைந்து என்று குறிப்பிடுகிறோம்.

திக்கவும் வரும் வருணாட்டு

திக்கவும் வரும் வருணாட்டு என்று வெளிப்பட்ட கூற்றுகளும் குறை அஞ்சும் காட்டுகளொட்டு, குறித்துத் தெரியும். தீர்வு விளையாட்டு முற்பாட்டு என்று பேசுகிறோம். தொடர்பானவை பெறுவதால் குறைந்து என்று போஸ்டரில் இந்த முறை இல்லை. இதன் நூற்றீடுகள் குறைந்து என்று குறிப்பிடுகிறோம். வருவாக அப்போது எந்த வகையில் அதிகமான புரோமைட்டுகளும் காணப்படுகின்றன. இதன் காட்டுகளும் மட்டும் அம்சமான போல வங்காளத் தொடர்களில் பெறப்பட்டுள்ளது. காலை அலா, நேரலைகள் என பாதித்தினால், குறித்துத் தெரியும் குறைந்து என்று குறிப்பிடுகிறோம்.
நமது வாழ்க்கை பாதையில், செயல்கள் எனவும் பாதுகாப்பு எனவும் காணப்படுகின்றன. செயல்களை எறிய பயணமானது, என்ன செய்ய வேண்டும் என விளக்க பொருளளக்கினர். அதனால் வாழ்விடமான செயல்களை என்ன செய்ய வேண்டும் என விளக்க பொருளளக்கினர். இவ்வாறான செயல்களின் விளக்கம் என்ன செய்ய வேண்டும் என விளக்க பொருளளக்கினர்.

எனினும் இது வாழ்விடமான செயல்களின் விளக்கம் என்ன செய்ய வேண்டும் என விளக்க பொருளளக்கினர். இவ்வாறான செயல்களின் விளக்கம் என்ன செய்ய வேண்டும் என விளக்க பொருளளக்கினர். இவ்வாறான செயல்களின் விளக்கம் என்ன செய்ய வேண்டும் என விளக்க பொருளளக்கினர்.
Pocket Calculators and the Mathematician

By

Dr. I. M. Wilson,

Statistical Unit, Colombo Campus

 Sadly, too many University Maths students think calculators are of no real interest except in commerce. Certainly they do take some of the drudgery (and some of the mistakes) out of simple arithmetic. Certainly, too, arithmetic is not what mathematicians should be studying at University. However, I would argue that mathematicians who see no interest in the calculator are being narrow-minded!

As a basis for debate, rather than a presumptuous prediction, let me also suggest that mathematicians with pocket calculator expertise could be economically important and valuable to Sri Lanka in the 1980’s. By expertise I don’t just mean the ability to add up numbers very quickly with nimble fingers, but rather the ability to use the calculator for sophisticated applications using a nimble mind.

Most calculators now sold in Sri Lanka are simple four-function machines which can add, subtract, multiply and divide. At greater expense others offer more sophisticated features varying from automatic square rooting to rectangular/polar coordinate transformations, but even with the most basic machine a clever and ingenious mathematician can solve very complex problems in engineering, commerce or statistics. The work is not just mechanical drudgery - there are real opportunities for advanced work in developing techniques which are both efficient and accurate.

Books are written and University courses given on the mathematical topics useful in this field, such as numerical iteration, approximation theory or error analysis. All that can be done here is to illustrate a few points as they relate to the four-function calculator.

Say you have to calculate \( e^x \) for a range of values of \( x \). The natural thing is to use the polynomial expansion:

\[
e^x = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \frac{x^4}{24} + \frac{x^5}{120} + \frac{x^6}{720} \ldots \]

truncated at some point. The simple-minded would then evaluate each term, write them all out on paper, and add them up on the machine. Every transfer to or from the machine from or to paper is a chance to make a mistake, as well as being time-consuming, so it is good to realise that the truncated sum above can be evaluated: without writing down any intermediate steps, and on even the simplest pocket calculator!

Even better news is that the number of keys to press on the calculator is also reduced, saving time and errors.
when we rewrite the polynomial in so-called "nested parenthetical form" as:
\[ e^x = 1 + x \left( 1 + \frac{x}{2} \right) \left( 1 + \frac{x}{3} \right) \left( 1 + \frac{x}{4} \right) \left( 1 + \frac{x}{5} \right) \ldots \left( 1 + \frac{x}{n} \right) \).

Working from the inside bracket outwards, the whole calculation can now be done on the calculator. The best way to get a feeling for the saving in time and labour is to find a calculator and try out the two approaches, but as a rough guide Smith (1975) suggests that the relative amount of calculator time using this method rather than the first, primitive, one is something like \(22/(32+6n)\), \(n>5\), where \(n\) is the degree of the polynomial approximation.

Another somewhat more advanced procedure is to fit numerically an interpolating polynomial based on a set of calculated values of the function that span the range of interest. For example in nested parenthetical form, the polynomial:
\[ 1 + x(-0.9664 + 0.3536x) \]
is within \(3 \times 10^{-3}\) of the function \(e^{-x}\) if \(0 \leq x \leq \ln 2\). This is surprisingly good for such a simple approximation. Hamming (1973) includes more examples.

A different type of problem familiar in any sort of numerical work is that of calculating accurately the difference between two similar numbers. For certain functions an interesting idea here is to use the mean value theorem of calculus, replacing \(f(c) - f(a)\) by \((c-a) f'(b)\) where \(a \leq b \leq c\). Then, for example, we would say:
\[ \sin(a + \varepsilon) - \sin(a) = \varepsilon \cos(b) = \varepsilon \cos \left( a + \frac{\varepsilon}{2} \right) \]
if we arbitrarily take \(b\) as the midpoint of the interval \((a, a+\varepsilon)\). Smith quotes an example where that choice of \(b\) produces the error of either \(b = a\) or \(b = c\), but that sounds less impressive when you realise the errors were one-thousandth of one percent and one-fifth of one percent, probably both negligible in practice!

Simply averaging numbers is the kind of procedure that does not require a B.Sc. in Mathematics or Statistics, but when handling a lot of data it's sometimes useful to be able to see the "average so far" after each new number has been included i.e. to watch the convergence of the mean. Then if the average \(A_n = (x_1 + x_2 + x_3 + x_4 + \ldots + x_n)/n\), in the obvious notation, it may be worthwhile to build up the average using the recursion formula:
\[ A_{n+1} = (nA_n + x_{n+1})/(n+1) \]
even though this is more work than the simple totalling and dividing more usually done.

The above few notes merely hint at the interesting work that has been done, and still needs doing, to exploit the new technology of pocket calculators. Of course they are less powerful than "real" computers, but being thousands of times cheaper they are much more readily available. In another way, too, the intermediate technology of the pocket electronic calculator is more effective than a huge computer — the human operator can keep on thinking out refinements to the procedure used, which is not easy when a machine has taken over the job! I hope even the small and trivial examples given are sufficient to support my argument that it is the country's young mathematicians who face the challenge of making full and intelligent use of the pocket calculator revolution.

REFERENCES


Random Numbers & Simulation

By

Dr. J. M. Wilson,
Statistical Unit, Colombo Campus.

1. INTRODUCTION

As with any subject of study, you can get a better and deeper understanding of Statistics if you are actively involved in the learning rather than just sitting in lectures. For this reason it is a good study technique to try out the formulae used in lectures. Feed in a set of data so that you can see the technique in operation; soon you will have a better idea how the technique really works, and probably you will remember it better too.

Statisticians sometimes call this kind of process “simulation”, but usually simulation involves rather more. It is used where exact formulae cannot be worked out algebraically or where they are so complicated as to defy intuitive understanding. A particular “realisation” of the theoretical situation is evaluated and studied arithmetically. Generally the results are less general, but this can be balanced by the gain in understanding.

Queueing theory provides a good example of this. About the simplest queueing system a statistician can hope to use to represent reality is that described in D. G. Kendall’s shorthand rotation (extended by A. M. Lee) as M/M/1: ∞/FIFO. Working backwards through this string of symbols, service is in order of arrival – First in, First Out; there is no upper limit on the queue size; there is one server; M stands for Markovian which is used to denote that arrivals are at random at a certain rate — statistical theory then tells us that the inter-arrival times have an exponential distribution - and the times taken to complete service (of a customer by the server) are random variables of the same type.

It turns out that the behaviour of this queue can be very neatly evaluated algebraically in terms of the two parameters “arrival rate” and “service rate” but only for the equilibrium situation when the queue has been operating for long enough to have settled down.

Before equilibrium is reached the corresponding results are not at all pleasant, involving Bessel functions which make them hard to use and understand. Now if you wanted to use this (highly-simplified) model to describe a real-life queue, you would have to consider whether your system worked in equilibrium conditions. For example, if a hospital clinic is open two hours a day does the pattern settle down to a steady state in that time? If not the nice equilibrium results will not be relevant.

In such a situation it will often help the statistician to simulate how the queue might evolve in practice. This
can be done in a number of different ways for different purposes. One possible aim is that of the student who wants a clearer mental picture of the real meaning behind the formulae. Another purpose is that of the operational researcher who might want to observe a real queue and to try out with pencil and paper what could be expected if the queue system was changed e.g. by introducing an extra server.

Both these simulation exercises involve the use of random numbers, so that an understanding of random number generation is a necessary first step. Section 2 of this article discusses how random numbers may be generated and tested to check that they do not show any important type of pattern, i.e., that they are 'effectively random'. The remainder of the article then describes how such random numbers might be used in simulations of a simple queue.

2. RANDOM NUMBERS:

Given a stream of random digits, truly patternless and unpredictable, it is easy to see that random decimal numbers can be produced from them by a rule such as, "Take three successive random digits and put a decimal point in front". This will produce equally unpredictable decimal random numbers in the range 0.000 to 0.999. Thus generating and testing random numbers reduces to the simple problem of producing and testing effectively random digits.

One easy way to attempt this is to get a friend to call out integers 0, 1, 2,......9 "at random". Quite possibly this stream of integers will not be "very random". There is a tendency to spread the numbers too evenly, for example calling "5" because "it seems a long time since there was a 5", i.e. using the past history of the sequence to determine what now happens and introducing an element of predictability. I conjecture that you could conceal this type of pattern from most tests by writing down your friend's digits in rows of 20 and reading from the resultant table in columns.

Taking the third digit from a series of 5 digit telephone numbers is another possibility and if time is of no value to you, tossing a coin could be used to produce binary random digits. You could then translate these to decimals by allocating the values 0 to 9 to 10 of the possible outcomes of tossing the coin 4 times — ignoring the other 6 outcomes. For example

- TTTT = binary 0000 = decimal 0
- TTTT = binary 0001 = decimal 1
- TTHT = binary 0010 = decimal 2 etc.

Although this last method is incredibly slow by hand it might be used with certain kinds of computer, but other techniques might be feasible on various machines and a lot of work has been done to find methods which are fast on computers and which do not have visible peculiarities. All these methods produce "pseudorandom" sequences by using various formulae. This means that the sequences are reproducible by repeating the calculation, but that simple tests do not detect any pattern in the numbers produced. A convenient formula using a hand calculator could be

\[ U_{r+1} = \text{the reminder on dividing} (a, U_r+b) \text{ by } M \text{ where } a, b, M \text{ are mutually prime}. \]

Using the Colombo Campus Statistical Unit's Hewlett - Packard HP-25 programmable pocket calculator it is easy to use
Ur+1 = the fractional part of (Ur + π)5.

To check the absence of various types of pattern usually involves a standard statistical technique, the chi-squared test of significance. This involves defining null hypothesis expectations i.e. what should happen if there is not a pattern of the type you suspect. Then the test checks whether the observations are or are not inconsistent with the expectations. The null hypothesis has to be rejected if the observed data are inconsistent with what should happen, and then we conclude the generated data are not random.

A typical test would be one to check the gaps between successive odd digits. Alter one odd digit in a truly random series, there is probability \( \frac{1}{2} \) that the next digit is odd, probability \( \frac{1}{2} \) then of a gap of length 1. By the multiplication law of probability for independent events, there is probability \( \left(\frac{1}{2}\right)^2 \) of a gap of length 2 before the next odd digit and so on.

In this way we argue that gaps of lengths 1, 2, 3...etc. can be expected in the proportions 1 : 4 : \( \left(\frac{1}{2}\right)^2 \) : ... The chi-squared test then gives us a method of comparing the observed distribution of gaps with these expected proportions. For example, too many gaps of length two would mean that the odd and even numbers tended to alternate making the series at least partly predictable.

In practice you might choose, or invent, a number of such tests specifically designed to check any particular deficiencies you suspected in your generating system.

Finally in this section, may I comment that you will probably have a better understanding of random number generative if you have actually tried out the methods 1 described, producing 50 or 50 random digits by each process. Also a good way to familiarise yourself with the workings of the chi-squared test would be to generate several sets of non-quite-random data and to look at how the chi-squared test behaved with these. This is another instance of the method advocated at the start of section 1.

---

'To each is given a bag of tools
A shapeless mass and a book of rules
And each must make eve life is flown
A stumbling block or a stepping stone.'

R. L. Sharpe
Fisheries and its Development in Sri Lanka

By

Dr. K. Sivasubramaniam
Ministry of Fisheries

Unfortunately there appears to be an impression that very little or no information is available for development activities in the field of fisheries. This seems to be the view among some Biologists as well and this position is not correct. The knowledge available is sufficient for the development of fisheries for another decade or more. Sri Lanka has had the opportunity of having very large number of foreign experts to report on fishery development, particularly through FAO sponsored projects. The material in the form of reports prepared by such experts, the scientific publications and information gathered by fishery Biologists in Sri Lanka, contain all the required information for possible line of development. Simply, a follow up of Development linked with Research, is the solution. One cannot deny that investments in fishing industry may be considered capital intensive and perhaps with a relatively higher level of risk compared to many other investments on land. This of course is well known and yet every country particularly those that are ideally located like Sri Lanka, make heavy investment in this field. It is also well known that fishery resource is one of the cheapest source of animal protein and fish protein is qualitatively and quantitatively not inferior to any other meat, if not superior. This is the main reason for the large scale investment by nations like USSR and Japan.

Fishing industry in Sri Lanka does not receive the same degree of attention as agriculture. Since of recent there are definite signs of private sector interest in making investments in the fishing industry. This is very encouraging. Up to now, investments in the industry has been almost entirely State sponsored and generally, there is a limit to which the State can be directly involved in the investment for development of the fishing industry. This limit will tend to be very low in the case of developing countries like Sri Lanka and this naturally leads to stagnation until the private sector moves in to boost the development.

If one looks at the general trend in the annual fish production, (Fig. 1) it will be possible to note that catches levelled off at least thrice. Initially the pre-war period when the Colonial interest was mainly in the Seer and Paraw and no figures are available for the war time period. The second levelling off was post-war production period, until mechanization. With mechanization, a sudden acceleration in the rate of production is evident since 1960. The third levelling off commenced around 1966/67 and perhaps continues to be at this phase even now.
All these exploitations being mainly in the coastal belt with only about 4% from off-shore and 6–7% from fresh water.

Coastal fishery — Is the mainstay or back bone of the industry and increased production in this sector can be expected from:

![Graph showing production over the years]

Inland fishing — Production can be increased almost by 100% of the present level but poor demand is pulling the production down. Schemes to improve the demand would automatically increase the production. Potential is very encouraging in view of number of new schemes being opened up. Capital investment required in this sector being relatively less, it is advantageous for developing countries.

Brackish water — Lagoon yields only small quantities of fish but the shrimp production from these waters is very significant in the light of present export market. Increase in the production of shrimps from lagoons may not be likely beyond the present level and we have to look to the sea for any further addition to the production of this valuable variety. Potential for farming shrimps grey mullets and milk fish exists but cost of producing through this system may become economical only when their market value per lb. becomes almost double.

1. Improved techniques of fishing—Purse seine, gill net, bottom long-line and trawling.
2. Improved design of existing mechanized boats and boat and gear maintenance.
3. Training of fishermen in modern fishing techniques.
4. Covering all fishable areas around the Island.
5. Guaranteed price schemes etc.

Production of fish from this sector could be increased safely by another 20–25% particularly through the exploitation of Sardine like fishes and bottom fishes as concluded from recent experimental investigations.

Off-shore and Oceanic ranges: Presently almost untapped except for the Wedge Bank. Main potential for future investment lies in these ranges but it calls for higher degree of skill, sophisticated vessels, equipment etc. However, investments in this sector are around
the corner with new incentives. Basically they are expected to be in the following schemes.

1. Skipjack fishery—Pole and line and Drift net fishery expected to yield about 30,000 Tons /annum.

2. Tuna longlining for large Tunas and Sharks — 5-10,000 tons of most valuable fish.

3. Trawling in the Pedor Bank.—atleast 10,000 Tons.

Incidental Fisheries—Such as ornamental fish. Beche de mer, chank, pearl, oyster and Sea weed contribute to the earning of valuable foreign exchange to the country. Some degree of development can be achieved even in these sectors. Perhaps pearl culture would workout to be a profitable venture in view of India’s successful attempts at an experimental level.

Import and Export—Presently fish and fish products exported are Tuna, squids, cuttlefish, shrimps, lobsters, Beche de mer, shark fins, ornamental fish. Our present earnings from export is in the region of Rs. 25 million but our import is more than twice this amount. (Rs. 54 million in 1973. dry fish 32.5 million, Maldives fish 12.8 million and other main items is fishing gear).

Significant increase in export earnings can be anticipated mainly from the Tuna fishery. Increased production could reduce import of fish for human consumption but human population growth in the country may not permit this. The per capita consumption of fish is estimated at 25-0 lbs/annum and this level has to be maintained.

Integrated Developments—Two basic things vital to the development of fisheries are boat building and gear construction. For satisfactory development these two industries should develop hand in hand with fisheries. The costs of import of these items are large and tend to limit their availability to fishermen. Establishment of local facilities for the construction of these items would reduce the foreign exchange commitments, increase employment opportunities in the country and contribute to increased fish production by meeting the demands of the fishing industry, at lower cost.

Management—In view of international trends in fishery resources management, the need for management measures has never been greater than it is today. Management measures have to be introduced now for the coastal fishery in order to avoid any risk of going over the maximum sustainable yield, which generally tends to happen easily in a coastal fishery.

Do not try to know everything if you wish to know anything.
கருத்துக்கள் நூற்றாண்டு....

வரலாற்று விளக்கம்

கருத்துக்கள் நூற்றாண்டு என்பது பல்லவத்துக்கான நூற்றாண்டு வரலாற்றில் முக்கியத்துவம் பெறுவது. அணித் தொலையே, மருந்து, கருணைகள் அனுபவது முன்னேற்றத்திற்காக நூற்றாண்டு வரலாற்றினை வைத்து. செயலான வரலாற்றுக்கு, நூற்றாண்டு வரலாற்றுக்கு எதிரான இயல்புகளை கொண்டு நூற்றாண்டு வரலாற்று முக்கிய அடையாளம் மாற்றுகிறது.


ஆரம்பிகள் சார்ந்த நான்கு நூற்றாண்டுகளுக்கு முன்னேற்றத்திற்கும் பெரும்பாலான வரலாற்றுக்கும் என்று கூறுவதில் "Nobular Theory" என்று புகுவதற்கு கீழ் உள்ளது.

புதியகிற்கு கூர்த்து, 30 வருடம் செயலான பிரம்மியம் என்று அடையாளம்.
விளக்கியல், அருங்காட்சியகம்; கருநாத் ங்கேவார் கல்லூரிய கலவாரத்தில், பல குறுக்காலங்களாலும், பலரும் கல்வியிடும்படி ஆராய்கும். பல கலைகளை வெளியாய்வு செய்யும்படி அனைத்துக்காட்சிகளையும் போட்டியை ஆராய்கும். உடல் மற்றும் புலிய கற்புகளும் மற்றும் உடல்வாய்ந்த போரின் கற்புகளும் வார்த்தையை போதும் கூறுகளையும் கொண்டு ஆராய்கும்.

எங்கே எங்கே, புலியராதல் கற்பு முன்னணி போட்டியை போதும் கலைகளும் அடையும் கற்புகளை வெளியாய்வு செய்துள்ளன.

உயிரியார் உயிரியார் வடிவமைக்கும். குற்றங்கள் குற்றங்கள், மனிதங்கள் மனிதங்கள், சிறுவர்கள் சிறுவர்கள், வருங்கால் வருங்கால் உழந்துறையார் வடிவமைக்கும்.

புலிய முன்னக் கற்புப் புறப்புச் செய்யப்படும் புறப்புவை வடிவமைக்கும். மனிதங்கள் மனிதங்கள், சிறுவர்கள் சிறுவர்கள், மற்றும் சிறுவர்கள் சிறுவர்கள் வடிவமைக்கும்.

எங்கே எங்கே, புலியராதல் கற்பு முன்னணி போட்டியை போதும் கலைகளும் அடையும் கற்புகளை வெளியாய்வு செய்துள்ளன.

புலியராதல் கற்புப் புறப்புச் செய்யப்படும் புறப்புவை வடிவமைக்கும். மனிதங்கள் மனிதங்கள், சிறுவர்கள் சிறுவர்கள், மற்றும் சிறுவர்கள் சிறுவர்கள் வடிவமைக்கும்.

புலியராதல் கற்பு முன்னணி போட்டியை போதும் கலைகளும் அடையும் கற்புகளை வெளியாய்வு செய்துள்ளன.

புலியராதல் கற்புப் புறப்புச் செய்யப்படும் புறப்புவை வடிவமைக்கும். மனிதங்கள் மனிதங்கள், சிறுவர்கள் சிறுவர்கள், மற்றும் சிறுவர்கள் சிறுவர்கள் வடிவமைக்கும்.

புலியராதல் கற்பு முன்னணி போட்டியை போதும் கலைகளும் அடையும் கற்புகளை வெளியாய்வு செய்துள்ளன.
அழிய, அழியமலர் என்றுதலாம் காத்து பிள்ளை என்று கல்வைனாரேக. கூறிழிருந்து பெற்றியுறுத்து கொள்ளப்படாயிற்று.

உயிரியுடன் ஸ்தார்க் பெருந்துக்கு காத்து விளக்கும் குறுகியது கல்வைக்கு முன்னேற்றம். பொழுது குளிர்களே முடியலாத என உயிரியதான் தக்க கும்பராக்கியது. இந்த காலத்தில் நாம் இருக்கலாம். எனக்கு ஆண்டு முதிக்கியால் நூற்றாண்டு கலந்து பெருந்துக்கு முன்னேற்றம் தரும்வேற்பும் கொள்ளி கொள்ளப்படும்.

உயிரியுடன் பிள்ளை

பொழுது பிள்ளைத்தான் காத்து பிள்ளைகளின் கல் காணப்பட்டுக் கொள்ளும் பொழுது கல்வைச் செய்யும் பொழுது கும்பராக்கியம். இந்தச் செய்திகளை எனக்கு எதும் முதிக்கியால் நூற்றாண்டு கலந்து பொழுது கல்வைச் செய்யும் பொழுது கும்பராக்கியம் தரும்வேற்பும் கொள்ளி கொள்ளப்படும்.

தீர்வு குழியறை

உயிரியுடன் பிள்ளைகளான தீர்வுச் செய்யும் நூற்றாண்டுகளை, உயிரியுடன் பிள்ளைகளான தீர்வுச் செய்யும் பொழுது கல்வைகளை, கூறிழிருந்து பொழுது கல்வைச் செய்யும் பொழுது கும்பராக்கியம். இந்த காலத்தில் பிள்ளைகளை காணப்பட்டுக் கொள்ளும் பொழுது கும்பராக்கியம் (1) பிள்ளைகளை விளக்கும் பொழுது கல்வைச் செய்யும் (2) காலத்தில் பிள்ளைகளை விளக்கும் பொழுது கும்பராக்கியம் (3) பிள்ளைகளை விளக்கும் பொழுது கல்வைச் செய்யும் பொழுது கும்பராக்கியம் (4) பிள்ளைகளை விளக்கும் பொழுது கல்வைச் செய்யும் (5) காலத்தில் பிள்ளைகளை விளக்கும் பொழுது கும்பராக்கியம் கொள்ளி

மலர் பிள்ளையுடன் பிள்ளைகளான தீர்வுச்செய்யும் பொழுது கல்வைகளை, உயிரியுடன் பிள்ளைகளான தீர்வுச் செய்யும் பொழுது கும்பராக்கியம். இந்த காலத்தில் பிள்ளைகளை விளக்கும் பொழுது கும்பராக்கியம் கொள்ளி. இந்த காலத்தில் பிள்ளைகளை விளக்கும் பொழுது கும்பராக்கியம் கொள்ளி. இந்த காலத்தில் பிள்ளைகளை விளக்கும் பொழுது கும்பராக்கியம் கொள்ளி. இந்த காலத்தில் பிள்ளைகளை விளக்கும் பொழுது கும்பராக்கியம் கொள்ளி.
(2) அழிந்த மூலிகங்கள் பிட்டு வெள்ளி வழங்குவதற்கு, நூற்றுள்ள வீட்டுகளும் முளைவாயுக்கான

(3) சிவப்பு பாலமட்டனின் குறைவான கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று

(4) காண்டெடுக்க தட்சினிகள் அளவுறும் பாலமட்டனின் குறைவான கொள்ளடை

(5) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று

(6) புது காற்று தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று

(7) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று

(8) வித்தியாசம், வேல்லறிவு வழங்குவதற்கு நூற்று வீட்டுகளும் குறைவான 

(9) காலம் ஒன்றுக்கு அதிகமான தயாரிப்பு 

(10) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறைவான 

(11) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறைவான 

(12) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறைவான 

(13) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறைவான 

(14) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறைவான 

(15) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறைவான 

(16) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறைவான 

(17) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறைவான 

(18) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறைவான 

(19) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறை 

(20) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறை 

(21) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்குவதற்கு, நூற்று வீட்டுகளும் குறை 

(22) பல்வேறு தரைத் தயாரிப்பு கொள்ளடை பயிரில் வழங்கு 

(23) பல்வேறு தரைத் 

(24) பல்வேறு தரைத் 

(25) பல்வேறு தரைத் 

(26) பல்வேறு தரைத் 

(27) பல்வேறу தரைத் 

(28) பல்வேறு தரைத் 

(29) பல்வேறு தரைத் 

(30) பல்வேறு தரைத் 

(31) பல்வேறு தரைத் 

(32) பல்வேறு தரைத் 

(33) பல்வேறு தரைத் 

(34) பல்வேறு தரைத் 

(35) பல்வேறு தரைத் 

(36) பல்வேறு தரைத் 

(37) பல்வேறு தரைத் 

(38) பல்வேறு தரைத் 

(39) பல்வேறு தரைத் 

(40) பல்வேறு தரைத் 

(41) பல்வேறு தரைத் 

(42) பல்வேறு தரைத் 

(43) பல்வேறு தரைத் 

(44) பல்வேறு தரைத் 

(45) பல்வேறு தரைத் 

(46) பல்வேறு தரைத் 

(47) பல்வேறு தரைத் 

(48) பல்வேறு தரைத் 

(49) பல்வேறு தரைத் 

(50) பல்வேறு
(11) கல்குருவியைக் குறிப்பிட்டு, 10,000 கி.மீ பயணம் செய்யும் வேறுபாட்டில், வேதியியலில் 300 மிளி தொலையே பயணம் செய்யும் வேறுபாட்டில் 600 மிளி தொலையே பயணம் செய்யும் வேறுபாட்டில் முக்கியப்பட்டுள்ளது, மற்றும் குறிப்பிட்டிட்டு வேறுபாட்டில் செய்ய காட்டுவது.

(12) சனியார் நீந்திகள் காணும் பதிவுபோன்று சுருக்குகிறது சிலக்காதிக்க.

(13) மாணவர்கள் கெளுப்புப் பாள்பாட்டில் முயற்சிக்கும் பதிவுuale 100-200 மில்லியன் பதிவுகள் செய்யப்பட்டுள்ளது என்றாகவோ போன்று.

(14) மாணவர் கல்வி முறைத் தொழில்நுட்பமான குறிப்பிட்டு, முடிக்கும் விளையாட்டுகளை குறிப்பிட்டு தொழில்நுட்பமான குறிப்பிட்டு பார்வையாளர் செய்ய வேண்டும்.

(15) மாணவர்கள் முயற்சியுடன் முயற்சியான பதிவுகளை கெளுப்பு கெளுப்புப் பாடலம் 3-6 மில்லியன் பதிவுகள் முயற்சியானது முயற்சியத் தொழில்நுட்பமான பதிவுகள் செய்யப்பட்டுள்ளது.

(16) பதிவுகள், முடிக்கும் விளையாட்டுகள் கெளுப்பு பாடல்களுகை முயற்சியான பதிவுகள், அவ்வாறு கெளுப்புகள் கெளுப்பு பதிவுகள் முயற்சியானது கெளுப்பு பதிவுகளைச் செய்யப்பட்டுள்ளது.

(17) மாணவர்கள் கல்வி முறைத் தொழில்நுட்பமான குறிப்பிட்டு, முடிக்கும் விளையாட்டுகளை குறிப்பிட்டு தொழில்நுட்பமான குறிப்பிட்டு பார்வையாளர் செய்ய வேண்டும்.

(18) பதிவுகள், முடிக்கும் விளையாட்டுகளை குறிப்பிட்டு சுருக்குகிறது முயற்சியானது முயற்சியானது கெளுப்பு பதிவுகளை கெளுப்பு பதிவுகளைச் செய்யப்பட்டுள்ளது.

(19) பதிவுகள், முடிக்கும் விளையாட்டுகளை குறிப்பிட்டு முயற்சியானது முயற்சியானது கெளுப்பு பதிவுகளைச் செய்யப்பட்டுள்ளது, நேர்க் கெளுப்புகளைச் செய்யப்பட்டுள்ளது.
கருவை, தேவதையிட்டு வெளியே தோன்ற வாதிய கருவியை நோக்கி வேகமாக வெளியே தோன்றி வைத்துண்டு. எனக்கு உண்மையான கருவை வேகமாக வெளியே தோன்றால் தோன்றேஷது. பொருள் அல்லது கருவுடன் உண்டாகவும் வெளியே தோன்ற்கின்றது. எனினும் தேவதையிட்டு வெளியே தோன்றலாம் எனை மொங்கிலிகள் வைத்துண்டு. அது என்பதாயிருக்கிறது வெளியே தோன்றிவைத்துண்டு. என்பது என்று கூறினோம். பொருள் அல்லது கருவை வேகமாக வெளியே தோன்றும்போது என்ன இருக்கிறது? தேவதையிட்டு வெளியே தோன்றும்போது என்ன இருக்கும்? இவ்வகையான பெருமையை மன்னரினை வைத்துண்டு. பொருள் அல்லது கருவை வேகமாக வெளியே தோன்றும்போது என்ன இருக்கும்? தேவதையிட்டு வெளியே தோன்றும்போது என்ன இருக்கும்?
(1) நான் கைவிடத்தில் 35° வெளி நீரால், 75° அல்லது மேலே செல்வதால் அடர்த்தியில் கூறப்பட்டு இலத்திரைத் தமது பொழுதையாக விளைந்தது.

(2) சில காலத்தில், ஆறு நேரடை அமைந்துள்ளது.

(3) பாதை வலை 27° முதல் 14° வரை மாற்றியது.

(4) நான் ஆராய்ச்சியில் படித்துச் செல்லினார்.

(5) இது ஆராய்ச்சிக்கு 2000 k.m மற்றும் பாதையில் பயணித்து ரைல்லரின் பாதை ஆராய்ச்சியில் விளைந்து வருகிறது.

(6) தரவு, மதிப்பிட்த்து, சோதனை செய்யப்பட்டது. திறன், நெற் களால், மேற்பொருள் முறைப்படுத்தும் மாதிரிகள் பொருளாக இருந்து பயன்படுத்தப்பட வேண்டும் திறன் பெருந்துகூண்டியும் விளைந்தது.

(7) கொள்ளில்லாத பாதவியைச் செய்ய வேண்டும் வாணிகங்களை.

(8) 45 மிளையார் காலத்தில் பெரும் வெளியில் பாதவியைச் செய்யப்படும் காலத்தில் அனைத்து சேர்மங்கள் விளைந்து வருகிறது அனைத்துத் திறன் பெருந்துகூண்டியும்.

(9) காரணிகள். அதிகளையும் மேலும் இருந்து வெளியில் பாதவியைச் செய்யப்படும் காலத்தில் பாதவியைச் செய்யப்படும் காலத்தில் இருந்து வெளியில் பாதவி செய்யப்படும் காலத்தில்.

(10) காரணிகள் கொள்ளும் வாணிகங்களை விளைந்து வருகிறது. இது உண்மையான காலத்தில் உயர்ந்து, மேலும் பாதவியைச் செய்யப்படும்.

(11) கொள்ளில்லாத பாதையை பயணித்து ரைல்லரின் பாதை விளைந்து வருகிறது.
If there is anything that can bind the heavenly mind of man to this dreary exile of our earthly home & can reconcile us with our fate so that one can enjoy living - then it is verity the enjoyment of......the mathematical sciences & astronomy.

— Kepler
How far does the power of the simplex methods extend in Solving non-Linear Programming problems

By

Mr. S. Ganesalingam
Lecturer, Jaffna Campus.

1. Introduction:

The quick spread of the application of linear programming in solving manifold problems in economic and operations research is due, without doubt, to the Simplex procedure, a method of solution which is suitable for large scale problems and is easily adopted for use by electronic computers.

Quite a lot of scientists had tried to extend the power of the simplex, and similar methods to other mathematical programming problems and considerable results have now been achieved. This kind of advancement naturally raises the question of how far this power extends. Here I am trying to find a partial answer to this question. This was considered by Dr. B. Martos (1964), 'The direct power of adjacent vertex programming methods'. Charnes and Cooper in 1956 has pointed out that the simplex method may be capable of solving problems with objective functions which are neither convex nor concave.

Consider a general problem, with the usual notations,

Minimize $Z = CX,$

subject to $AX \leq b, X \geq 0.$

Let $L$ be the set of feasible solutions.

Let me recall the two important characteristics of the simplex method applicable to linear programming problems. They are,

(a) A minimum is taken on at an extreme point of $L$

(b) Each local minimum is also a Global minimum.

In simplex procedure we are examining extreme points, once we obtained an extreme point which satisfies the optimality conditions we are stopping the search for the optimal solution (i.e.) Once we found a local optimum we are stopping with the great satisfaction that we have found out the solution for the whole problem. This is because of the fact that local minimum is also a global minimum.

1.2. We shall make and use the following assumptions.

(a) The set of feasible solution is a closed convex polyhedral set. (i.e. a non empty intersection of finite number of half spaces,) a half space is a set $ \{ x \mid x \in \mathbb{R}^n, c^T x \geq \alpha, c \neq 0, \alpha \in \mathbb{R} \}$
Formally we shall be concerned with sets L defined by, \( L = \{ X \mid AX \leq b, X \geq 0, X \in \mathbb{R}^n \} \) where A is an \( m \times n \) matrix, \( b \) is a \( m \) vector, \( X \) is a \( n \) vector of variables or points in \( \mathbb{R}^n \).

(b) L contains two different points.

(c) L is bounded.

(d) The objective function \( f(X) \) is continuous in \( L \).

We shall deal with the problem \( \text{Min} \{ f(X) \mid X \in L \} \). The existence of an optimum solution follows from the assumptions (a), (c) and (d).

We are looking for the family of functions \( f(X) \) which admit of optimization by methods which utilize adjacent extreme points only of \( L \). Owing to a particular shape and position of the set \( L \) a particular function may possess one or both of the properties A, B. In order to exclude such exceptional cases, the validity of properties A and B shall be required for all convex polyhedral sub sets of \( L \) too. Within the class of remaining functions then we specifically seek for necessary and sufficient conditions which applies to a continuous objective function with property A and B in the sets \( L \) and in all the convex polyhedral sub sets of \( L \).

Now I shall define a local minimum and prove the result (B) for a convex function in \( L \). The result holds in particular for linear functions as well.

**Definition: Local minimum**

\( X^* \) is a local minimum if there is a neighbourhood \( N(\varepsilon, X^*) \) such that,

\[ X \in N(\varepsilon, X^*) \cap L \Rightarrow f(X^*) \leq f(X) \]

**Proof of the Result B.**

Take any \( X \in L \), consider \( Y = \alpha X + (1 - \alpha) X^*, \quad 0 \leq \alpha \leq 1 \)

It is clear that \( Y \in L \).

For sufficiently small \( \alpha \), \( Y \in N(\varepsilon, X^*) \)

i.e. \( f(X^*) \leq f(Y) \Rightarrow X^* \) is the local minimum.

If \( f(X) \) is linear we have

\[ f(X^*) \leq \alpha f(X) + (1 - \alpha) f(X^*) \]

\[ = \Rightarrow f(X^*) \leq f(X) \quad \forall X \in L \]

\[ = \Rightarrow X^* \text{ is the Global minimum.} \]

If \( f(X) \) is convex the result is immediate because

\[ f(\alpha X) + (1 - \alpha) X^* \leq \alpha f(X) + (1 - \alpha) f(X^*). \]

Therefore we require class of functions for which it is sufficient to examine the extreme points of \( L \) alone and stop as soon as local optimality conditions are satisfied:

**2. Special functions**

As a first step let me define the following:

**Definitions (i) Quasi concave function (QV function)**

A function \( f(X) \) is QV in \( L \) if for all \( X_1, X_2 \in L \), \( X_0 = \alpha X_1 + (1 - \alpha) X_2 \in L \)

\[ 0 \leq \alpha \leq 1, f(X_0) \geq \text{Min}_L[f(X_1), f(X_2)]. \]

**Note:** \( f(X) \) is said to be a concave function in \( L \) if \( \forall X_1, X_2 \in L \), \( X_0 = \alpha X_1 + (1 - \alpha) X_2 \)

\[ 0 \leq \alpha \leq 1, X_0 \in L, \]

\[ f(X_0) \geq \alpha f(X_1) + (1 - \alpha) f(X_2) . \]
Def: 2. Explicit Quasi concave function (EQV)

A function \( f(X) \) is said to be EQV in \( L \)
if \( X_1, X_2 \in L \) \( f(X_1) \neq f(X_2) \), \( X_0 = [\lambda X_1 + (1 - \lambda) X_2], 0 \leq \lambda \leq 1, f(X_0) > \) Min \( f(X_1), f(X_2) \).

Def: 3. Quasi convex function: (QX function)

A function \( f(X) \) is said to be QX in \( L \)
if \( -f(X) \) is QV in \( L \).

i.e. \( X_1, X_2 \in L \) \( X_0 = \lambda X_1 + (1 - \lambda) X_2, 0 \leq \lambda \leq 1 \).
\( X_0 \in L, f(X_0) \leq \) Max \( f(X_1), f(X_2) \).

Def: 4: Explicit Quasi convex function (EQX)

A function \( f(X) \) is said to be EQX in \( L \)
if \( X_1, X_2 \in L, X_0 = \lambda X_1 + (1 - \lambda) X_2, 0 \leq \lambda \leq 1 \),
\( f(X_1) \neq f(X_2), f(X_0) < \) Max \( f(X_1), f(X_2) \).

Def: 5: Quasi Monotonic function (QM)

A function \( f(X) \) is said to be QM in \( L \)
if it is both QX and QV in \( L \).

Def: 6: Explicit Quasi Monotonic function (EQM)

A function \( f(X) \) is said to be EQM in \( L \)
if it is both EQX and EQV in \( L \).

Now I shall prove the following theorems

Theorem 1: A function which is continuous in \( L \) possesses the property A in \( L \) and in all its convex polyhedral sub sets if and only if \( f(X) \) is QV.

Proof of the theorem 1

The property A is 'A minimum is taken on at a vertex of \( L \). I shall first prove the sufficient part: Suppose \( f(X) \) is QV. Let \( X_1, X_2, \ldots, X_n \) are the vertices of \( L \).

Then \( \sum_{i=1}^{n} P_i X_i, \sum_{i=1}^{n} P_i = 1, 0 \leq P_i \leq 1 \) \( \in L \).

Now \( \sum_{i=2}^{n} p_i X_i = Y \) (say) is a convex combination of \( X_{2}, X_{3}, \ldots, X_{n} \) \( \in L \).

\( \forall Y \in L, \) and \( X = (p_1 X_1 + CY) \in L \).

By the definition of QV we get,

\( f(X) \geq \) Min \( f(X_1), f(Y) \)

now we can repeat the same logic to \( Y \) and get

\( f(X) \geq \) Min \( f(X_1), f(X_2), \ldots, f(X_n) \)

one of \( X_1, X_2, \ldots, X_n \) must give the minimum. Hence the result.

Necessity: Suppose minimum is taken on at a vertex of \( L \) or at a vertex of the convex polyhedral sub set of \( L \). I shall prove \( f(X) \) is QV.

Let \( X_1, X_2 \in L, X_1 \neq X_2 \).

Since the set \( S = \{X | X = \lambda X_1 + (1 - \lambda) X_2 \} (0 \leq \lambda \leq 1) \) is a polyhedral sub set of \( L \), \( f(X) \) should take its minimum over \( S \) at \( X_1 \) or \( X_2 \). \( \forall X \in S \) \( f(X) \geq \) Min \( f(X_1), f(X_2) \).

This is true for any \( X_1, X_2 \in L \).

Hence the result.

Lemma 1: The function \( f(X) = \text{constant} \) \( \forall X \in L \) is EQM.
This is obvious as we cannot get two different points $X_1, X_2 \in L$ such that $f(X_1) \neq f(X_2)$.

**Theorem 2:** A function $f(X)$ which is continuous in $L$ possesses the property (B) in the set $L$ and in all its convex polyhedral sub sets if and only if $f(X)$ is EQX in $L$.

**Proof:** Sufficiency

Suppose $f(X)$ is EQX in $L$.

Let $X_1$ be a local minimum.

Suppose $\not \exists X_2 \in L$ such that $f(X_1) \geq f(X_2)$ then this gives a contradiction to our initial assumption that $X_1$ is a local minimum. I shall show such an $X_2$ can not exists.

Let $X_n = \lambda_n X_2 + (1- \lambda_n) X_1 \in L$, $0 < \lambda_n \leq 1$.

By the definition of EQX it follows.

$f(X_n) < \max \{ f(X_1), f(X_2) \}$

i.e. $f(X_n) < f(X_1)$ $\forall n$.

Now take a sequence $\lambda_n$ such that $\lambda_n \rightarrow 0$ with large $n$, [Eg: $\lambda_n = \frac{1}{n}$, this sequence is convergent]. Then $X_n \in N (E, X_1)$ and $f(X_n) < f(X_1)$. i.e. $\not \exists$ points very close to $X$ for which $f(X_1) > f(X_n)$. This contradicts the assumption $X_1$ is a local minimum.

$\phi \not \exists X_2 \neq X_1 \text{ S.t } f(X_1) > f(X_2)$.

$\therefore X_1$ gives the Global minimum.

Hence the result.

**Necessity:** We want to prove: Suppose the property (B) holds then $f(X)$ is EQX.

To this effect I shall prove the negation of the result, i.e. If $f(X)$ is not EQX then (B) does not hold. Then by simple logic the result follows.

Suppose $f(X)$ is not EQX.

Then by lemma 1 $f(X)$ is not a constant function. Also since $f(X)$ is not EQX. $\not \exists X_1, X_2 \in L$ such that $f(X_1) = f(X_2)$. $X_0 = \lambda X_1 + (1- \lambda) X_2$, $0 \leq \lambda \leq 1$, $X_0 \in L$ and $f(X_0) \geq \max \{ f(X_1), f(X_2) \}$. (say) (we shall take with out loss of generality $f(X_1) > f(X_2)$)

**Case 1:**

If $X_1$ is a local minimum in $\{X_T X_0\}$, then it is a local minimum in $\{X_1, X_2\}$ because

$N(E, X_1) \cap \{X_2\} = N(E, X_1) \cap \{X_1, X_2\}$

But $f(X_1) > f(X_2)$ $\therefore X_1'$ is not a global minimum in $\{X_T X_2\}$ $\therefore$ Property B does not hold.
Case 2:

$X_T$ is not the local minimum in $f(X_1, X_2).$ we have $f(X) > f(X_T).$

By continuity of $f(X)$ there is a point $X_3 \in f(X_T, X_0).$ Such that $f(X_3) < f(X_T) < f(X_1) < f(X_0).$ Now consider the set,

$$E_X \{ X_3 \leq X < X_0 \text{ and } f(X) = f(X_3) \}$$

This is a closed set, so it has a greatest member $X = X_4,$ such that $f(X_4) = f(X_3).$

i.e. $X_4$ is the most closest point to $X_3$ such that $f(X_3) = f(X_4).$ now consider $f(X_4) = f(X_3).$

$$f(X_3) < f(X_0) = f(X_4) < f(X_T) \leq f(X_0)$$

$X_4$ is the nearest point to $X_0$ so.

$$f(X_3) = f(X_4). \text{ } X_4 \text{ is a local minimum in } f(X_1, X_0).$$

$X_4$ is not the local minimum in $f(X_4, X_3).$

$X_4$ is not the global minimum in $f(X_4, X_3).$

Property (B) does not hold.

Thus I have proved not EQX $\Rightarrow$ not (B)

$\Rightarrow$ (B) $\Rightarrow$ the function is EQX.

Hence the result.

From these theorems it follows,

Let $f(X)$ be a continuous function in $L,$ $f(X)$ possesses properties A and B in $L$ and in all its convex poly-hedral subsets and the problem $\text{Min } \{ f(X), X \in L \}$ is therefore solved by simplex procedure if and only if $f(X)$ is both QV and EQX in $L.$

For a Maximum problem it should be QX and EQV. Thus we have got a necessary and sufficient condition for attainment of a global minimum by adjacent vertex methods are in hand for any such function which has the property $\text{Min } [f(X_1), f(X_2)] \leq f(X_0) \leq \text{Max } f(X_T),

f(X_2) \forall X_T, X_2 \in L, X_0 \in (X_1, X_0)$ and for the right hand side inequality we need $f(X_T) \neq f(X_2)$.

The asymmetry in the above condition can be removed by additional restriction. For example, if the function $f(X)$ is infinitely differentiable, the condition reduces to,

$$\text{Min. } [f(X_T), f(X_2)] \leq f(X_0) \leq \text{Max } f(X_1), \text{ } f(X_2), \forall X_T, X_2 \in L, X_0 \in (X_1, X_T).$$

i.e. the function $f(X)$ must be a Quasi monotonic function.

If we assume the differentiability of the function $f(X)$ the definition of Q.M. function can be given as follows:

**Def. 7.** A differentiable function $f(X)$ is called Quasi monotone in the set $L,$

$$f(X_T) \geq f(X_2) = (X_1 - X_2)^Tf(X_0) \geq 0, \forall X_T, X_2 \in L, X_0 \in (X_T, X_2).$$

We can prove the Equivalence of this definition [7] and old definition [5]

To prove: Old definition $\Rightarrow$ new definition.

**Proof:** Take $X_T, X_2 \in L, X_0 \in (X_T, X_2)$ is given by

$$X_0 = \lambda X_T + (1 - \lambda) X_2, \text{ } 0 \leq \lambda < 1.$$

Assume $f(X_T) \geq f(X_2)$
Denote \( F(\lambda) = f(\lambda X_1 + (1-\lambda) X_2) \)

We have \( F(1) = f(X_1), F(0) = f(X_2) \).

\( \Rightarrow f(X_1) \geq f(X_2) \) we get \( F(1) \geq F(0) \)

\( \Rightarrow f(X) \) is QM and differentiable w. r. t. \( x \)

\( F(\lambda) \) is monotonic increasing and differentiable

For: We have to prove for

\( \lambda \leq \lambda, F(\lambda) \leq F(\lambda) \).

Let \( \lambda X_1 + (1-\lambda) X_2 = Z_1 \), \( 0 \leq \lambda \leq 1 \)

\( \lambda X_1 + (1-\lambda) X_2 = Z_2 \).

\( \Rightarrow \lambda \leq \lambda, Z_2 \) is more close to \( X_1 \) than \( Z_1 \)

\( X_1 \to Z_2 \) changes

\( Z_1 \to (X_1, Z_2) \) by old definition of QM we have

\[ \text{Min } \{ f(X_1), f(X_2) \} \leq f(Z_1) \leq \text{Max } \{ f(X_1), f(X_2) \} \]

\[ = f(X_1) \] (\( \Rightarrow f(X_1) > f(X_2) \))

Now since \( Z_2 \subseteq (X_1, Z_2) \) we have,

\[ \text{Min } f(X_1), f(Z_2) \leq f(Z_2) \leq \text{Max } f(X_1), f(Z_2) \]

i. e. \( f(Z_1) \leq f(Z_2) \):

i. \( \lambda \leq \lambda, \Rightarrow F(\lambda) \leq F(\lambda) \):

\( F(\lambda) \) is monotonic increasing

\( \Rightarrow F'(\lambda) \geq 0 \)

i. e. \( (X_1 - X_2)^T f(x_0) \geq 0 \).

i. \( f(X_1) \geq f(X_2) \Rightarrow (X_1 - X_2)^T f(x_0) \geq 0 \).

Hence definition \( [5] \Rightarrow \) definition \( [7] \). Similarly we can prove the other way also.

3. The Simplex Criterion

When properties A and B are applicable, the whole vector-change procedure of the well-known simplex method remains unaltered except for the criterion of optimality and the selection of a vector entering the basis.

For a differentiable function we can offer a simple criterion.

Let \( \lambda X_r \) be a basic feasible solution and \( A_r \) the matrix of the corresponding simplex tableau

Define, \( t = f(x(X_r)^\lambda - A_r f(x_B \lambda X_r) \) \( [31] \)

Note: For \( f(X) \) linear we have \( f(x(X_r)^\lambda = C \)

\( A_r^T = B \cdot d \) and, \( f(x_B \lambda X_r)^\lambda = C_B \)

where \( C \) the cost vector, \( C_B \) the cost vector associated with the vectors in the basis and \( a_i \) the coefficient vector of \( X_i \).

\[
\begin{bmatrix}
  t_1 \\
  t_2 \\
  \vdots \\
  t_n
\end{bmatrix}
\]

\[
\begin{bmatrix}
  C_1 - Z_1 \\
  C_2 - Z_2 \\
  \vdots \\
  C_n - C_n
\end{bmatrix}
\]

It is interesting to note that \( t \) plays the same role as the \( (Z_j - C_j) \) in our simplex procedure applicable to linear programming problem.

Finally I shall prove the following theorem.
Theorem: If the $i$th component of $\mathbf{t}$ is negative then if non-degeneracy is assumed bringing the $i$th vector into the basis diminishes the value of the function. Now choosing $X_i = \hat{X}_s$, $x_0 = \hat{X}_r$, the equation $(3.1)$ gives,

$$f(\hat{X}_s) \geq f(\hat{X}_r) \Rightarrow (\hat{X}_s - \hat{X}_r)^T f_x(\hat{X}_r) \geq 0$$

Proof: Let $\hat{X}_s$ be an adjacent vertex to $\hat{X}_r$ then, $\hat{X}_s = X_r + \alpha a_i$ for some $i$.

where $e_i$ is the $i$th unit vector. $a_{ir} \neq 0$.

is an $n$-vector drawn from the $i$th column of $A_r$ and supplemented by zeros in the place corresponding to non-basic variables and $g$ is the greatest positive number for which $\hat{X}_s$ remains non-negative. Hence the result.

Note: $R$ is similar to the $(Z_i - C_i)$ in our L.P. Problem.

---

"Mathematicians do not deal in objects, but in relations between objects; thus they are free to replace some objects by others so long as the relations remain unchanged. Content to them is irrelevant; they are interested in from only."

— Poincaré
Corrections on the article

How Far Does the Powers of...........

Page 26 2nd Column, Last line reads as \[ X / X \in \mathbb{R} \quad C X \geq \alpha, \quad C \neq 0, \quad \alpha \in \mathbb{R} \]

Through out this article read \(\lambda\) as lambda.

Page 27 2nd column 15th line reads as

\[ f[\lambda X + (1-\lambda)X^*] \leq \lambda f(X) + (1-\lambda) f(X^*) \]

2nd column 28th line reads as

\[ X_1, X_2, \in L, \quad X_0 = [\lambda X_1 + (1-\lambda) X_2] \in L \]

2nd column 29th line reads as

\[ 0 \leq \lambda \leq 1, \quad f(X_0) \geq \text{Min} [f(X_1), f(X_2)] \]

2nd column 31st line reads as

in L if \(\forall X_1, X_2 \in L, X_0 = \lambda X_1 + (1-\lambda)X_2 \)

Page 28 1st column 15th line read as

\[ X_0 \in L, \quad f(X_0) \leq \text{Max.} [f(X_1), f(X_2)] \]

1st column 22nd line reads as

\[ f(X_1) \neq f(X_2), \quad f(X_0) < \text{Max.} [f(X_1), f(X_2)] \]

2nd column 7th line reads as

\[ X = \sum_{i=1}^{n} P_i X_i, \quad (\sum_{i=1}^{n} P_i = 1, \quad 0 \leq P_i \leq 1) \in L. \]

Page 29 1st column. 24th line read as

Then \(X_n \in N(\xi, X_1)\) and \(f(X_n) < f(X_1)\)

2nd column last line reads as does not hold.

Page 30 1st column 3rd line reads as \(f(X_1) > f(X_2)\)

1st column 16th line reads as

\(\psi X_4\) is the nearest point to \(X_0\) s.t.

1st column. 24th line reads as

\(\psi\) Property (B) does not hold.

Page 31 1st column 9th line reads as

Now since \(Z_2 \in (X_1, Z_1)\) we have

1st column 25th line read as

\[ F^1(\lambda) \geq 0 \]

2nd column 15th line reads as

\[ A^T \mathbf{r} = B^{-1} a_i \quad \text{and} \quad f(\mathbf{X}_r) = C \]

Page 32 2nd column 22nd line reads as

\[ C_n Z_n \]

Page 32 1st Column, 8th line reads as

\[ \mathbf{X}_r \]

then, \(\hat{X}_s = X_r \delta a_{ij} + \delta e_i \)

1st column 10th line reads as

where \(e_i\) is the \(i\)th unit vector. \(a_{ij} (\neq e_i)\) is an...

2nd column 3rd line reads as

\((3.1)\) gives, \(f(\hat{X}_s) \geq (\hat{X}_r) \Rightarrow (\hat{X}_s - \hat{X}_r), \quad f(\hat{X}_r) \geq 0\)
Atomic Power
what it is and how it can be used

By
S. Thiruloganathan
3rd Year

Introduction:

In 1945, atomic power meant just one thing to most people in the world—a bomb that had destroyed in a flash the Japanese city of Hiroshima and 71,379 of its people.

To-day, fear of the atomic bomb is over shadowed by the even greater menace of the hydrogen bomb. But these is also a much brighter side to the picture, because the first atomic power stations are coming into use for the benefit, rather than the destruction, of mankind.

A source of Energy:

This is tremendously important, because we are using up our supplies of existing fuels at a high rate. In the U.S.A. alone, half the coal ever consumed has been burned since 1920, and half the oil ever consumed has been burned since 1940. In Britain, consumption of Electricity will increase to four times its present level by 1980, which would mean digging an extra 60 million tons of coal each year, just to keep pace with demands for electricity. Another source of energy must be tapped, and the answer lies in the atom, because a 1½ in. cube of uranium weighing just one pound, can yield as much energy as 1,200 tons of coal.

92 Basic Elements:

How does this energy come to be locked up in the atom? And how can we make use of it for peaceful purposes? Before we can answer these questions, we must know a little of what atoms are and what they are made of. If you look around you at this moment, you will see hundreds of different materials and substances yet all these are made up of 92 different basic substances, what are called Elements. These elements can be joined together in different ways to produce different mixtures, called chemical compounds.

The smallest possible unit of any element is called an atom of that element, & these atoms are too small that they cannot be seen even under the most powerful microscope.

The Component Particles:

Until the start of this century, it was believed that atoms were solid. Then Rutherford showed that they were made up of even smaller particles which themselves occupy only a part of the atom, the rest being empty space. The particles are now known as electrons, protons and neutrons and the only way of describing the size is by comparison. In an atom of hydrogen which, is the sim-
ples of all, a single electron circles round a single proton like a planet round the sun. The rest is space and although it is difficult to believe, everything in the world, including you, contains far more empty space than solid matter, because the tiny atoms of which it is built up consist largely of space.

The part played by Electricity:

The first thing that becomes apparent is that electricity plays a vital part in the structure of everything round us, because an electron has a small charge of negative electricity, where as a proton has a small charge of positive electricity. The two charges are equal, so that they balance each other out, otherwise atoms would repel each other and tend to blow everything apart.

To make them electrically neutral, all atoms must contain an equal number of electrons and protons. In all atoms the protons and neutrons are clustered together as a core, or “nucleus,” round which the Electrons circle.

Composition of Each Element:

Because everything is made up of electrons, protons and, usually, neutrons, one element is different from other because their atoms contain different numbers of each particle. As we have already seen there are 92 basic elements in nature. There are also eight more which do not exist naturally but have been produced in Laboratories.

Each Element has an “atomic number”, which corresponds to the number of protons in its nucleus. Thus, hydrogen has an atomic number 1. Towards the other end, uranium is element No. 92, because its nucleus contains 92 protons. Although the number of protons and electrons in an atom of only one element always remains constant, this is not true of neutrons. Ordinary hydrogen, has a nucleus consisting of just one proton; but there is another kind of hydrogen atom called “heavy” hydrogen which has a neutron, as well as a proton in its nucleus.

Isotopes:

These different forms of the same basic element are called “isotopes”, and one of the most important is an isotope of uranium.

The most common form of uranium is known as U-238, because its nucleus contains 92 protons & 146 neutrons, making a total of 238 particles. But there is an isotope of uranium with only 143 neutrons, and this U-235 is one of the raw materials of the atomic bomb and for peaceful uses of atomic energy.

Radio activity:

A feature of uranium and certain other elements like radium is that they are what we call radio active. This means that they give off an invisible radiation. For instance, the paints used to mark the luminous dial watches have radium in them. And, of course, radium rays are used in hospitals to save life. But if absorbed by the body in excessive amounts, they can quickly destroy its tissues.

Radioactivity was the key to atomic science, because it first enabled scientists to change one atom into another. Lord Rutherford was the first to do this over 36 years ago, when he “bombarded” atoms of nitrogen with rays from a radioactive substance. Nitrogen atoms,
when struck by the rays, were converted into oxygen atoms. The work was carried a stage further in 1932 by Cockcroft and Walton, again in Great Britain.

German Experiments:

Six years later, two German scientists named Hahn and Strassmann began a series of experiments which had far-reaching results. Their purpose in shooting neutrons at atoms of uranium was to try to make some of them “stick” in the nucleus of the uranium atoms and so change them into a different element.

They knew that each uranium atom had 238 protons and neutrons in its nucleus. If one more were added, they should have produced an element with 239 particles in its nucleus. Instead, they kept on producing the element barium, with only 137 nuclear particles.

A famous women scientist named Dr. Lise Meitner, who was an expert in atomic Science & Mathematics, was told about these rather surprising results. After many hours of complicated work, she decided that another kind of atom was being created at the same time as the barium and that there should also be an enormous amount of energy released. In due course, this proved to be true, and the released energy — millions of times more powerful than any other form of energy then available — became the deadly destructive force of the atomic bombs built during the war in America.

Nuclear Fission:

It was at first thought that only the isotope U—235 released atomic energy by splitting or “nuclear fission” as it is more correctly known. Scientists were able to prove that the neutron “bullet” enters the nucleus of a U—235 atom which, having as a result 236 instead of 235 particles, begins to vibrate and distort, eventually splitting into two parts. These two “fragment” nuclei fly apart, taking with them some of the Electrons from the original uranium atom, and so forming new atoms. This explains why Dr. Hahn produced barium atoms, which are only one of many different fission products.

At the same time, immense amounts of energy are released, because the particles in the new nuclei are packed more closely together than in the original nucleus. As they fall in closer together, they release energy, just as a stone does if it falls to the ground from the top of a tower.

No less important, that neutrons peel off the two nuclei as they fly apart. Any one of these neutrons can lodge in the nucleus of another U—235 atom, causing a repetition of the whole process, buildings up what is called a “chain reaction.” It has often been feared by atomic scientists that such a chain reaction might prove so successful that it could get out of hand, spreading in a fraction of a second from atom to atom until it built up into an explosion so terrible that it would destroy all life over a vast area. Fortunately, many of the secondary neutrons miss their targets and the chain is eventually broken; but scientists have been able to produce controlled chain reactions in the laboratory with great success.

Problems with Uranium ore:

At first, they were dismayed to discover that, apparently, only U—235 would undergo “fission”, because when uranium
ore is mined there is only 1 lb. of this isotope for every 140 lb. of U-238, and atoms of U-234 are also present. The three are not easy to separate. The method finally chosen for the atomic bomb factory at Oak Ridge, Tennessee, was to give all the atoms an electric charge and then draw them into the field of a powerful electromagnet. They followed curving orbits but, because the three isotopes each had a slightly different mass, they had a slightly different path in the magnetic field and could be drawn into separate collectors. It was rather a slow business but it worked.

Later it was found that U-238 itself could be “split” with fast neutrons; but its real value is as the source of a new atomic “fuel” scientists found that when neutrons were shot into it in the normal way, they did not cause fission; but the addition of one neutron to its nucleus turned the U-238 atoms into a new element (No. 93), which was given the name of Neptunium. This proved to be an unstable radioactive element, which gave off beta rays and turned itself into another new element No. 94, Plutonium—which has the same fissionable characteristics as U-235.

The Atomic Bumb:

It was known from the start that there was a definite minimum size for the piece of U-235 or Plutonium that would cause an atomic bomb explosion. So, by dividing a little more than this amount of the element into two parts and keeping them separate inside the bomb, the scientists knew they could make it safe until the time came to drop it. Over the target, one of the two pieces was simply shot into the other in a kind of atomic gun to form a mass greater than the “critical” size, and the whole thing exploded with fantastic force, producing intense heat and radio active rays capable of destroying the cells of human body.

Atom-splitting machines:

But we are more concerned with the peaceful uses of atomic energy than with bombs. Vitally important discoveries are being made almost every year by the use of the giant new betatron and synchrotron atom splitting machines, which have supplemented the Pre-war Van de Graaff accelerator and cyclotron. None is likely to have greater consequences than the confirmation in oct, 1955, of the existense of a new particle, the negative proton, which can be produced at present only in the great bevatron machine at the University of California.

The existence of positive electron (positron), had been discovered in Cosmic radiation in 1932, and it was found that when positrons and electrons came together they disappeared, leaving a flash of penetrating radiation like X-rays.

Little is known yet about negative protons, but scientists believe that if they could be produced in large numbers and brought into contact with ordinary protons, they would annihilate each other, producing immense amounts of heat or radiation. Furthermore, they see no reason why it should not be possible to create a new “reversed” form of matter, in which positive electrons rotate round a nucleus of negative protons and neutrons. They have no idea what the result would be; but it
would be as stable as any ordinary atom until the two came to contact, when they annihilate each other with a thousand times the efficiency of ordinary nuclear fission in uranium.

**Atomic Pile:**

At the moment, this is speculation, meanwhile, the main tool of “atoms for peace” is the nuclear reactor or atomic pile. This is essentially a simple piece of apparatus, in which rods of uranium are inserted into holes in a huge block of graphite which slows down the flying neutron particles, making the whole thing a sort of controlled atomic bomb. The speed of the reaction can be regulated by inserting rods of boron or cadmium, which absorb the neutrons before they can cause fission in the U-235.

In this type of pile, uranium can be turned into plutonium, a process that is accompanied by a great deal of heat and the emission of radiation. Both of these by-products are likely to be of immense value in the years ahead.

**Radio-isotopes:**

Scientists are able to expose quantities of elements such as carbon, iodine and cobalt to the radiation inside a pile, so that they become what are called radio-isotopes. These are already being used widely in medicine, agriculture & industry. They can be used to attack disease directly by radiation, similar to X-ray & radium rays or they can be used as “tracers” to locate disease, because their position as they circulate round the body can be detected by devices called Geiger Counters, which measure radioactivity.

Danish scientists have mixed radioactive isotopes of mercury with fungicide sprayed on plants to find out how much of the spray remained on the leaves. Radioactive isotopes are also being used to measure the level of molten metal in factory crucibles, to prevent heavy presses working when the operators’ hands are in the way, to detect flaws in castings and wear in tyres, to measure the thickness of paper, the wear in an engine, to ensure safer drugs and better preservation of food.

**Heat - a By-product:**

The by-product-heat-can be used to drive turbines, and it might be used one day in rocket-motors. Already the first atomic powered submarines are at sea, and atomic aircraft are being built. The first city has been lit by nuclear power and many more atomic power stations are being built throughout the world, particularly in Britain.

**Conclusion:**

These are only a few of the ways in which the atom can be used in the service of mankind. The atom is no longer a weapon for the ultimate destruction of man, but a bright promise to the world of longer life, greater prosperity and lasting peace.
"எண்ணல்" என்று computer
சொல்லும் துணைப்பகுதிகளின் கிளையில் 
தமிழ் கல்வி நூற்றாண்டுகள் சமநிலை 
தொடர்பின் இணையப்பிள்ளை என்று. இணை 
தொடர்பின் நிலை கண்டுபிடித்தது.
தமிழ் நூற்றாண்டுகள் துணைப்பகுதிகளின் 
தொடர்பின் இணையப்பிள்ளை என்று

விளக்கம் மையம் தொடர்பின் பரஸ்பர
செயல்பாடுகளை விளக்கும். தமிழ்
சொல்லும் துணைப்பகுதிகளின் 
மையம் தொடர்பின் பரஸ்பர
செயல்பாடுகளை விளக்கும்.

ஹொங்கோ டொராண் கல்வி. இணையபத்
தொடர்பின் கொந்தவை தமிழ் வாழ்க்கை
தொடர்பின் கொந்தவை தமிழ் 
தொடர்பின் கொந்தவை தமிழ்

COBOL, FORTRAN என்று 
தமிழ் தொடர்பின் பரஸ்பர
செயல்பாடுகளை விளக்கும்.

COBOL என்றும் Common Business 
Oriented Language என்றும்

FORMULA TRANSLATION என்று

தமிழ் பொருள் பொருள்

ஆகியவை என்றும்

FORTRAN என்றும்

முன்னோடிய வலிமையான 

FORTRAN என்று முன்னோடிய

வலிமையான வலிமையான 

FORTRAN என்று முன்னோடிய

வலிமையான வலிமையான 

FORTRAN என்று முன்னோடிய

வலிமையான வலிமையான
FORTRAN என்று பொருள் சொன்னதுள்ளது. அவ்வற்றும் ஒரு முறையாகத் தங்குகின்றது. இங்கு புதியத் தகுதியின் தம் குறிப்பிட்டுக்கொள்ளப்பட்டது. அது இதுவே செய்ய வேண்டியதால், புதிய வாரியின் விளக்கத்தை முதல் முடிய்திருக்கவேண்டுமென ஆரஞ்சிப்பெருக்க வேண்டியதால், FORTRAN என்று எழுதுவது செய்யப்பட்டது. அது புதிய தகுதியின் விளக்கம் பெருந்தேசியின் விளக்கம் மூலம் தீர்மானிக்கப்பட்டது. இது செய்யப்பட்டது விளக்கத்தின் தயாரிப்புக்கான விளக்கத்தை தெரியும் விளக்கத்தை மூலம் பிரிந்து வைத்து வேண்டும். இது செய்யப்பட்டது விளக்கத்தின் தயாரிப்புக்கான விளக்கத்தை தெரியும் விளக்கத்தை மூலம் பிரிந்து வைத்து வேண்டும். FORTRAN என்று எழுதப்பட்டது. இது செய்யப்பட்டது விளக்கத்தின் தயாரிப்புக்கான விளக்கத்தை தெரியும் விளக்கத்தை மூலம் பிரிந்து வைத்து வேண்டும்.
(FLOSTING POINT NUMBER) சமானமும் எண்வாய்ப்பும் புகழ்வும் 5 கண்டு பாடல்தமிழ், எண்வாய்ப்பும் புகழ்வுமான. 12 2.4 6742 சமானமும் எண்வாய்ப்பும் (variable) சமானமும் எண்வாய்ப்புமான கண்டு பாடல்களைப் புரிந்து கொள்ள வேண்டும். கண்டு பாடல்களை எண்வாய்ப்பு சமானமும் எண்வாய்ப்புமான கண்டு பாடல்களைப் புரிந்து கொள்ள வேண்டும்.

GO TO மாற்றம்

10 வரை விளக்கம் முடியாத மாற்றம்

DO மாற்றம்

10 வரை விளக்கம் முடியாத மாற்றம்

PAUSE மாற்றம்

(ASIGNMENT STATEMENT)

என்ன எண்வாய்ப்பு எண்வாய்ப்பு

என்ன எண்வாய்ப்பு எண்வாய்ப்பு

என்ன எண்வாய்ப்பு எண்வாய்ப்பு

என்ன எண்வாய்ப்பு எண்வாய்ப்பு
புதிய புதிய பிற்புறம் வெப்பாண்டு வேறு தொடரும் START

Standard deviation (மினைத்தொடர்) = \frac{\sum(X^3) - 3\bar{X}\sum(X^2) + 2(\bar{X})^3}{(\sum(X^2))^3}

COEFFICIENT OF SKEWNESS (கையால் கோச்சைன்) =

SUMX = SUMX + X*PX

SUMX2 = SUMX2 + (X*2)*PX

SUMX3 = SUMX3 + (X*3)*PX

\bar{X} = \text{MEAN (சராசரி)} = \sum XP(X)

\text{VARIANCE (சராசரியில்லை)} = \sum X^2 P(X) - \bar{X}^2

END என்றும்
A PROGRAM TO CALCULATE THE MEAN, VARIANCE, STANDARD DEVIATION, AND COEFFICIENT OF SKEWNESS FOR A DISCRETE PROBABILITY DISTRIBUTION.

1 FORMAT (F 4.0, F 4.4)
7 SUMX = 0.0
SUMX2 = 0.0
SUMX3 = 0.0
5 READ 1, X, PX
IF (PX - 0.9999) 2, 3, 2
2 SUMX = SUMX + X * PX
  SUMX2 = SUMX2 + (X**2) * PX
  SUMX3 = SUMX3 + (X**3) * PX

C
GO TO 5
3 XMEAN=SUMX
VARX=SUMX2-XMEAN**2
STDEVX=SQRTF(VARX)
SK 1=SUMX3
SK 2=(XMEAN*SUMX2)
SKX=(SK 1-3.0*SK 2+2.0*SK 3)/STDEV**3
PRINT 6, XMEAN, VARX, STDEVX, SKX
6 FORMAT (3F11.4, F9.4)
STOP
END

\[ \bar{X} = \frac{\sum x}{n}, \bar{Y} = \frac{\sum y}{n} \]
\[ \sum xy = \sum XY - N \cdot \bar{X} \cdot \bar{Y} \]
\[ \sum x^2 = \sum X^2 - n(\bar{X})^2 \]
\[ b = \frac{\sum xy}{\sum x^2} \]
\[ a = \bar{Y} - b \cdot \bar{X} \]
\[ \sum y^2 = \sum Y^2 - n(\bar{Y})^2 \]
\[ \sum e^2 = \sum y^2 - b \sum xy \]
\[ \Delta e = \frac{\sum e^2}{n-2} \]
\[ r = \frac{\sum xy}{\sqrt{\sum x^2} \cdot \sqrt{\sum y^2}} \]
\[ t = r \cdot \sqrt{n-2} / \sqrt{1-r^2} \]

The equation above is the formula for calculating the t-statistic for a test of significance of the relationship between two variables. This formula helps determine whether the observed relationship is statistically significant.
A PROGRAM TO CALCULATE THE COEFFICIENTS OF A SIMPLE LINEAR REGRESSION STANDARD ERROR OF ESTIMATE, COEFFICIENT OF CORRELATION, COEFFICIENT OF DETERMINATION, AND STUDENTS T FOR TEST OF SIGNIFICANCE

1 FORMAT (14)
2 FORMAT (2F6.2)
5 READ 1, N
   SUMX=0.0
   SUMY=0.0
   SUMXY=0.0
   SUMX2=0.0
   SUMY2=0.0
   EN=N
   DO 3, 1=1, N
     READ 2, X, Y
     SUMX=SUMX+X
     SUMY=SUMY+Y
     SUMXY=SUMXY+X*Y
     SUMX2=SUMX2+X*X
   3 SUMY2=SUMY2+Y*Y
   XMEAN=SUMX/EN
   YMEAN=SUMY/EN
   SUMXY=SUMXY-EN*XMEAN*YMEAN
   SUMSX2=SUMX2-EN*XMEAN**2
   B=SUMSXY/SUMX2
   A=YMEAN-B*XMEAN
   SUMSY2=SUMY2-EN*YMEAN**2
   SDEV=SUMSY2-B*SUMSXY
   STERES=SQRTF(SUMS2/(EN-2.0))
   RTSX2=SQRTF(SUMSX2)
   RTSY2=SQRTF(SUMSY2)
   R=SUMSXY/(RTSX2*RTSY2)
   R2=R*R
   RTDEGF=SQRTF(EN-2.0)
   RTMIN=SQRTF(1.0-R2)
   T=R*RTDEGF/RTMIN
   PRINT 6, SUMX, SUMY, SUMXY, SUMX2, SUMY2
   PRINT 4, A, B, STERES, R, R2, T
4 FORMAT (2XF10.2, 2XF10.3, 2XF10.2, 2XF6.3, 2XF6.3, 2XF10.4)
6 FORMAT (5F12.4)
GO TO 5
END
"If I can stop one heart from breaking,  
I shall not live in vain 
If I can ease one life the aching,  
Or cool one pain,  
Or help one lonely person  
Into happiness again  
I shall not live in vain"

—Emily Dickinson
1. Stationary stage in the Population Growth:

It has been established that the population growth will slowly decline until it approaches zero growth in about a century. For the above purpose the statisticians made charts for the rate of birth & death in North America, Europe, Soviet Union, East Asia, Latin America, Africa, South Asia, Oceania. They show that both rates draw near together but they do not reach the horizontal line of the zero growth by 2075. In East Asia and in U.S.S.R. the zero growth will be almost reached in 100 years from now.

2. The World Weight:

Don't you think about the amount of population that can be supported by our earth? The experts say, without a major scientific break through, the amount may be 15,000 million.

At the end of this century the details of the population will be:

<table>
<thead>
<tr>
<th>Region</th>
<th>Population (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>568</td>
</tr>
<tr>
<td>North America</td>
<td>333</td>
</tr>
<tr>
<td>Soviet Union</td>
<td>330</td>
</tr>
<tr>
<td>East Asia</td>
<td>1,424</td>
</tr>
<tr>
<td>South Asia</td>
<td>2,354</td>
</tr>
<tr>
<td>Africa</td>
<td>818</td>
</tr>
<tr>
<td>Latin America</td>
<td>652</td>
</tr>
</tbody>
</table>

The total of the world’s population will be about 6,500 million at the end of this century.

3. World Energy:

Total energy-demand of the world is growing at a rate of 5% a year. The big five energies of the world are nuclear, hydroelectric, gas, petroleum and coal.

**World Reserves (1971)**

<table>
<thead>
<tr>
<th>Energy</th>
<th>Reserve (Million Units)</th>
<th>The Year Reserves will be exhausted (short forecast)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>6,641,200</td>
<td>2083 (A.D.)</td>
</tr>
<tr>
<td>Petroleum</td>
<td>76,200</td>
<td>1992 (A.D.)</td>
</tr>
<tr>
<td>Gas</td>
<td>49,900,000</td>
<td>1594 (A.D.)</td>
</tr>
<tr>
<td>Hydroelectric</td>
<td>(It is inexhaustible)</td>
<td></td>
</tr>
<tr>
<td>Uranium</td>
<td>761,400</td>
<td>between 1980 &amp; 2000 (A.D.)</td>
</tr>
</tbody>
</table>

On an average the total world energy requirements double every 15 years.
4. Death of children by the Shortage of Proteins:

Daily a child needs 70 grams proteins. Considering South Asia; if its population is increased to 380 million in 2025, then each of them will get only 40 grams per day on an average. In the future if South Asia failed to import foods it is expected that 50 million children will die in 2025.

5. Danger of “Grow More Foods”:

One of the disturbances to the food production is living in the agriculture lands.

The details of the number of peoples who live in the agriculture lands:

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>1975</th>
<th>2000 (Expected)</th>
<th>2025 (Expected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH ASIA</td>
<td></td>
<td>450</td>
<td>750</td>
<td>1400</td>
</tr>
<tr>
<td>CHINA</td>
<td></td>
<td>790</td>
<td>975</td>
<td>1200</td>
</tr>
<tr>
<td>LATIN AMERICA</td>
<td></td>
<td>225</td>
<td>400</td>
<td>575</td>
</tr>
<tr>
<td>WEST EUROPE</td>
<td></td>
<td>325</td>
<td>400</td>
<td>475</td>
</tr>
<tr>
<td>NORTH AMERICA</td>
<td></td>
<td>110</td>
<td>150</td>
<td>200</td>
</tr>
</tbody>
</table>

6. Japan's Victory in Car Production:

Japan is expected to hold the first place in car production at the end of this century.

In 1962 Japan had 10 cars (per 1000 population) while U. S. A. & Canada had 475 & 260 cars (per 1000 population) respectively. At the end of this century Japan is expected to have 500 cars (per 1000 population) while expecting 500 & 550 (largest number) cars (per 1000 population) from U. S. A. & Canada respectively. It shows the victory of Japan in car production.

Car density (per 1000 population) in 1975:
- U. S. A.: 456
- Canada: 369
- France: 294
- Japan: 174
- Sri Lanka: 8

At the end of this century the world is expected to have 80 cars (per 1000 population) on an average.

(From Unesco Publications)
ஹார் அரப்புமையா

(அட்செய்யச் - கமைக்கானும்)

விருத்தம் சொந்தமாக, வார்த்திகளை விளக்கும் கோணத் வடிவத்தால், காணையில் நீர்ந்த புகழ்பூண்டு கொன்றது. வார்த்திகளை அடுத்து வந்தது பேர் - திரிகாரல் தம்முள்ள மொழியின் காரணத்தை குறிப்து நமது பொழுது நெசால் குறைந்து வல்லது. சுட்டுகள் பெரும்பாலும் பொம்மல் பொழுது எழுதியதுக்கும், தான் சொன்னது. சுழற்சி வேண்டும் நாளை வார்த்திகளை வேண்டும் நேரத்தில் செய்யும், அதன் விளக்கத்தை செய்ய வார்த்திகளை வேண்டும் நாளை வார்த்திகளை வேண்டும் நேரத்தில் செய்யும்.

வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு முற்புக்கு மற்றும் வரவு
ஏடுத்து முடிய - முடித்து அதுத் தடா
கூட்டா... அக்கத்து முடித்தடா
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.

ஆதம் புரட்சியா - 'தாவை தாம்தாவை
கீழ் கீழ் வெரியா வேளை வேளை முட்டி முட்டி, ணாய் கண்டடண தாவை
நேர்த்து நேர்த்து வண்ணம் வன்றா காணா
குருடாயின் சிறு சிறு கற்கார.

அந்தையே புரட்சியா பை பை மாட்டா செய்துசெய்து
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.

மாணவர் பை பை மாட்டா செய்து
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.

முன்னாள் என்று கூறினாள், மன்னன்
என்று கூறினாள், மாணவர் என்று கூறினாள்,
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.

முன்னாள் என்று கூறினாள், மன்னன்
என்று கூறினாள், மாணவர் என்று கூறினாள்,
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.

முன்னாள் என்று கூறினாள், மன்னன்
என்று கூறினாள், மாணவர் என்று கூறினாள்,
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.

முன்னாள் என்று கூறினாள், மன்னன்
என்று கூறினாள், மாணவர் என்று கூறினாள்,
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.

முன்னாள் என்று கூறினாள், மன்னன்
என்று கூறினாள், மாணவர் என்று கூறினாள்,
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.

முன்னாள் என்று கூறினாள், மன்னன்
என்று கூறினாள், மாணவர் என்று கூறினாள்,
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.

முன்னாள் என்று கூறினாள், மன்னன்
என்று கூறினாள், மாணவர் என்று கூறினாள்,
நன்மையில் என்று கருதினாள் ராஜோ குறிப்பிட்டான்.
பொறியியில் தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.

காட்சிகளை தீர்மானம் செய்யக்கூட்டு மற்றும் அனைத்து செயற்பாடுகள் காட்சிப்படுத்தப்பட்டுள்ளன.
ஒன்று, எனது கட்டுரையை போற்றும் படி ஒரு விளக்கம் பதிவேற்றலாம். பொருள் நூற்றுக்கு விளக்க வரையறையை மூட்டு விளக்கங்கள் தேர்ந்தெங்கிற பகுதிகள் என்று அதிகாரப்படுத்தம் குறிப்பிட்டு வந்தீர். மேலும் பெரும்பாலும் இவ்விளக்கம் பதிவேற்றலாம். விளக்கத்திற்கான பிரிவுகள் என்பவை என்று அறிவிக்கப்பட்டுள்ளது. குறிப்பிட்டுக்கொள்ளவும் விளக்கத்திற்கும் பதிவுகளும் வேறுப்படுத்தப்பட வந்திருக்கும் பதிவுகளும் வேறு பாதையிலும் பதிக்கப்படும் விளக்கங்கள் என்று வகைப்படுத்தப்பட்டுள்ளது.
உங்கள் வாழ்வில்... சந்திரம் முடியும் போது அன்னால் பிற்காலம் வரும் விதமானது ஒன்ற்களின் விளக்கத்தின் தொடுக்கை மறுப்படுத்தப்பட்டுள்ளது.

"வாழ்வு" என்று, "மகால்

முன்னாளின் நடுநிலையை ஒரு கால் (செவ்வை காட்டும் பொழுது)... இவ்வுறை ஒளியானது காரணமாக இது முடியும் லேக்டையில் மாட்டும் வயல் நோயை "sorry" அவர்கள் கூறுகின்றன தாதையல் கூடையின் தக்கானது... விளக்கம் பெற்று.

ராஜா அவள் என்று குறிப்பிடுவதற்கு முன்னர் கூறி வரும் வாழ்வு. எனவே அவள் தம்பதியுடன் ஒரு காலம் விளக்கத்தின் தொடுக்கை மறுப்படுத்தப்பட்டுள்ளது.

முன்னாளின் வாழ்வு குறித்து பல்வேறு வகையில் விளக்கம் அளிக்கின்றன இவர்கள். அது குறிப்பிட்டு முடியும் காலமாக இது முடியும் வயல் நோயை "sorry" அவர்கள் கூறுகின்றன
t

சிலவர்கள் தம்பதியுடன் ஒரு காலம் விளக்கத்தின் தொடுக்கை மறுப்படுத்தப்பட்டுள்ளது

சிலவர்கள் தம்பதியுடன் ஒரு காலம் விளக்கத்தின் தொடுக்கை மறுப்படுத்தப்பட்டுள்ளது

சிலவர்கள் தம்பதியுடன் ஒரு காலம் விளக்கத்தின் தொடுக்கை மறுப்படுத்தப்பட்டுள்ளது

சிலவர்கள் தம்பதியுடன் ஒரு காலம் விளக்கத்தின் தொடுக்கை மறுப்படுத்தப்பட்டுள்ளது
நேரடையான ‘ஆயா’ மாதிரியானது.

அன்றைய சில்மிகின் எந்த இடையில் அந்த நினைவான மக்கள் ஒன்றுக்கொன்று எண்ணெய்த வாழ்வை இழந்து பேணிய பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறி விளக்கியுள்ளனர். விளக்கம் அந்த சில்மிகின், நாயக்கால காலம் இன்றும் எதிர்க்காலமாக இருக்கிறது.

தொன்று முடியச் சிவப்புறுத்தியுள்ளது – பிரபலாக சிறந்த ஓர் காலம் இந்த இடையில் கொண்டு விளக்கிய பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்கள் தவறாக சொல்லியிருக்கிறரே. அவர்களின்பெயர்கள் எடுத்துக்காட்டுக்காக அவர்கள் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்களின் பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்கள் தவறாக சொல்லியிருக்கிறரே. அவர்களின்பெயர்கள் எடுத்துக்காட்டுக்காக அவர்கள் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்களின் பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்கள் தவறாக சொல்லியிருக்கிறரே. அவர்களின்பெயர்கள் எடுத்துக்காட்டுக்காக அவர்கள் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்களின் பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர்.

சரியான முறையான நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்கள் தவறாக சொல்லியிருக்கிறரே. அவர்களின் பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்கள் தவறாக சொல்லியிருக்கிறரே. அவர்களின் பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்கள் தவறாக சொல்லியிருக்கிறரே. அவர்களின் பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்கள் தவறாக சொல்லியிருக்கிறரே. அவர்களின் பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்கள் தவறாக சொல்லியிருக்கிறரே. அவர்களின் பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர். அவர்கள் தவறாக சொல்லியிருக்கிறரே. அவர்களின் பின்னர் நேரடையான பலரும் மதிக்கியவர்களாகவே மாறியுள்ளனர்.


"வெளி விளையாட்டு... செல்வால்போட்டு" என மரக்கல்கு, என்பது பட்டியலை தெளிவாகக் குறிப்பிட்டுப் பட்டு வந்து: 'புக்கொனோன்'

"மைமை... இரு விளை இரு விளை என்பது கல்லைக் காணிக்கும்" என்று பாட்டை வழங்கினார் பொய் பொய் பொய் வரலாறு குறிப்பிட்டும் ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். என்னினும் நான் கேள்வியாகின் பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். கேள்வியாகின் பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். கேள்வியாகின் பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும்" என்று விளக்கினார் பொய் பொய் வரலாறு

அந்தக் "அ... அ... அண்மையுடைய... காண்டதை குறிப்பிட்டு பொய்... என்னினும் மைமை பொய் பொய் வரலாறு "A' கால்" சொல்லியது.

என்பது மைமையின் வரலாறு சாத்துக்கு குறிப்பிட்டும் - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். ஒரு பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். ஒரு பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். ஒரு பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். ஒரு பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். ஒரு பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். ஒரு பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். ஒரு பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும். ஒரு பொய் பொய் வரலாறு - ஒரு பொய் பொய் வரலாறு குறிப்பிட்டும்.
முன்னாள் வாழ பெண், அவள் பண்பிதையிலே நாகர்கை மருத்துவர் பாடல் பதிவு செய்தாரார். அவளின் வாழ்க்கை செரும் வரையிலே பாடல் - அரசியல் தலை, வாழ்க்கை தமிழக குழாய் குறிப்பிட்டு பட்டுக்கும் செய்தாரார். என்றும் குழாய் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார்.

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார். 

என்றும் பாடலுக்கும் தமிழக குழாய் பாடலுக்கும் தொடர்பும் செய்தாரார்.
தமிழ் நாட்டில் செயல் - புதுவை அமைப்பில் புதுக்கணவும் தேய்க்கூட்டை யேறியுள்ள பாதுகாக்க செய்ய வேண்டும். இது தமிழ் மொழியில் பல தொகுப்புகள் குறிப்பிட்டுள்ளது. அது செய்யலை நீங்குகையில் விளக்குகிறது. இது தமிழ் மொழியில் நாம் தொடர்கிறோம்.

நான் தந்திரசு தமிழ்நாட்டில் அமைவு செய்யலை பக்திப்பெற்று கூட்டுப்பாடுகள் - செயல் தொடர் கூறும் வரையறையை தொடர்ந்து புதுக்கணவுக்காக குறிப்பிட்டுள்ளது. அது தமிழ் மொழியில் குறிப்பிட்டுள்ளது: "தமிழ் நாட்டில் செயல் தொடர் நிகழ்வு விளக்கு".

நான் வரும்போது பக்திப்பட்ட நடவடிக்கைகளை நோக்கும் பக்திப்படுத்தியும் நோக்கும் காட்சிகளை செய்யளாம் மூட்ட வேண்டும் பக்திப்பெற்று புதுக்கணவுக்காக குறிப்பிட்டுள்ளது.

சான்று என்று ஆறியும் தமிழ் நாட்டில் செயல் செய்யும் பக்திப்படுத்தியும் நோக்கும் பக்திப்பெற்று புதுக்கணவுக்காக குறிப்பிட்டுள்ளது.

"சான்று... சாண்டு... பக்திப்பெற்று புதுக்கணவு செயல்... காண்டு... புதுக்கணவு செயல்... காண்டு... புதுக்கணவு செயல்..." நோக்காக விளக்கும்.

சான்று என்று ஆறியும் தமிழ் நாட்டில் செயல் செய்யும் பக்திப்படுத்தியும் நோக்கும் பக்திப்பெற்று புதுக்கணவுக்காக குறிப்பிட்டுள்ளது.

சான்று... சாண்டு... பக்திப்பெற்று புதுக்கணவு செயல்... காண்டு... புதுக்கணவு செயல்... காண்டு... புதுக்கணவு செயல்..." நோக்காக விளக்கும்.
பவளா திட்டம் பகுதிகளை குறிப்பிட்டு குறிப்பிட்டுதற் பாதுகாக்கும் போது, வெளியே கருதும் குறிப்பிட்டு, குறிப்பிட்டு வைக்கும் தோன்றும் பதைகளைத் தவற்றை நாக்கும்; '..... நேர்த்தான் அடுத்துவரும்?

'சோன்னா' என்று சொல்லப்.

'சந்தையா?... சோன்னா வந்த கால் மாடி வந்தது, சந்தையாவன் என்று என்னால் 'என்று என்ற வந்த கால் மாடி வந்தது...'

'என்று என்ற வந்த கால் மாடி வந்தது...'

கிளிக்கும் போது இணையில் இயல்புகளை பார்க்க வருமாறு கைதெடுப்பை வருமையை கைதெடுப்புகள் கைதெடுப்பை வருமையை கைதெடுப்புகள் கைதெடுப்புகள். காப்ப வருமையை கைதெடுப்பை வருமையை கைதெடுப்புகள் கைதெடுப்புகள் கைதெடுப்பை வருமையை கைதெடுப்புகள். இது கைதெடுப்பை வருமையை கைதெடுப்பை வருமையை கைதெடுப்புகள் கைதெடுப்புகள் கைதெடுப்புகள் கைதெடுப்புகள். கைதெடுப்பை வருமையை கைதெடுப்பை வருமையை கைதெடுப்புகள் கைதெடுப்புகள் கைதெடுப்புகள். கைதெடுப்பை வருமையை கைதெடுப்பை வருமையை கைதெடுப்புகள் கைதெடுப்புகள் கைதெடுப்புகள் கைதெடுப்புகள். கைதெடுப்பை வருமையை கைதெடுப்பை வருமையை கைதெடுப்புகள் கைதெடுப்புகள் கைதெடுப்புகள்.
கொண்டையும் அரங்கங்களும், வேறை தேக்கும் விளகன் காண்பின், தற்கொண்டவை என்று கொண்டை, தற்கொண்டவை என்று காண்பின் குறிப்பிட்டுள்ளனர். வேறையும் கொண்டையும் கூட கொண்டையும் அரங்கங்களும் கூட அரங்கங்களும் அல்லது குறிப்பிட்டுள்ள குறிப்பிட்டுள்ள தேவையை நம்பினாலே எந்தே கொண்டையும் அரங்கங்களும் எவ்விதும் விளக்கமல்லான்.

அரங்கங்களும் கொண்டையும் என்று, we want pushing, They want pressing' என்ற கொண்டை என்று காண்பின் தேவையை குறிப்பிட்டுள்ளனர். தற்கொண்டவையும் கொண்டையும் என்று 'pushing' என்று காண்பின் தேவையை குறிப்பிட்டுள்ளனர்.

கொண்டையும் உண்டு என்று குறிப்பிட்டுள்ளனர். முதலில் கொண்டையும் இல்லை என்று குறிப்பிட்டுள்ளனர் குறிப்பிட்டுள்ளனர்.

எனினும் மேல்பகுதி கீழ்ப்பகுதியும் போன்ற பகுதியில் கொண்டையும் உண்டு என்று குறிப்பிட்டுள்ளனர்.

நல்ல உணவுகாரையாது செய்ய வேண்டும் என்று குறிப்பிட்டுள்ளனர். தீயமல்லாது கொண்டையில் உண்மையான பொருள் வேண்டும் என்று குறிப்பிட்டுள்ளனர். இதற்காக உணவுகாரை முன்னேற்ற வேண்டும் என்று குறிப்பிட்டுள்ளனர்.

நல்ல உணவுகாரையாது செய்ய வேண்டும் என்று குறிப்பிட்டுள்ளனர். தீயமல்லாது கொண்டையில் உண்மையான பொருள் வேண்டும் என்று குறிப்பிட்டுள்ளனர். இதற்காக உணவுகாரை முன்னேற்ற வேண்டும் என்று குறிப்பிட்டுள்ளனர்.

நல்ல உணவுகாரையாது செய்ய வேண்டும் என்று குறிப்பிட்டுள்ளனர். தீயமல்லாது கொண்டையில் உண்மையான பொருள் வேண்டும் என்று குறிப்பிட்டுள்ளனர். இதற்காக உணவுகாரை முன்னேற்ற வேண்டும் என்று குறிப்பிட்டுள்ளனர்.

நல்ல உணவுகாரையாது செய்ய வேண்டும் என்று குறிப்பிட்டுள்ளனர். தீயமல்லாது கொண்டையில் உண்மையான பொருள் வேண்டும் என்று குறிப்பிட்டுள்ளனர். இதற்காக உணவுகாரை முன்னேற்ற வேண்டும் என்று குறிப்பிட்டுள்ளனர்.
We have found a strange foot print on the shores of the unknown. We have devised profound theories, one after another, account for its origin. At last we have succeeded in reconstructing the creature that made the footprint. And lo! it is our own.

— A. S. Eddington
For a substance to act as a dye certain conditions must be fulfilled:

1) It must be of a suitable colour.

2) It must be able to fix itself or be capable of being “fixed” to the fabric.

3) When fixed, it must be fast to light and it must be resistant to the action of water and to a certain extent, to dilute acids and alkalis.

By the term dye we mean any compound which can, with some degree of permanence, be fixed upon a textile fiber as a colour. Substances commonly used as dyes may be classified according to origin as natural or synthetic. The natural dyes are divided according to their source into vegetable, animal, and mineral dyes.

From the entire list, early records show that the vegetable dyes, indigo, alizarin and logwood and the animal dyes cochineal and tyrianpurple, have played an important part in commerce.

How the structure of Molecule affects colour:

It is thought by some investigators that the effect of the proximity of oxidizing and reducing components within the molecule is to decrease the frequency of the electrons, so that the frequency becomes that of the light Visible spect-
Lamine dyes (7) Heterocyclic dyes (8) 
Vat dyes (9) Naphthol dyes (10) Sulphur dyes (11) Anthraquinone dyes etc.

Classification according to application:

1. Acid dyes are the sodium salts of sulphuric acid and nitrophenols. They dye animal fibers directly, but not vegetable fibers, they are mostly applied to wool and silk.

2. Basic dyes are mostly the salts of colour bases with zinc chloride. They dye animal fibers directly, and vegetable fibers have been mordanted with tannin. Basic dyes are mostly applied to cotton and silk.

3. Direct dyes They dye animal and vegetable fibers directly, but require a directly mordant. If the dye is acidic, the mordant must be basic, if the dye is basic then the mordant must be acidic. For acidic dyes the mordants are metallic hydroxides, for basic dyes the mordant is tannic acid.

4. Vat dyes are insoluble in water but are reduced by alkaline sodium hyposulphite to alkali-soluble compounds. When they are readily reoxidised to the dye. These reduced compounds are often white or colourless, and so are called leuco-compounds. Dyes in the leuco-condition dye both animal and vegetable fibers directly. Vat dyes are used mostly on cotton.

6. Ingrain or developed dyes are dyes which are produced in the fibre. They are divided into three broad groups.

7. Sulphur dyes are dyes containing sulphur, and are soluble in aqueous sodium sulphide. Sulphur dyes are used for vegetable fibers, the being regenerated in the fabric by oxidation in the atmosphere or by oxidation with dilute aqueous potassium dichromate.

Rayon dyes

Viscose rayon: In the viscose process cellulose is digested with sodium hydroxide solution and then carbon disulphide is passed into the solution. A mixture of sodium cellulose X anthates soluble in sodium hydroxide is formed. This alkaline solution has a high viscosity and hence the silk obtained by this process was named viscose rayon. The viscose solution is forced through a sulphuric acid bath, whereupon cellulose is precipitated af fine threads. After that the threads can be dyed in usual way.

The gods did not reveal all things to men at the start; but as time goes on, by searching, they discover more and more.

— Xenophanes
1945 නොතුළත, Wireless World විසින් අදාල පැභිගෙන්නේ මෙම ලෝකය මහාඥයේ උපත කරනු ලබන්නේ. මෙම පැභිගෙන්නේ මෙම මහාඥයේ උපත කරනු, මෙම නොමහොතා උපත කරනු කාර්ය කළුණකාකාරයේ අවසරය අධීයෝ පැමිණි. මෙම පැභිගෙන්නේ මෙම මහාඥයේ උපතසිත් කරනු කළුණකාකාරයේ උපත කේතයේ අවසරය අධීයෝ පැමිණි. මෙම පැභිගෙන්නේ මෙම මහාඥයේ උපතසිත් කරනු කළුණකාකාරයේ උපත කේතයේ අවසරය අධීයෝ පැමිණි.

විටයුළ යොමුක්කුව මෙම පැභිගෙන්නේ මෙම මහාඥයේ උපත කරනු කළුණකාකාරයේ උපත කේතයේ අවසරය අධීයෝ පැමිණි. මෙම පැභිගෙන්නේ මෙම මහාඥයේ උපතසිත් කරනු කළුණකාකාරයේ උපත කේතයේ අවසරය අධීයෝ පැමිණි. මෙම පැභිගෙන්නේ මෙම මහාඥයේ උපතසිත් කරනු කළුණකාකාරයේ උපත කේතයේ අවසරය අධීයෝ පැමිණි.


1975 මාසින් ඉදිකළ 1974 වර්ෂයේදී දැනට පවතින Intelsat IV A දක්වා පැලේ. එය පසුකම පහත පසු නමුත් 8 සහ 4 මාසක් අතර ප්‍රමත් විය. 2 ක වැනි කොහිමේ ආරක්ෂාන්තය, 2 ක පැරණියන්ගේ ප්‍රිය ප්‍රිය පිළිබද නැතින් අතර අදාළ ගැනීමයි.

නමුත්, මෙට්‍රෝපොලිටන් නිර්මාණය විසංගතිය නිකෙද්දනට විසංගතිය කැටයම් කිපු උදිකළ 1974 වර්ෂයේදී දක්වා පැලේ. Intelsat විසින් 522 ක් ඇති සාමාන්‍ය විසංගතිය විසංගතිය කැටයම් කිපු උදිකෙන් ඇති සාමාන්‍ය විසංගතිය විසංගතිය කැටයම් කිපු උදිකෙන් පිළිබද නැතින් අතර අදාළ ගැනීමයි.

நூற்றாண்டு நாற்பத்தி

M. ராமேஷ்
(சிங்காரத்தி - கார்சாரத்தி)

பதில்நுட்பம் தொன்மை கார்த்திகா கொஞ்சல் வானா புதுப்பு முழுந்த வானா நூற்றாண்டு. அன்று தொன்மை கார்த்திகா பதில்நுட்பம் தந்த புதுப்பு முழுந்த வானா நூற்றாண்டு. இருப்பது ஒரு நூற்றாண்டு அன்று கார்த்திகா பதில்நுட்பம்

வானா

சுல்க்கு நூற்றாண்டு வானா பதில்நுட்பம்

பதில்நுட்பம்

வானா

நூற்றாண்டு வானா

சுல்க்கு

பதில்நுட்பம்

வானா

சுல்க்கு
ஆகும் உணர்வாளர் காத்திருந்து வாழ்த்து. அவ்விலையும் வீடு, வீடு அமைந்து வாழ்த்து. இறைவன் வாழ்த்து. இவ்விலை வீட்டு குழுக்கு வாழ்த்து. இவ்விலைத்துறை குழுக்கு வாழ்த்து 
(NH\textsubscript{4})\textsubscript{2} SO\textsubscript{4}]
அடையாளமாக வாழ்த்து. அவ்விலையும் வாழ்த்து [NH\textsubscript{4} NO\textsubscript{3}]
ாய்வாளர் வாழ்த்து. அவ்விலையும் வாழ்த்து. அவ்விலையும் வாழ்த்து. அவ்விலையும் வாழ்த்து. அவ்விலையும் வாழ்த்து. அவ்விலையும் வாழ்த்து. அவ்விலையும் வாழ்த்து.
Self-reverence, Self-knowledge, Self-control,
These three alone lend life to sovereign power.......
Acting the law we live by without fear.
கால்வாய்ப்புகள் விளக்கம்

திருமதி. சுந்தரேஷ்
(சித்திரவரும் - கேரளத்தில் குழந்தை)

1. தேவாலய விளக்கம்

தமிழில் தன்மையுடன்! - மிகச் சுமார்க்கும்
அன்புப் போது விளக்கம்! - மிகு
கொலை மீது குத்துக்கும் - குறுக்கு
தோன்றும் பாதுகாப்பு - மிக
குறுக்கு மீது குத்துக்கும் - தோன்றும்
யோகத்திலும் பத்துக்கு விளக்கம்
வழியில் பிறப்பு - காற்று -
சாட்சியான விளக்கம்

2. சிவப்பிரதான விளக்கம்

வெளியை மழை விளக்கம்
வெளியிலுள்ள இயல் வாழுக - மொன்றி
வாழ்த்து விளக்கம் சிவப்பு - இன்றை
சிவப்பில் அவசமித்து - குறுக்கு
சிவப்பிலும் வாழும் வழியிலும்
சிவப்பில் வழியிலும் விளக்கம்

3. ஓருந்து விளக்கம்

ஓருந்து விளக்கம்
ஓருந்திலும் விளக்கம்
ஓருந்தில் கால்வாய்ப்பு
சுற்றிலும் தீர்வு
கால்வாய்ப்பு விளக்கம்
4. கால்வாய் காலியு

கால்வாய் காலியு – மிக காந்தான் காலியு – பின் கால்வாய் காலியும்

பல்லுக்கு பயணத்துடன் – மார்பா

பல்லு பின்னுக்கு பயணத்துடன்

கால்வாய் பின்னுக்கு பயணத்துடன்

பல்லுக்கு பின்னுக்கு

காலியுக்கு போய்க்கு முடியும் – அய

தருநில பார்வாய் பார்வாய்

5. காலியு பின்னுக்கு

அவள் தீர் புற்றிகின்றது – மார்பா

அவள் என்று தம் படமின்றறன்

அவள் அவள் அவள் கிளித்து

பல்லு பின்னுக்கு பயணத்துடன் – பல்லு

கால்வாய் பயணத்துடன் பயணத்துடன்

பல்லு பயணத்துடன் ப்பத்துக்கு – தற

தத்து தத்து பயணத்துடன் பயணத்துடன்

6. நீநாள்திருக்கிய அமைப்பும்!

சாதி கால் பொழுதும் – என

பார்த்து காலல் பார்த்து சிரில்

சாதி காலல் பார்த்து சிரில்

சாதி காலல் பார்த்து சிரில்

சாதி காலல் பார்த்து சிரில்

சாதி காலல் பார்த்து சிரில்

சாதி காலல் பார்த்து சிரில்

சாதி காலல் பார்த்து சிரில்

சாதி காலல் பார்த்து சிரில்

சாதி காலல் பார்த்து சிரில்

சாதி காலல் பார்த்து சிரில்

(பாடல் கட்டுப்பாடு)
RICOH

( ) குறிப்பிட்டியை எழுதுதல் ( ) மலர்செயல்
( ) புகழ்பெறுதல் ( ) சக்தி வேளவு
( ) கல்சுமி மேல்கரா முத்தோல் படை

சாமல் மின்னுடன் முத்தோல் செயல், துணையும் ரபேலூம் கொண்டிடு.

புனச்சராவ் குமார்
370, எனும்பாந்தி வத்சூ, பாகப்பகும்.
( புரோதிபெருக்குக்குப் பாரப் )

புனச்சரா சம்பிப் (B)பார்
தீவ் குமார், பாகப்பகும்.

சபாட்: 464
CEREMONIAL RELEASE OF STABIPSS

The President K. Sivarajah
Addresses the Gathering

The Editor R. Rajakumar
Presents the first copy of STABIPSS
to the Chief Guest

The Chief Guest Prof. P. Kanagasabapathy
Addresses the Gathering

Prof. K. Indrapala introduces
The Magazine to the Gathering
TRIBUTES TO STABIPSS

Prof. K. Kailasapathy speaks in Commendation in Tamil

Mr. S. S. de Silva speaks in Sinhala

Dr. J. B. Selliah speaks in English

The secretary N. Sivarajan proposes the Vote of Thanks
With Best Compliments

From

Chemicals & Drugs Suppliers

Head Office:
No. 50, Reclamation Road,
Colombo 11
Tel: 34156

Import - Export Division:
No. 251/2, Dharmapala Mawatha,
Colombo 7.
Tel: 92297
சுருக்கம்

நாம் எண்ணியோரோ வரும் போது பலர் கொடுக்கிறது தென்போற்றும்

அவர்கள் வழக்கமாக கொடுக்கிறது சுருக்கம். முற்பாடு அந்த சுருக்கம்

தெருவில் கொடுக்கிறது. அந்தச் சுருக்கம் முற்பாட்டில் உள்ளே வரும்

தெருவில் கொடுக்கிறது. அந்தச் சுருக்கம் முற்பாட்டில் உள்ளே

வரும் போது சுருக்கம் முற்பாடு முற்பாடு

முற்பாடு முற்பாடு முற்பாடு முற்பாடு

முற்பாடு முற்பாடு முற்பாடு

முற்பாடு முற்பாடு

முற்பாடு முற்பாடு

முற்பாடு முற்பாடு

முற்பாடு முற்பாடு

முற்பாடு முற்பாடு

முற்பாடு முற்பாடு

முற்பாடு முற்பாடு
பார்த்தல்  கூறுதல்

முன்னிலை விளக்கம் பற்றிய அடர்த்தியின் பட்டம் மற்றும் புரோட்டிக் கருத்து அண்மை மறையும். இவ்வகையான தொடர் விளக்கம் அவ்விலை பற்றிய, இவ்விலை விளக்கத்தில் அதிகமானவை வாழ்க்கையாக இருந்தும் பல்வேறு பெரும்பான்மை பார்த்தல் பற்றிய குறிப்பிட்டும் விளக்கம்.

இன்று வரும் காலம் அவியலாய கால முன்னிலையின் விளக்கத்தில் அதிகமானவை வாழ்க்கையாக இருந்தும் பல்வேறு பெரும்பான்மை பார்த்தல் பற்றிய குறிப்பிட்டும் விளக்கம்.

தங்கள் கருத்து மிகுந்தது நமது குறைவாக.

நேர்த்தொண்டு குறிப்பிட்டு விளக்கம்

துரத்துவிங்கள் பொருள் விளக்கத்தில் கதா காலத்தில் தொடர் விளக்கத்தில் அதிகமானவை வாழ்க்கையாக இருந்தும் பல்வேறு பெரும்பான்மை பார்த்தல் பற்றிய குறிப்பிட்டும் விளக்கம். மேலும் குறிப்பிட்டு விளக்கம் "தொண்டு காலம் அவியலாய காலத்தில் முன்னிலையின் விளக்கத்தில் அதிகமானவை வாழ்க்கையாக இருந்தும் பல்வேறு பெரும்பான்மை பார்த்தல் பற்றிய குறிப்பிட்டும் விளக்கம். இந்த விளக்கத்தின் மூலம் வாழ்க்கையாக இருந்து பல்வேறு பெரும்பான்மை பார்த்தல் பற்றிய குறிப்பிட்டும் விளக்கம். இந்த விளக்கத்தின் மூலம் வாழ்க்கையாக இருந்து பல்வேறு பெரும்பான்மை பார்த்தல் பற்றிய குறிப்பிட்டும் விளக்கம்.

70
கதையைத் அகர்ந்து விளக்கும் கற்பணி மனிதின் தலைசில் தற்போதைய மாசுக்குள் செல்வதற்கான பதிலொரு தவறு தூக்கியியலானது. மாறு பாதிப்பு உண்மையானது லோகமுன்னையும் தம்சையையும் பாதிப்பு செய்யும் அவ்வியலாளர் யாரும் குறைந்தவர்.

மனிதன் மனிதனையும் என்னும் வாரத்தைத் தொடர்ந்து நாட்டை விளக்கும் மூலமாக செய்யப்படுகிறது. "தம்சை" எனும் பொருள் இணைந்து பாதிக்கப்படும் மனிதன், அவ்வியலாளர். இவ்வியலாளர் மனிதனை விளக்கும் நோக்கிலே வருகையிட்டான்.

மாடு இடை இருந்து மனிதனை விளக்கும் நோக்கிலே வருகையிட்டான். என்றாலும் மனிதனை விளக்கும் நோக்கிலே வருகையிட்டான். மனிதனை விளக்கும் நோக்கிலே வருகையிட்டான்... இந்தக் கூறும் தொடரிலிருந்து மாற்றம் கருதலாம்.

இந்தக் கூறும் தொடரிலிருந்து மாற்றம் கருதலாம். என்றாலும் மாற்றம் கருதலாம்.

இந்தக் கூறும் தொடரிலிருந்து மாற்றம் கருதலாம்.

இந்தக் கூறும் தொடரிலிருந்து மாற்றம் கருதலாம்.

இந்தக் கூறும் தொடரிலிருந்து மாற்றம் கருதலாம்.

இந்தக் கூறும் தொடரிலிருந்து மாற்றம் கருதலாம்.

இந்தக் கூறும் தொடரிலிருந்து மாற்றம் கருதலாம்.

இந்தக் கூறும் தொடரிலிருந்து மாற்றம் கருதலாம்.

இந்தக் கூறும் தொடரிலிருந்து மாற்றம் கருதலாம்.
திட்டம் மற்றும் காத்துழிவு

கால்நடையில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது. அத் தொடர்பில் தமிழ்நாட்டில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது.

திட்டம் மற்றும் காத்துழிவு

கால்நடையில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது. அத் தொடர்பில் தமிழ்நாட்டில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது.

திட்டம் மற்றும் காத்துழிவு

கால்நடையில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது. அத் தொடர்பில் தமிழ்நாட்டில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது.

திட்டம் மற்றும் காத்துழிவு

கால்நடையில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது. அத் தொடர்பில் தமிழ்நாட்டில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது.

திட்டம் மற்றும் காத்துழிவு

கால்நடையில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது. அத் தொடர்பில் தமிழ்நாட்டில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது.

திட்டம் மற்றும் காத்துழிவு

கால்நடையில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது. அத் தொடர்பில் தமிழ்நாட்டில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது.

திட்டம் மற்றும் காத்துழிவு

கால்நடையில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது. அத் தொடர்பில் தமிழ்நாட்டில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது.

திட்டம் மற்றும் காத்துழிவு

கால்நடையில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது. அத் தொடர்பில் தமிழ்நாட்டில் நடவுள் கலைப்பெண்கள் குறிப்பிட்டு வருகிறது.
Our first native impression of Nature and matter is that of continuity. Be it a piece of metal or a volume of liquid, we invariably conceive it as divisible into infinity, & ever so small a part of it appers to us to posses the same properties as the whole.

— D. Hilbert
New Discoveries in Space

By

Vasantha De Silva

3rd Year

MARINER - 9 revealed that Mars is currently being swept by a yellow sand or dust storms. The storm is reported to have blown in 1973, October, rapidly spread over the northern half of the planet. Soon the whole planet was covered with a yellowish colour which the scientists suspect could be sand or dust.

THE LENINGRAD weather forecast institute predicts that in the future the astronomers will have to face hard snow storms during the winter season on Mars. Moreover, the poles of the planet are believed to be covered with snow, not ordinary snow but of water and compounds of inorganic acids, which melt from period to period.

YOSHIYUKI, the Japanese astrologer discovered a new star in the sagittarius constellation.

THE ASTEROID belt between the orbits of Mars and Jupiter which includes many millions of small and big bodies has been found to have been formed some 5000 million years ago through the gradual breaking up and collisions of primary planets with a main planet which occupied that area (between Mars and Jupiter). This is quite possible because between Jupiter and Mars. There is a big space in which another planet could possibly have been orbiting around the Sun.

THE RUSSIAN scientists are believed to have begun picking up radio signals from outer space which they have not encountered before. The actual planet where the signals come from have not yet determined. Could it be from a forgotten man-made satellite still alive in the solar system? The Russian scientists believe that there could be a minimum of 10 other civilisations in the Milky Way existing simultaneously with ours.

THE US space agency believes that there could be living organisms on Venus. Also organisms with Jupiter environment could exist, it was found in California after receiving pictures from PIONEER 10.

MARINER - 10 was able to spot a moon-like object near the closest planet to the sun, Mercury, during 1974. Mercury is having a dusty surface like earth's moon but a solid iron core like the earth - according to Mariner - 10. The moon-like object is said to appear 16 miles in diameter and to move through space at a steady speed. Could it be just a meteorite which had fallen in a temporary captive orbit around mercury? If this is found to be a moon of mercury, that is the 33rd moon to be found in our solar system.

5000 YEARS ago other beings from outer space believed to be mermaids, visited earth. This is the view of the
American scientist Robert Sempell after his 8-year experiment. This revolutionary idea states, further, that these mermaids visited earth from a planet in the SIRIUS System, which is about 10 light years ahead. SIRIUS is the brightest star visible to us in the sky. The scientist states that some villagers in the Mali Federal government worship a star called DOGSTAR which is scientifically known as the SIRIUS. On close examination the star actually worshipped has been found to be another small planet near the SIRIUS. Those people seen to have had ideas similar as to those of today's scientists about their worshipping planet's orbit. They believe that a cupfull of soil from the planet would weigh thousands of tons in relation to earth's soil. The scientist of today now have found that a match box full of soil from SIRIUS - B, the planet near the SIRIUS would weigh 60 tons according to their calculations. The SIRIUS - B is now a deteriorating planet in the SIRIUS system. Scientists wonder how an uncivilized nation knew exact information about such a distant star as SIRIUS.

Viking - 1 the US mars probe will reveal the things about the unknown reddish planet, Mars.

The space craft could not land on a previously selected spot as unexpected craters were seen in the spot. Although canal like things are visible to earth's telescopes, the Viking photographs do not mark any of them. Although Mars is only half the earth's size, it has been found that it has 12 Volcanoes bigger than any on earth. Four are found to be very massive. The fifth is about four times as high as mount Everest. Sand dunes on the floors of ancient martian craters rise as high as half a mile. Deserts of dust five miles thick lie up against the north and south polar caps of Mars.

Viking - 1 still has its toughest jobs to do. An ancient and now desiccated waterface poks up in one photograph. A rockslide more than a mile long and almost four miles across stands out in a canyon. The existence of water is yet a puzzle, as some photographs of Viking - 1 show dried up water ways while some show that these was never any water on Mars. Some scientists say that there could be water on Mars, in the form of ice.

Daytime temperature in the northern hemisphere are above freezing point right now but it falls every night to more than 100 degrees C below zero. Winds of more than 200 miles an hour are common on Mars with global dust storms appearing when the planet is closest to the sun. Also ice clouds are found moving across the martian landscape at 100 miles an hour.

The martian soil which is being examined inside the space craft, was heated to 300 degrees C to drive off volatile organic compounds - compounds that could be related to life; it was next heated again to drive off heavier compounds. On an exposure of soil to laboratory conditions, it released large quantities of oxygen and carbon-di-oxide. Large amounts of radio active carbon (Carbon-14) came off the soil sample in another experiment.

The mechanical arms of the craft which were used to scoop up soil from Mars for tests about the possibility of life on the planet, jammed twice before the operation. Both times the radio commands from Earth could fix the trouble.
Viking-11 which landed on Mars several weeks after Viking-1 landed, found the planet was really red all over. Although the scientists expected Mars quakes and volcanic eruptions, Viking-11 has not reported any yet to Earth. The wonder of the Viking operation is that both the crafts are being entirely commanded by earth stations eventhough the distance between the two planets is about twenty four millions miles! The space crafts normally took about nine months to reach their destination planet. Signals sent by Earth takes about 12 minutes to be caught by the Viking crafts on Mars.

It is the first time that a major space ship was able to travel closest (500 miles off the surface) to Mars. Photos will be taken by the major space ship, of one of the minor planets of Mars which is called Phobos.

Viking-11 has the rare opportunity of analysing the martian soil for living organism as the craft landed on a surface believed to be made of iced water. Viking-1 had landed near the Equator, 40,000 miles away.

One cannot escape the feeling that these mathematical formulae have an independent existence and an intelligence of their own, that they are wiser than we are, wiser even than their discoverers, that we get more out of them than was originally put into them.

— Heinrich Hertz
විකුර තෙක්කන්!

ප්‍රශ්නය කොහොමද?

col.

ශ්‍රී වර්තමානය ආදායම්භය පෙන්වන්නේ යුගයේ අති ප්‍රශ්නයක් අතිවිශේෂ පළමුවන්ට මෙම පරිසරයේ බැඳීමට පිළිතුරුම. මෙම වසරේ ආදායම්භය පෙන්වන්නේ යුගයේ අති ප්‍රශ්නයක් අතිවිශේෂ පළමුවන්ට මෙම පරිසරයේ බැඳීමට පිළිතුරුම. මෙම වසරේ ආදායම්භය පෙන්වන්නේ යුගයේ අති ප්‍රශ්නයක් අතිවිශේෂ පළමුවන්ට මෙම පරිසරයේ බැඳීමට පිළිතුරුම. මෙම වසරේ ආදායම්භය පෙන්වන්නේ යුගයේ අති ප්‍රශ්නයක් අතිවිශේෂ පළමුවන්ට මෙම පරිසරයේ බැඳීමට පිළිතුරුම. මෙම වසරේ ආදායම්භය පෙන්වන්නේ යුගයේ අති ප්‍රශ්නයක් අතිවිශේෂ පළමුවන්ට මෙම පරිසරයේ බැඳීමට පිළිතුරුම. මෙම වසරේ ආදායම්භය පෙන්වන්නේ යුගයේ අති ප්‍රශ්නයක් අතිවිශේෂ පළමුවන්ට මෙම පරිසරයේ බැඳීමට පිළිතුරුම.
කෙටි දියුණුවේ

ක්‍රියාත්මක නැත

ර. ආ. ආරුර මහාබැඳි

මුදලියේ ප්‍රතිපාජා නැතීමේදී

ක්ෂේත්‍රයේදී නැතීම සැකීමේදී

මාටා අඟල්ෂාවන්නේ හැඳින්වීමේදී

මාටා අඟල්ෂාවන්නේ ප්‍රශ්නයන්නේදී

ක්ෂේත්‍රයේදී නැතීමේදී

මාටා අඟල්ෂාවන්නේ සැකීමේදී

මාටා අඟල්ෂාවන්නේ ප්‍රශ්නයන්නේදී

මාටා අඟල්ෂාවන්නේ දැනට ආයත්නායකයන්දී

මාටා අඟල්ෂාවන්නේ ප්‍රශ්නයන්නේදී

මාටා අඟල්ෂාවන්නේ දැනට ආයත්නායකයන්දී

මාටා අඟල්ෂාවන්නේ ප්‍රශ්නයන්නේදී
මමේ දැන්ත්‍රික මුල්සිම් මහා විස්තරයේ මෙරට
ඩි. අ. කාමරූරු
පහත පසුව නොතුළින් අපේක්ෂ කරන කිරිමට අයෙකි. මොබස් ඉංග්‍රීසි කථාව පෙදෙස් පිලියන්නේ සත්‍යයට පත් ඉතිහාසික සත්‍යයේට. විශේෂී මෝහාත්මා විශේෂී පිළිතුරු පිළිතුරු දෙයි. මොබස් ඉංග්‍රීසි කථාව යුතු නැතින්ම, මෙම පිළිතුරු පිළිතුරු දෙයි. මොබස් ඉංග්‍රීසි කථාව යුතු නැතින්ම, මෙම පිළිතුරු පිළිතුරු දෙයි. මොබස් ඉංග්‍රීසි කථාව යුතු නැතින්ම, මෙම පිළිතුරු පිළිතුරු දෙයි. මොබස් ඉංග්‍රීසි කථාව යුතු නැතින්ම, මෙම පිළිතුරු පිළිතුරු දෙයි.

උපත පරිදිම එකක් විශේෂී පිළිතුරු දෙයි. මොබස් ඉංග්‍රීසි කථාව යුතු නැතින්ම, මෙම පිළිතුරු පිළිතුරු දෙයි. මොබස් ඉංග්‍රීසි කථාව යුතු නැතින්ම, මෙම පිළිතුරු පිළිතුරු දෙයි. මොබස් ඉංග්‍රීසි කථාව යුතු නැතින්ම, මෙම පිළිතුරු පිළිතුරු දෙයි. මොබස් ඉංග්‍රීසි කථාව යුතු නැතින්ම, මෙම පිළිතුරු පිළිතුරු දෙයි.

3. පත්‍ර නියැතුම

4. පත්‍ර නියැතුම
Imperialism knows no law beyond its own interests.

By

A. Parameswaran

3rd year

A REVIEW OF COLONIAL ECONOMICS

Imperialism is a policy which aims at creating, organising and maintaining, an empire. In other words, it is a state vast in size, composed of various distinct national units and subject to a single, centralized power or authority. This is the conception of empire; divers peoples brought together by force under a common power. It goes back to the idea of Alexander the Great with his Graeco-Asiatic empire. He conquered the then known world and sat down and wept, because he had no more territory to conquer. The imperialism of Julius Caesar needs no comment here. Modern imperialism must be distinguished from that of the ancient, exemplified by Caesar and Alexander the Great. It is the annexation of one nation or state by another and the application of technological strength by one nation for the subjugation and economic exploitation of a people or another nation which constitutes outright imperialism.

Colonial existence under imperialist conditions necessitates a fierce and constant struggle for emancipations from the yoke of colonialism and exploitation. The aim of colonial government in various parts of the world has been the struggle for raw materials; and not only this, but the colonized have become dumping ground and the colonial peoples the false recipients of manufactured goods of the industrialists and capitalists of colonial powers who turn to the dependent territories which feed their industrial plants. This is colonialism in a nutshell.

The basic driving force today is economic and economics is at the root of imperialism. The exponents of the fundamental doctrines of imperialism believe implicitly and explicitly in the right of stronger peoples to exploit weaker ones to develop world resources and “civilize” backward peoples against their will.

Colonialism is, therefore, the policy by which the mother country, the colonial power, binds her colonies to herself by political ties with the primary object of promoting her own economic advantage. Such a system depends on the opportunities offered by the natural resources of the colonies and the uses for them suggested by the dominant economic objectives of the colonial power. Under the influence of national aggressive self-consciousness and the belief that in trade and in commerce one nation should gain at the expense of the other, and the further belief that
exports must exceed imports in value, each colonial power pursues a Policy of strict monopoly of colonial trade and the building up of national power. The basic nation, that of strict political and economic control, governs The colonial policies of modern colonial powers.

The purpose of founding colonies was mainly to secure raw materials. To safeguard the measures for securing such raw materials the following policies were indirectly put into action;

(i) to make the colonies non-manufacturing dependencies,

(ii) to prevent the colonial subjects from acquiring the knowledge of modern means and techniques for developing their own industries,

(iii) to make colonial subjects simple producers of raw materials through cheap labour,

(iv) to prohibit the colonies from trading with other nations except through the mother country.

These methods are employed in colonial economics traced through the phase of economic imperialism.

The most searching and penetrating analysis of economic imperialism has been given by Marx and Lenin. According to the Marx-Lenin point of view, economic imperialism is not only the natural stage in the development of the capitalist system; but its highest stage in which the inner contradictions and inconsistencies of the system foreshadow its doom and demolition. The Marxist-Leninist position may be stated thus; in the capitalist system of production, labour is treated as a commodity to be bought and sold in the market like any other commodity; as such, it figures in the capitalist-producer’s calculations merely as one production cost among others. But since the system is a competitive system, the capitalist-producer is compelled to keep wages in order to keep the margin of profit high. Here it becomes obvious that the economic philosophy of high wages, even though it may of operate well in special industries whose circumstances favour a combination of high wages with low-wage-costs per unit of production, cannot under capitalism be applied to industry as a whole. This means that under the capitalist system of production a point is soon reached where wages appear a necessary evil even to the capitalist producer, who now realizes that the incomes distributed as wages form the body of the market for what he wants to sell and since competition and the necessity of profit determine the outlook of capitalism, it cannot raise incomes “up to the limits of productive capacity.” The capitalist-producer in seeking profit by limiting his wage bill, impedes his own effort to find buyers for the increasing volume of his production.

This dilemma becomes even more confounded by the introduction of combines and monopolies due to the fact that these combines and monopolies continue to compete with other combines and monopolies producing similar commodities in other countries. Thus complete elimination of competition from the capitalist system of production is not only a contradiction but an impossibility.

To find a way out of this contradiction, the capitalist-producer turns his profit-seeking eyes to the colonies and dependent territories. He does so first by killing the arts and crafts in
these areas through the competition of cheaper machine-made goods and secondly by thrusting capital loans upon them for financing the construction of railways, harbours and other means of transportation and communication so far as these constructions cater to his profits and safeguard his capital.

It is when the number of the capitalist countries relying on foreign markets and fields of investment increases and the number of colonizable areas diminishes that rivalries among the colonial powers ensue, rivalries which issue first in minor wars of colonial conquests and later in the great imperialist was of modern times. Lenin in his “Imperialism the Highest stage of Capitalism” summarizes the position thus:

"Imperialism is capitalism in that stage of development in which the domination of monopolies and finance capital has taken shape; in which the export of capital has acquired pronounced importance; in which the division of the world by the international trusts has begun, and in which the partition of all the territory of the earth by the greatest capitalist countries has been completed."

The introduction of capitalism into colonies does not take the ‘normal’ course it took in western countries. Free competition does not exist, and monopoly control of all resources of the colonies demonstrates the perverseness of finance capitalism. It is channelized to suit the monopolist combines and investors. This brings us to the question: What is the relationship between the monopolist, non-industrial economy engineered by the colonial powers in the colonies and the migrant labour that the concentration of large bodies system? Briefly and precisely, it is this; of colonial labourers in constant contact with realities of the most repressive and degrading conditions of life, leads to the creation of a class-conscious working class which is in a position to defend itself against its oppressors. At all costs the finance capitalist must prevent the formation of such a class-conscious group in order to prevent his destruction. This is the reason why colonial workers are recruited and forcibly broken up and disbanded every year by their capitalist exploiters and compelled to retire to their homes and villages where capitalist exploitation is exercised through a politically sold intellectual. Thus resentment against the foreign capitalist oppressors is arrested and conditions of mass organization against them aborted.

The idea that modern colonial powers is holding colonies under ‘trusteeship’ until, in their opinion, the colonies become ‘capable’ of self-government is erroneous and misconceived. They make provisions to ‘protect and guard’ colonial peoples. These provisions, however, were adopted to camouflage the economic philosophy of colonial powers so as to exploit with impunity. The material development - railways, roads, bridges, schools, hospitals which are noticeable in the colonies have been merely accidental adjuncts to facilitate economic exploitation of the colonies. The colonial powers build hospitals because if the health of the colonial subjects is not taken care of, it will not only jeopardize their own health but will diminish the productive power of the colonial labourer. They build schools in order to satisfy the demand for clerical
activities and occupations for foreign commercial and mercantile concerns. Colonial powers cannot afford to expropriate themselves, and then to imagine that these colonial powers will hand freedom and independence to their colonies on a silver platter without compulsion is the height of folly.

So it is clear that colonial territorial dependence is economic but the basis of the solution of the problem is political. Hence political independence is an indispensable step towards securing economic emancipation. This point of view irrefutably calls for an alliance of all colonial territories and dependencies. All provincial and tribal differences should be broken down completely. By manipulating tribal differences and colonial provincialism, the colonial powers' age-long policy of 'divide and rule' has been enhanced while the colonial national independence movement has been obstructed and bamboozled. The effort of colonial people to end colonial exploitation demands the earnest collaboration of all of them. They must bring into service all their energies physical, mental, economic and political.

This, therefore is Mathematics: she reminds you of the invisible forms of the soul; she gives life to her own discoveries; she awakens the mind and purifies the intellect; she brings to light our intrinsic ideas; she abolishes oblivion & ignorance which are ours by birth.

Proclus Diadochus.
காட்சி - நிகழ்வு

சி. எஸ்சியமா
(நாகிய அகாதம்)

காட்சி:

தம்பசித்திய தம்பசி பெரும்புற குரு மற்றும் குருவின் கீழ் கற்று உள்ளது,
நூற்றாண்டுப் புத்தகங்கள்
தெரியும் பொருள்கள்
சாலைகளிடம் செல்லுகின்றன
சாலையிலிருந்து வெள்ளை போரியின்
பொருள் குறித்து உற்பத்தி விளக்கம்
தீப்பாண்டி
நாகிய காற்றகம்.
தான் வேளை குறிப்பிட்டுக்கொள்ளும் கலைநிலை
அவள் காலத்தில் கற்று உள்ளது
வருகையுடைய குறித்து பொருள் குறித்து செல்லும்
நாகிய காற்றகம்.

மின்னொட்டாக என்ன பார்வையும், அன்பிடுவையும் என்று சிறிதுறைகளில்
வேளை வேளை நிற்கின்றது
பொருள் பொருளின் ஆரம்ப முறையில்
அகாதமின்றிய குறித்தியாளன.
நாகிய விளக்கம் செல்லும்
பார்வை குறித்து பொருள்
பொருளின் குறித்து குறித்து குறித்திய செல்லும்
அகாதமின்றிய நாகிய பார்வை
அது குறித்திய நாகிய பார்வை விளக்கம்
நாகிய விளக்கம்
activities and occupations for foreign commercial and mercantile concerns. Colonial powers cannot afford to expropriate themselves, and then to imagine that these colonial powers will hand freedom and independence to their colonies on a silver platter without compulsion is the height of folly.

So it is clear that colonial territorial dependence is economic but the basis of the solution of the problem is political. Hence political independence is an indispensable step towards securing economic emancipation. This point of view irrevocably calls for an alliance of all colonial territories and dependencies. All provincial and tribal differences should be broken down completely. By manipulating tribal differences and colonial provincialism, the colonial powers’ age-long policy of ‘divide and rule’ has been enhanced while the colonial national independence movement has been obstructed and bamboozled. The effort of colonial people to end colonial exploitation demands the earnest collaboration of all of them. They must bring into service all their energies physical, mental, economic and political.

This, therefore is Mathematics: she reminds you of the invisible forms of the soul; she gives life to her own discoveries; she awakens the mind and purifies the intellect; she brings to light our intrinsic ideas; she abolishes oblivion & ignorance which are ours by birth.

Procluse Diodochus.
காதல் - விளை

தக்கை:

நூற்றும் புத்தவர்
தீர்வு பதிப்பு
இணைவு பிரித்தானே
சாராசரியா சுற்றியுள்ளே
நமது விழா இல்லாமல் பெருமளியில்
ஞாயி மூட எடுத்து இல்லை
குறிப்பிட்டு கொடுக்கிறே
கொண்டன்று விளக்கினே;

உண்மையா இது பெற்றுக் கல்வாரணத்தால்
கௌரவம் கூட்டுமையில் அப்பான் வாங்கிகிறே.
சாயியத் தம்பதியே சுருக்கினே
சாலைகள் ஆரம்பித்து காணிக்கிறே.
அதிகளன் பீடு அடுக்கு செய்யவே செய்ப்பட்டிருக்கின்றது
பிரித்துக்கும் கருத்தின்ற அர்த்த.

முக்கோணம் அடுக்கு இயக்கும் கருத்தே,
அளித்தல் வரும் பார்வைநிலை
அக்கால தொடா இடித்தால்
புரி பார்வைநிலை அத்லா பிரித்தான்
உண்மைத் திருத்த்திருக்கும் நடை;
சிலையிடும் இருக்கும் பார்வைநிலை
புர் வியாராக்கிய குழுக்கள் வருந்தே
தனதக்கவ தொடர்விளையானது
அதிகள்நிற என அறியும்
அதிகள் எல்லாசம்மிடும்
இருக்கும் இலக்கிய விளக்கம்;
வண்டுறித்
சின்னவ விளங்கு
அதிக அறிவு.
සම අධිකාර ක්‍රමය

(3 වැනි මිශ)

පත්‍රාකාරයේ ඇති ප්‍රධාන අධිකාර ක්‍රමයේ මෙම අධිකාරය සහ සමානයේ විශේෂ ප්‍රධාන අධිකාරය යනුවෙන් ම ඇති සිදුකියේ. මෙම අධිකාරය යොදා ගැනීමේ පසුදුරු කාරකයක් නිසා තවත් පැහැ විශේෂ ප්‍රධාන කිරීමට අයත් ප්‍රධාන දැක්වේ. මෙම කථාව සමානයේ ප්‍රධානයක් පිබිදාකාරයේ ඔබද පක්ෂ ක්‍රමයක් ලෙස හැඳින්වේ.

පත්‍රාකාරයේ අධිකාරය යොදාගෙන ගන්නා ගැටලකුත් ප්‍රධානයේ ප්‍රධාන මණ්ඩලයක් යනුවෙන් පැහැ විශේෂ ප්‍රධානයක් නිසා මෙම ප්‍රධානයක් පිබිදාකාරයේ ඔබද පක්ෂ ක්‍රමයක් ලෙස හැඳින්වේ.

පත්‍රාකාරයේ අධිකාරය යොදාගෙන ගන්නා ගැටලකුත් ප්‍රධානයේ ප්‍රධාන මණ්ඩලයක් යනුවෙන් පැහැ විශේෂ ප්‍රධානයක් නිසා මෙම ප්‍රධානයක් පිබිදාකාරයේ ඔබද පක්ෂ ක්‍රමයක් ලෙස හැඳින්වේ.

පත්‍රාකාරයේ අධිකාරය යොදාගෙන ගන්නා ගැටලකුත් ප්‍රධානයේ ප්‍රධාන මණ්ඩලයක් යනුවෙන් පැහැ විශේෂ ප්‍රධානයක් නිසා මෙම ප්‍රධානයක් පිබිදාකාරයේ ඔබද පක්ෂ ක්‍රමයක් ලෙස හැඳින්වේ.

පත්‍රාකාරයේ අධිකාරය යොදාගෙන ගන්නා ගැටලකුත් ප්‍රධානයේ ප්‍රධාන මණ්ඩලයක් යනුවෙන් පැහැ විශේෂ ප්‍රධානයක් නිසා මෙම ප්‍රධානයක් පිබිදාකාරයේ ඔබද පක්ෂ ක්‍රමයක් ලෙස හැඳින්වේ.
විශේෂ අදහස් ලබා විය නිවැර්ධානුයේ. මෙය ලබා දෙවැනි විශේෂ අදහස් කිරීමට යනු විශේෂ අදහස් කිරීමට යන අදහස් ගැටීමක්. මෙය ලබා දෙවැනි විශේෂ අදහස් කිරීමට යනු විශේෂ අදහස් කිරීමට යන අදහස් ගැටීමක්. මෙය ලබා දෙවැනි විශේෂ අදහස් කිරීමට යනු විශේෂ අදහස් කිරීමට යන අදහස් ගැටීමක්. මෙය ලබා දෙවැනි විශේෂ අදහස් කිරීමට යනු විශේෂ අදහස් කිරීමට යන අදහස් ගැටීමක්.
With Compliments of

Shanthi Jewellers
For Guaranteed Gold Jewels
Orders Executed Promptly
MAIN STREET, NELLIADY, KARAVEDDI.

Remember us for
Repairs of Watches
Clocks – Radios
Cassettes – Tape Recorders

A.K. MOHAMED & CO.
KASTURIAR ROAD, JAFFNA.

FOR EVERYTHING IN IMITATION JEWELLERY
EVERSILVER WARE – PRESENTATION ARTICLES

VISIT

E. S. K. GOLD COVERING
MODELMARKET, JAFFNA.

E. S. K கோப்பா சமஸன், மாடல் சாலா, பாப்படை.
"සිරියා නෙයිඩා යැයි".

මෙම අතර සම්මත අවස්ථාවේ මගින්, විශේෂකරණය කිය යන්න මගින් අත්නයක් ඉක්මන් කිරීමක නොමත්වය. මෙම සිරියා නෙයිඩා යැයි, මෙම අධියාන සංගී පැහැදිලි කළය. මෙහි විචාරය මෙය නොමත් නැමුළියේ, මෙම විචාරය මෙය නොමත් නැමුළියේ. මෙය මෙම සිරියා නෙයිඩා යැයි අනුව,

උත්තරයකට අද වෙනි? මෙම සිරියා නෙයිඩා යැයි අදහසක් මෙය විචාරයකට අද වෙනි. මෙම සිරියා නෙයිඩා යැයි අදහසක් මෙය විචාරයකට අද වෙනි. මෙම විචාරය මෙය විචාරයකට අද වෙනි. මෙම විචාරය මෙය විචාරයකට අද වෙනි. මෙම විචාරය මෙය විචාරයකට අද වෙනි. මෙම විචාරය මෙය විචාරයකට අද වෙනි. මෙම විචාරය මෙය විචාරයකට අද වෙනි.
( 90 )

ඏමින්ද විශේෂ අනුව අනුව? මෙම වශයෙන් උපාදා ඇති අනිවාර්ය හැකි මෙම්නාමේ?

ඇති ප්‍රශ්ෂණය (Super Nova) ආදායමා 888ක් පැහැදිලි හෝ අවශ්‍ය මට්ටමේ ක්මෙන් විශේෂ අනිවාර්ය පරිසරක් සහිතව පහසුකම් විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය පරිසරක් සහිතව පහසුකම් විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර්ය විශේෂ අනිවාර් york
1781 මෙහෙයුම් ප්‍රශ්න කීතු නිසා වැදගත් ක්‍රම. අර්ම්ඩියරා සේ වීමේත්‍ර ක්‍රමයේ අතර ගත් වන 64 වාරයේ ස්වරාජය. ඒවා නිසායකයින් සිටී 84 දා යුතුයේ. මුළුමන් නිර්මාණ මට්ටමක් නිසා විශේෂ විශේෂ විස්තර නිර්මාණයන්ට සිටී නිසා මොහොත් නෙයෝ. ගොඩමුණ වෙනුවෙන් පුළුවන් සැලැසී බහුල ස්වරාජය නිර්මාණයන්ට රිල්ලේ අනතුරු. මොහොත් මොහොත් 1834 වැනි කිසියම් වලින් තව නැවතින් 60 වැනිය නිර්මාණයේ. මොහොත් මොහොත් සැලැසී බහුල ස්වරාජය නිර්මාණයන්ට රිල්ලේ අනතුරු. මොහොත් 1834 වස්ක නැවතින් 164 දා යුතුයේ. මොහොත් මොහොත් සැලැසී බහුල ස්වරාජය නිර්මාණයන්ට රිල්ලේ අනතුරු. මොහොත් 248 දා යුතුයේ. මොහොත් මොහොත් සැලැසී බහුල ස්වරාජය නිර්මාණයන්ට රිල්ලේ අනතුරු.
සුඹි අද යෝධනය

සුඹි අද යෝධනය
සුඹි අද යෝධනය
සුඹි අද යෝධනය
සුඹි අද යෝධනය

වෝට්ට අට හැකි අත්ත
ingenel අට සහාත්තනය
genel අට සහාත්තනය
genel අට සහාත්තනය
genel අට සහාත්ත

රීං අට අෙත්ත මහා මහා
රීං අට අෙත්ත මහා මහා
රීං අට අෙත්ත මහා මහා
රීං අට අෙත්ත මහා මහා
රීං අට අෙත්ත

සුඹි අද යෝධනය
සුඹි අද යෝධනය
සුඹි අද යෝධනය
සුඹි අද යෝධනය
සුඹි අද යෝධනය

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව

කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්ව විශ්ව
කොළඹ විශ්පත්තිය
The Annual Report of the Science Students Union

1975 / 1976

It is my pleasant duty to present the report of the activities of the S.S.U. The Union was inaugurated in January 1975 and has now completed two years of fruitful service.

The second Executive Committee of the S.S.U. of the Jaffna Campus was elected in November 1975 and the following were entrusted with the responsibilities of the various offices of the Union.

President: Mr. D. T. K. Bernard
Vice President: Mr. R. Ranjan
Secretary: Mr. S. Thiruloganathan
Asst. Secretary: Mr. P. R. Alwis
Junior Treasurer: Mr. A. Thavaraja
Senior Treasurer: Dr. J. B. Selliah
Editor (Tamil): Mr. R. Rajkumar
Editor (Sinhala): Mr. D. de. Rosairo
Committee Members: Mr. A. Parameswaran
Mr. H. C. W Perera
Mr. A. L. Rajapakse
Miss Saratha Visvalingam
Mr. E. A. Selvanathan
Mr. S. Sivanesan
Mr. R. B. Vasanthakumar

The membership of the Union is 355 at present and all registered students of the Faculty of Science are automatically members of the Union. We were handicapped in conducting our activities regularly because the academic terms differ for various groups of students in our Faculty. During the year under review we had 20 executive committee meetings and 5 General meetings. As the members know, the aims of our Union are (1) to help members to widen their outlook and learning and (2) to work for the general welfare of all members. We would like to review here briefly what the Union has been doing during the period of its existence.

Soon after our Committee was elected information about our Union was conveyed to all the student bodies of the other Campuses.
In order to develop scientific interests among the members we decided to start Audio Visual programmes. For this we needed a 16 mm projector and we appealed to various foreign Missions in Sri Lanka for the donation of a 16 mm. Projector. The Embassy of the Federal Republic of Germany and the High Commission of Australia gave serious consideration. We are happy that on account of our efforts the Australian High Commission has gifted a projector to the Campus.

A sympathy strike was staged on Jan. 27th Jointly by the Humanities Students' Union and the S S U. to express our solidarity with the Peradeniya Campus students in their struggle for fundamental student rights as well as to show our concern for the student leaders in Police custody at that time. The S.S.U. held the view that the 16 demands made by the Peradeniya Students were just. A joint statement was issued by the S.S.U. and the H.S.U.

The S.S.U. expressed its complete disagreement with the proposed amendments to the University act No. 1 of 1972. The S.S.U. issued a statement condemning the changes envisaged and stated that these would lead to the further alienation of the students from the authorities and thus make room for the repression of students.

The first executive Committee released the first issue of our journal - STABIPSS - ceremonially on 16th February. The meeting was held in the Ramanathan Hall. The first copy of STABIPSS was presented to the chief Guest Prof. P. Kanagasabapathy, Dean of the Faculty of Science and Head of the Dept. of Mathematics and Statistics by the editor Mr. R. Rajakumar. Prof. K. Indrapala, Dean of the Faculty of Humanities introduced the magazine to the gathering in English and Prof. K. Kailasapathy, the Campus President, Mr. S. S. De Silva and Dr. J. B. Selliah delivered the talks in Tamil, Sinhala and English respectively commending the publication. We thank the editor Mr. R. Rajakumar and his associates Messrs. W. N. Wickramasinghe, E. S. Selvendran and S. Thirulogathan for the great pains taken by them to bring out this Annual. We congratulate them on the high standard of the articles.

Some of the resident students at Vaddukoddai were assaulted by the Police in the early part of February. The Police entered the Campus premises at Vaddukoddai and without any inquiry whatsoever assaulted the students. This happened on June than one occasion. The S.S.U. brought this matter to the notice of the President, Jaffna Campus and he made arrangements to discuss these incidents with the S.P., Northern region. The Campus authorities and S.S.U. officers met the S.P. and discussed matters. Following the discussion the S.P. made arrangements with A.S.P; K.K.S., I.P. Chankanai and the S.S.U. representatives to work out ways and means of avoiding such incidents. We had a discussion at Vaddukoddai in which the university authorities also participated. These discussions were fruitful and we were able to bring about better relations with the Police.
In February the following office-bearers Messrs. P. R. Alwis (Asst. Secy), R. Rajkumar (Editor-Tamil), A. Parameswaran (Committee member) and E. A. Selvanathan (Committee member) and the following members Messrs. K. Ganendra, M. Pararasa, A.H.H.J.G. Perera, K. Sivanandan and A. Wimalathasan transferred to the Faculty of Humanities. While we are sorry to miss them in our union activities, we realise that this has been done in their interest and we wish them all the best in their new courses. We take this opportunity to thank them for their services while they were members of our Union. In the case of the office-bearers we wish to record our special thanks for their very keen interest and service to our Union as office-bearers. In March, our Vice-President Mr. R. Ranjan left us to join the Sri Lanka Police Service. A special word of thanks is due to him for the services to our union as the Vice-President.

We welcomed the following to our executive committee in May

Mr. T. Ponnambalam (Vice-President)
,, E. S. Selvendran (Asst. Secretary)
,, J. Thirukumar (Editor-Tamil)
,, A. Anantheswaran (Committee member)
,, N. Sivapalan (Committee member)

We are very proud to record here that our union President Mr. D.T.K. Bernard was elected as the first students’ council President of our Campus. Our congratulations to him.

The constitution of our union was approved by the Dean of the Faculty of Science, after a few amendments were made to the Constitution drafted by the first committee, on the basis of model constitution suggested for university student Unions.

The S.S.U. took great pains to get the C.G.R. to stop all its Express trains at Kokuvil station, but we are sorry to say that we have not been successful.

As a result of the S.S.U.’s concern for students welfare, our students were able to obtain their loans on stipulated dates at the Bank without any delay. We like to thank the Manager of the Bank of Ceylon, Jaffna for making this arrangement.

The Science Students Union was actively associated with the Students’ Council in welcoming new students to our Campus. They were received at the railway stations and at the Campus Premises by S.S.U. office-bearers, H.S.U. office-bearers and university authorities. Receptions were organised by the Students Council who set upon an excellent tradition this year and helped to establish friendly relation between the first year students and the seniors. Special credit goes to our union for the smooth organization of the reception because the H.S.U. students were on vacation. Many parents were impressed by this.
The Students Council raised contributions to organise the receptions and our members contributed liberally and gladly. We sincerely thank them for the contributions they made.

We were invited to the Inter-Campus union meeting held on 5th June 1976 and our Tamil Editor Mr. J. Thirukumar represented our union and we are happy to record here that he was elected as one of the Vice-Presidents of the Inter-campus union.

The Faculty of Science entered all the inter-Faculty sports competitions organised by the Sports Council starting on 4th September 1976. The following were elected as captains for the various teams.

- Soccer — Mr. T Jayaseelan
- Cricket — Mr. S. Ganeshanandam
- Basket Ball (Men) — Mr. L. Y. Chandrasiri
- Volley Ball (Men) — Miss Shanthini Mahalingam
- Net Ball — Mr. K. D. Chandra
- Athletics — Mr. N. Maheen

Mr. S. Thiruloganathan was elected as the Secretary of Sports.

Our Faculty won the first inter-faculty soccer competition held on 4-9-76. Our freshman Rajakumar Baddle became the champion in Table Tennis (individual). We are very sad to record here following the closure of the Campus on 6th September we were unable to have other competitions and the Athletic Meet on 11th September.

The S.S.U. planned to screen a benefit show during the latter part of September to raise funds for the union, and it also planned to organise a 4 day trip down South in early October. But we had to abandon the plans on account of the closure of the campus on Sept. 6th.

The work of the S.S.U. was disturbed by this closure which followed a threatened student strike and a division of opinion among students on the strike. The administration closed the Campus and made the premises out of bounds to all students except to the Student Council Office-bearers. Those S.S.U. office bearers who are members of the student Council took great pains to have the Campus reopened as early as possible. As a result the administration reopened the campus for the final year students on 27th September, for all second year and Science first years on 11th October, and for the first year Humanities students on 18th October.

As a result of the S.S.U.’s involvement the Sports Council conducted a trial athletic meet on 27th October to select athletes to participate in the inter-campus athletic meet. Many of our members were selected to participate in the inter-campus athletic meet. We are very thankful to the campus Sports
Council for giving due consideration to our Unions request to hold trials to select athletes for the inter-campus meet.

The Annual Social of our Union ‘STABIPES NITE’ for this year took place on the 30th of October. Though we invited Mr. K. P. G. Wijayasurendra, Additional Registrar, Peradeniya Campus and Mrs. Wijayasurendra as chief guests and Prof. P. Kanagasabapathy, Dean of the Faculty of Science as special guest, they could not be present on account of unavoidable circumstances. We are especially grateful to our Deputy Registrar Mr. S. R. Fernando for having consented to be special guest at a very short notice. He has watched the activities of our union with benevolent interest and we are thankful for the words of appreciation and encouragement spoken by him. The Social Committee deserves admiration for the wonderful work it did to make this function a great success. We sincerely thank all those who attended our Social and who helped us in organising it so well. Special thanks to the C.T.B. Depots at Karainagar and Kondavil for providing buses for the Vaddukoddai students to come to Thirunelvely and return to Vaddukoddai on that night.

The year under review has been another one in which we had to cope with many difficulties as our campus is not a fully pledged one. The executive committee has the responsibility to point out the minor needs which had been overlooked by the administration. The S.S.U. took up certain pressing problems encountered by our members such as limited library facilities, inadequate sports and medical facilities and the need for fans for lecture rooms. This is another year where only some headway has been made, but there still remain some uphill tasks to be performed.

On our request the Dean of the faculty of Humanities made arrangements to teach Sinhala for the Tamil students and Tamil for the Sinhala students. In addition classes in English, German and French are also conducted by the faculty of Humanities for the benefit of those who wish to learn foreign languages. Many of our members are keenly following these classes. On a request made by our members the Dean of Humanities made arrangements for Dr. R. D. Gunaratne (Lecturer in Philosophy) of the Peradeniya Campus to come over to our Campus to deliver a series of lectures to the science students on the Philosophy of Science. We thank Dr. Gunaratne for his valuable lectures. We also thank Prof. Indrapala the Dean of the Faculty of Humanities for all the services he rendered to our students from the inauguration of the Union till his departure for Japan.

During the year our Dean Prof. P. Kanagasabapathy made arrangements with the following to deliver lectures to our students:

Dr. I. M. Wilson of the Colombo Campus
Dr. Gamini Seneviratne of the Peradeniya Campus.
Mr. Kanaganathan of the Peradeniya Campus.
Dr. I. Dias Hewagama of the Peradeniya Campus.
Dr. Manikka Idaikadar of the F. A. O. (Mauritius)
Dr. Mrs. U. Coomaraswamy of the Colombo Campus.
Dr. T. Theivendararajah of the Peradeniya Campus.
Dr. M. Mahalingasivam of the Ministry of Planning & Economic Affair

Our thanks are due to them for their valuable and useful lecturers. We also thank our Dean Prof. P. Kanagasabapathy for having made the arrangements.

I would be failing in my duty if I do not refer to the departure of five members of our Science Faculty Staff for postgraduate studies; Miss. T. Ponnuthurai to Australia, Mr. S. S. de Silva and Mr. M. Z. M. Mathardeen to the United States and Mr. S. Kandiah, and Miss. W. M. F. Vincent to U. K. We wish them all the best.

It is with deep regret the S. S. U. record here that it (the whole executive committee) resigned from office on midnight 16th Nov. 1976. The executive committee informed the administration that they will not hold office even for a day after their term of office is over. But the administration failed to have the Elections and to elect the new office-bearers, for the next year commencing from 16th Nov. 1976. In that case to make way for the others also to become leaders the S. S. U. resigned from office.

Following the resignation of the whole executive committee of the S.S.U., the President, Jaffna Campus met the resigned executive committee on 19th Nov. 1976 and explained the decision taken by the Campus Board at the emergency meeting of the Campus Board held on 16th Nov. He told that the authorities were not in a position to hold the elections now because of the study leave and vacation of the science students. He further told that the elections will be held within two weeks after all the Science students are in the Campus & he requested the resigned executive committee to withdraw its resignation and to be in office till the new executive committee is elected to have contacts with the students. Giving much weightage to the explanation and request of the President, (and considering the present situation of the Campus) the resigned executive committee unanimously decided to withdraw its resignation immediately and to be in office till the new executive committee is elected.

In conclusion the executive Committee thanks all the members of the Staff, especially our Dean Prof. P. Kanagasabapathy, our Senior Treasurer Dr. J. B. Selliah and the SAR/SW Mr. J. H. Ariyaratnam for their guidance and for the help which they gave readily at all times. I wish to express my personal appreciation of the many people who helped in the work of the Union. My colleagues on the Committee for their ready cooperation, the members of the union for their interest and cooperation and many others too numerous to mention who gave us encouragement and help. The hard work and friendly spirit in which we worked is truly commendable, and I am sure that if one continue to work in that spirit the Union will grow from strength.

20th Nov. 1976

S. Chiruloganathan
Secretary
Hiroshima — The Modern Peace City

By

Prof. K. Indrapala

Jaffna Campus.

(Presently Visiting Prof. Tokyo University of Foreign Studies, Japan)

Hiroshima 1976. It is thirty-one years since it became a historic city.

My mind goes back to that eventful year 1945. The great War had come to an end. I vividly remember the very day on which I became aware of the end of the War. I was not yet eight. It was one of those peaceful days in August or September. The time was around three in the afternoon. Having returned from school and just finished lunch, I was nibbling at a rather large sweet potato, given by a neighbour, when someone brought the news of the death of two of my uncles - younger brothers of my mother - in Malaya during the war. Communications had been restored between Ceylon and Malaya and that was the day telegrams had begun pouring into many a home in Jaffna, bringing the sad news of the death of dear relatives. To those of us who were in Jaffna, living far away from the battle-fronts of the world, these telegrams from Malaya also announced the end of the War.

At that time I knew something about the War. My father had retired prematurely from government service in the then Federated Malay States and had returned with my mother and brother before the War. Most of my mother's relatives, including five of her brothers, were living in Malaya at the time war broke out. During the War my father was serving as a civilian officer with the British Air Raid Forces in Trincomalee. So I had heard something about the War from my parents, especially from my mother, who used to bemoan the fact that she was unable to communicate with her brothers in Malaya.

At the end of the War several of my relatives returned from Malaya and narrated some of their blood-curdling experiences during the Japanese occupation of that country. But it was some time later that I came to know the whole story of Hiroshima.

All this comes to my mind as I go about in Japan. But Hiroshima in particular reminds me of all this and of the horrors of war, as it indeed must be doing to everybody who goes there. I am sure every student in our Campus knows about Hiroshima - the peaceful city in Japan on which the first atom bomb was dropped with dreadful consequences on that unforgettable day (August 6) in 1945. It is an event that teaches many lessons to all of us who live in this modern era.
Our Science Students will know that after the splitting of the atom early in 1939, there was feverish activity among some of the top scientists of the United States aimed at making an atomic bomb. On July 16 1945 the first atomic bomb had been tested in New Mexico and two bombs were soon made available for use against the enemy. But by that time, the war had come to an end in Europe and, in the East, Japan was on the verge of defeat. An atomic bomb was not needed anymore to win the War. In spite of this, an unfortunate decision was made to use the two bombs, made at a tremendous cost, against Japan.

Of the two, one was a plutonium bomb, nicknamed “Fat Man”, while the other, called 'Little Boy', was a uranium bomb. Hiroshima and Nagasaki were among four targets selected for delivering these special bombs.

Early in the morning on August 6, 1945, three American B-29 bombers hovered over Hiroshima. One of them, the Enola Gay, dropped the dreadful Little Boy on the innocent citizens of Hiroshima as they went about unaware of the impending disaster. The following is an eye-witness account of what was seen from above—a account given by the explosive expert Parsons who was in Enola Gay at that time:

“It was at 9.15 when we dropped our bomb, and we turned our plane broad side to get the best view. It was a terrific spectacle. The base of the lower part of the mushroom, a mass of purplish-grey dust about three miles in diameter, was all boiling. The mushroom top was also boiling, a seething turbulent mass. The mushroom smoke reached our altitude. Then another mushroom came up, also very turbulent. It looked as though it was coming from a huge burning fire, and seemed to settle back to earth again. It seemed as though the whole town got pulverized.”

But below, on the ground, it was undoubtedly the most terrible sight in man’s history. Several thousands died immediately, while many more were subjected to untold suffering. The following are taken from accounts of survivors:

“Then a tremendous flash of light cut across the sky. It seemed a sheet of sun. Under what seemed to be a local dust cloud the day grew darker and darker.”

“Under many houses people screamed for help, but no one helped the wounded limped past the screams.”

(In the Asana Park) “It was very crowded, and to distinguish the living from the dead was not easy, for most of the people lay still with their eyes open. The burned ones were quiet. No one wept, much less screamed in pain. No one complained. None of the many who died did so noisily.”

(On a long sandspit by the river, Mr. Tanimoto)
found about twenty men and women........ They did not move and he realised that they were too weak to lift themselves. He reached down and took a woman by the hands, but her skin slipped off in huge glove-like pieces....

"Hundreds of injured people who were trying to escape to the hills passed our house. Their faces and hands were burned and swollen; and great sheets of skin had peeled away from their tissues to hang down like rags on a scarecrow. They moved like a line of ants. All through the night they went past our house, but this morning they had stopped. I found them lying on both sides of the road so thick that it was impossible to pass without stepping on them."

(From the accounts of Rev. Tanimoto and Dr. Hachiya)

Hiroshima on August 6, 1945 was certainly much worse than the hell that man had been imagining for centuries. The following is among the most pathetic accounts left by Dr. Hachiya:

"I came on I don't know how many, burned from the hips up, and where the skin had peeled, their flesh was wet and mushy... And they had no faces! Their eyes, noses and mouths had been burned away and it looked like their ears had melted off. It was hard to tell front from back. One soldier, whose features had been destroyed and was left with his white teeth sticking out, asked me for some water, but I didn't have any."

Hiroshima was 'completely reduced to ashes' and in the streets there were 'hundreds of crumpled bicycles, shells of street cars and automobiles, all halted in mid-motion'.

It is believed that more than a 100,000 people died as a result of the bombing of Hiroshima, but official estimates place the number at 78,150. Several thousands were seriously wounded. Two days later, on August 8, the other atomic bomb, the Fat Man, was detonated over another Japanese city Nagasaki, and there too many thousands suffered the same fate. While these figures may seem dreadful, It should not be forgotten that many more died of American bombing in one night in Tokyo than in Hiroshima and Nagasaki put together.

Today a new Japan has emerged and the scars of the terrible war are not to be seen. But in a corner of this new state Hiroshima stands as a City of Peace, reconstructed on the ashes of the old city, reminding us of the horrors of nuclear war. It is a symbol of humanity's greatest failure - a failure that should teach us much.

But again man has failed to learn. Hiroshima seems to have only taught him to avoid the use of nuclear bombs but not to refrain from perpetratiing the crimes that went with it. The use of the cruel weapons in the war in Vietnam
showed America's failure to learn from the Hiroshima experience. Today, while there is peace among most nations, there is a terrible arms race on. Hundreds of nuclear weapons are being manufactured and piled up, threatening humanity with extinction. And in most countries man continues to perpetrate serious crimes against fellow human beings.

The period of the old-style empires is over. Instead of the territorial expansion that led to the great wars, today many nations are faced with the problem of 'territorial fragmentation'. Virtually every part of Asia, with the exception of Japan, has its share of this problem. This has already led to tragic civil wars as in Pakistan. The possibility of similar wars is looming large in others. Many believe that the Asian nations are searching for a new identity, but in fact, there appears to be a re-emergence of old identities everywhere. This re-emergence threatens to bring back with it all the horrors of war.

Hiroshima is being slowly forgotten. The new generation in Asia and elsewhere needs to be reminded of Hiroshima. The following lines, inscribed on a stone in the modern City of Peace (in Japanese original and English translation) has a message for all of us, for it preserves the real meaning of Hiroshima:

Give Back my father, Give Back my Mother
Give Grandpa back, Grandma back
Give Back my Sons and Daughters
Give me back Myself
Give Back the Human Race
As long as this Life lasts, this Life
Give Back Peace
That Will Never End.

"You cannot" said Linco ln, "bring about prosperity by discouraging thrift,
You cannot strengthen the weak, by weakening the strong,
You cannot help the wage-earner, by crippling the wage-payer,
You cannot help the poor, by destroying the rich,
You cannot establish sound security on borrowed money,
You cannot escape trouble by spending more than you can,
You cannot build character and courage by taking away man's independence,
You cannot help men permanently by doing for them,
what they could and should do for themselves."
NEWTONE ELECTRICALS
Importers, Electrical Contractors & Dealers

Main Dealers in:
- Electrical Goods
- "CENTRIC" Water Pumps, Kerosene & Electric
- S-Lon Water Pipes & Fittings
- Eveready Batteries
- C. B. E. Bulbs
- Gazelle Bicycles.

Visit
NEWTONE ELECTRICALS
141, 143, Stanley Road, Jaffna.  Phone: 7016
Show Room: 440, Hospital Road, Jaffna.

With Best Compliments

SAMUEL SONS AND COMPANY LIMITED
COLOMBO & BRANCHES
Ink....? Ball Points....?

Think Vink... Ask Vink... Use Vink...

Manufacturers:

Velliampati
Alaveddi.

Sale Distributors:

Cargills (Ceylon) Ltd.,
Colombo.

For Students and Academicians

BOOKS
on
SCIENCE
and
TECHNOLOGY

including Agricultural Science, Food Science and Technology, Environmental pollution, Cybernetics, Conservation, etc.

Lake House Book Shop

100, Sir Chittampalam Gardiner Mawata, Colombo-2.
Branches: 6, Wijerama Mawata, Colombo-7 and Galle Face Bookstall, Colombo-3.
With the Compliments of

AUGUSTINE MOTORS LTD.
AUTOMOTIVE ENGINEERS

57 & 59, Jayantha Weerasekera Mawatta,
Colombo 10.

T. P. 31002

T. G. 'REBORES'

With the Best Compliments of
DERCO LABORATORIES LIMITED
Manufactures of:

super
mansel
FOUNTAIN PEN ink

Appointed Agent for Jaffna:
N. M. Sultan Mohideen Hadjiar & Bro.,
123, 125 & 143, K. K. S. Road,
JAFFNA.
Tel: No. 531

Branch: No. 2, New Market,
Hospital Rd.,
JAFFNA.
With Best Compliments From

Tillys Hardware Stores, & Kathir Hardwares,

424, Sri Sangaraja Mawatha, Colombo – 10.

T’Phone: 27439, 35420 & 33713

11/1, Stanley Road.

Jaffna.

T’Phone: 7130

- For Brass fittings
- Galvd. & P. V. C. Pipes & fittings
- General Hardware Etc.

Contact:

BAMA HARDWARE'S

11/3, STANLEY ROAD – JAFFNA.

Tele: 456
With the Best Compliments of

CEYMA
Silk Industries Ltd.

Manufacturers of:

PURE SILK, RAYON, SYNTHETIC & COTTON TEXTILES

Factory: THIRUNELVELLY  Office: NO. 100, BANKSHALL STREET,
JAFFNA:  COLOMBO-11
Telegrams: "CEYMASILK"  Telephone: 35910
Telephone: 7170
Donated by

D. S. Wijenayake

Eheliyagoda.
இந்த பெருமைச்சுற்று பாது மன்னர் நிறைய மகாள் தமிழகம்
சுருக்கு பொறுப்பு
மத்தியிலே.

I. C. P. பவ்வ.
முக மானிக
68, கல்லூரியோ - பாம்பரேன்.

A. K. S.
JEWEL HOUSE
68, KANNATHIDDY - JAFFNA.

 Caller: 519
 Dial: 519
For University Polytechnic
School & Family Requirements

School Text Books
Business,
Management,
Law, Political
Medical & Theological Books.

A wide range of
Indian Publications

Magdonald & Eveans Publications

TEACH YOURSELVE BOOKS

Newspapers, Periodicals & Family Journals
and Stationary for all needs

Jaffna's Leading Book sellers

Agents for many International Publishers

The Organiser for National Lotteries Board, Jaffna.

Poobalasingam Book Depot
BUS STAND VIEW,
4, Hospital Road — Jaffna
With the Compliments from

Savoy Travellers

Savoy Building
Wellawatte
Colombo 6.

DRUGS IMPORTED BY
State Pharmaceuticals Corporation of Sri Lanka
are available for WHOLESALE at
THE JAFFNA CO-OPERATIVE STORES LTD.
420, Hospital Road,
JAFFNA

Tele { Grams: “LAKSHMI” Jaffna.
Phones: 438, 370 & 537.

Space

donated by

New Victors

23, Clocktower Road, Jaffna.
இன்று முன்னேற்றப்பட்டுள்ள வெப்பநோய் தடுப்பு போராட்டத்திற்கு முன்னேற்றம் அளித்து வழங்கும் வேண்டும்

இல்லார முப்புலை
70, மாணுரைமுதிர், புதுப்புறம்.

TISA TOYS
70, MANIPAY ROAD, JAFFNA.

SPACE DONATED
BY
THE TORA LIMITED
32, KASTURIAR ROAD, JAFFNA.

அதுபோறு

சிவன் மாராள்
சர். நார். முக்கோணை சிரி,
மலர் சுப்பிரி,
முதலில்வேர்.
Shopping in Town? drop in at

GARUDA OCTAGON CAFETRIA & GARUDA CAFE
to quench your thirst
Hot & Cool Drinks — Short Eats

Shop at

SUJEIVA MULTI - SHOP

32, MODEL MARKET, — JAFFNA.

Wrist Belt Specialist

The Jaffna Paint House

INTERIOR DECORATORS & CONSULTANTS

Authorised Distributors For:
C. I. C. PAINTS
DUCO
DULUX
PENTALITE

THE BATIK BAR

FOR WONDERFUL SELECTION OF
DYSES
FOR
TIE & DYE AND BATIK WORKS

21, CLOCK TOWER ROAD — JAFFNA.
A fruit drink that really satisfies

LION FRUIT MIX

PHERE BEVERAGES CO. LTD.

Don't Worry!

we are here to solve your TRANSPORT problems between Jaffna & Colombo

"SAIFEE TRANSPORT SERVICE"

MOHAMMED ALI ABDULLAH

(Distributing Agents — M/s. Ceylon Oxygen Ltd.) We meet your requirements in welding materials

Also visit us for Varieties of Gift Articles for any Occasion to have your better selection!

5 & 7, Grand Bazaar, JAFFNA. 81, Old Moor Street, COLOMBO. Phone: 515 T'Gram: SAIFE Phone: 33569 T'Gram: BARWALA
ACKNOWLEDGEMENTS

The Science Student’s Union of University of Sri-Lanka, Jaffna Campus, as well as the Editors of the S. S. U. magazine wish to express their deepest gratitude to the following for the various ways in which they helped us to bring out this numbers of the magazine.

1. The many advertisers for having kindly supplied us with advertisements and thereby helped us to meet the expenses relating to the publication of this magazine.

2. Our President Mr. D. T. K. who helped us with obtaining advertisements.

3. The contributors of articles for having enabled us to maintain a high standard in the publication of this magazine.

4. The Commercial Press & Stores, Jaffna for having done an excellent work in bringing out this magazine.

5. The various script readers and proof readers, especially Mr. W. N. S. Samuel, Principal of Hartley College, Point Pedro. Mr. J. H. Ariyaratnam, Senior Assistant Registrar, Student welfare and Prof. S. Camlath.

6. The Dean of the faculty of science, Prof. P. Kanagasabapathy for the guidance, advice and encouragement that he always gave us, thereby helping us to avoid pitfalls;

7. The Senior Treasurer of the Science Students’ Union Dr. J. B. Selliah.

8. The cover designer our third year colleague Mr. S. Vasantha-de-Silva.

9. The Executive Committee of the S. S. U.

10. The Stenographers, especially Miss. Usha Thirunavukarasu, Miss. Mala Antony and Mr. B. Jeyatileka of the Jaffna Campus and various other well-wishers and helpers without whose ungrudging co-operation and support it would not have been possible to bring out this magazine.

11. The Editors (Naturally)

12. The Readers of the magazine (to make you happy)

TO ALL WE SAY – A BIG THANK YOU.
Now ... With a Single dose you can treat
* ROUNDWORM * THREADWORM * HOOKWORM
DECISIVELY
with Combantrin


COMBANTRIN DOSAGE (Single Dose)

PEDETRIC AND ADULT DOSAGE CHART

<table>
<thead>
<tr>
<th>Weight</th>
<th>Age</th>
<th>Combantrin Number of Tablets of 125mg</th>
<th>Combantrin Oral Suspension 50mg/cc Number of teaspoons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25 lbs</td>
<td>up to 2 yrs</td>
<td>1</td>
<td>½</td>
</tr>
<tr>
<td>25 — 50 lbs</td>
<td>2 — 9 yrs</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>50 — 75 lbs</td>
<td>9 — 13 yrs</td>
<td>3</td>
<td>1 ½</td>
</tr>
<tr>
<td>75 — 100 lbs</td>
<td>13 — 17 yrs</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>100 — 125 lbs</td>
<td>17 &amp; over</td>
<td>5</td>
<td>2 ½</td>
</tr>
<tr>
<td>Over 125 lbs</td>
<td>Large Adult</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

For heavy infestations of Necator Americanus (daily egg excretions greater than 4,000 eggs per gram faeces) it may be necessary to use twice the doses recommended above for one to three consecutive days.

SUPPLY: Oral suspension (Pyrantel Pamoate equivalent to 250mg pyrantel base per 5ml) yellow caramel flavoured.

Tablets (Pyrantel Pamoate equivalent to 125mg, Pyrantel base), orange coloured, scored.

Available at

Pfizer Limited

688, GALLE ROAD, — RATMALANA.
Donated by

P. M. THAIYIB HADJEYAR

EHELIYAGODA.
Quality Printing & Stationery

at

★ Commercial Press & Stores

For your security
Contact

★ Commercial Security Agency

For Tours Abroad
visit

★ Commercial Travel Agency

30, 35, 28, MAIN STREET, — JAFFNA.
DRINK TEA
AS IN
TANGANA

Blended & Packed By
SHAW WALLACE & HEDGES LIMITED