A centre of cultural gravity

The theatre is for every man.

The art student studies the plays as literature. The playgoer listens and watches, and enjoys the performance—or criticises it—at his own level: words, construction, character; the message, the acting; decor and presentation; stimulation and involvement; or mere entertainment.

At least at the informal or personal level (as against the organised classes in literature and criticism), and at the amateur, repertory and experimental level (as against the box office in town), the theatre has a place in the University.

Five years ago, Monash acquired its Alexander Theatre for the presentation of plays, and more recently its Great Hall (Robert Blackwood Hall) for the great University occasions and for the presentation of concerts; not only by on-campus groups, but by visiting celebrities and players.

Blessings like Alexander and Blackwood are to be enjoyed not only by the transient population of students, but also by the friends and neighbours of Monash.

Monash University is at the centre of a large urban area—from, say, Caulfield to Dandenong, and from Blackburn to Frankston—whose half-million inhabitants are as likely to be interested in the theatre and the arts as, say, those of St. Kilda or Carlton.

As a centre of cultural activities, entertainment and stimulation, Monash sees a future in its theatre, in its hall, and in its Union.

Recent events show signs of fulfilling that future: the pantomime "Pinocchio" in Alexander Theatre, the Summer School in the Union, and a series of concerts in Robert Blackwood Hall, including visits by the Academy of St Martin-in-the-Fields string group and the Melbourne Symphony Orchestra.

... or ANTI-gravity

To a child, pantomime can mean a transport of delight to a land of fun, magic and adventure; to the grown-up it could mean all that—and more.

More than 8,000 children from town and country, and some 3,000 grown-up camp followers, found their way to Monash's Alexander Theatre in January this year to enjoy "Pinocchio".

The critics described it as "the only holiday show in or around Melbourne that truly earned the title of pantomime".

The production of J. M. Barrie's "Peter Pan" last year and of "Pinocchio" this year, has well begun the tradition of summer children's theatre at the Alexander.

The Alexander Theatre Guild, which operates the theatre on behalf of the University, is planning already for 1973, and is looking at ways of encouraging children's theatre at other times of the year.

In association with the Guild, "Pinocchio" was created and produced by the Pan Pow 72 Company—a co-operative group of Monash and other students, teachers on vacation, and University staff.

Producer was Miss Marie Cumisky, well known in both commercial and amateur theatre. John Wallis, a teaching fellow in Monash's English Department, wrote the lyrics; Savvas Christodoulou, a second year law student at Monash, wrote the music.

MONASH is produced five times yearly by the Information Office, Monash University, Wellington Rd., Clayton, Vic., 3168. Inquiries should be addressed to the Editor, c/o the Information Office.
Doing your own thing

In the vacations, especially in the long summer vacation, most Australian Universities offer their space and facilities, and often residence in the halls and colleges, for a wide variety of conferences and schools: usually for professionals or managers, typically specialist and private, typically high-pressure, and typically expensive.

While most of those schools and conferences are run by outside bodies, including business houses who in effect hire university or college premises and facilities, some are offered by the universities themselves as postgraduate refresher courses in academic and professional fields.

Over the last three summers Monash has opened its doors, particularly the University Union, to the public for a school of a different kind: neither refresher courses nor repeats from the academic year, but popular courses for the citizen.

The courses provide intellectual stimulation, though not academic study (drama workshop, film making), a glance at other people's work (computers, interior design), practice rather than precept (typewriting, Italian), elementary rather than erudite, arts and crafts rather than analytical discussion (pottery, photography), for the newcomer and tyro rather than for the expert (jewellery, silk-screen painting).

Some 39 courses were offered in the series just ended, running over two or three weeks, for hours each day, some at night.

A thousand participants were accepted, 40 per cent students of the University, 60 per cent from "the community": medics and typists, managers and housewives, laborers and salesgirls. Three thousand were turned away. Instructors were practising specialists, most from outside, but some from inside the University.

It was good to see a thousand people in groups as small as nine or ten (a large group cannot fit around the weaving looms) happily and enthusiastically doing, for a trivial fee, the things they wanted to do—just because they were interested.

The University regards such efforts, though not academic in the ordinary sense, as proper extensions of its activities: within the walls and in the Union, but to a wider public—a community service well suited to the University's aims and resources.

Arrangements for the summer school, and for other non-academic instruction to students during the year, are made by the Union's Activities Officer—for the last three years, Miss Carina Hack, who recently left to become Director of Aquarius, the Cultural Foundation of the Australian Union of Students. Miss Vicki Molloy has taken her place.

BLACK BOXES

How can we run experiments on a complex enterprise, when we know that to change a going concern for the sake of seeing what would happen would, for a variety of reasons, be totally unacceptable?

The answer that management looks for, and that modern scientists and engineers can often supply, is to substitute for the real thing an image of it in the form of a model or simulator; in effect, a block box.

That would be possible, provided the elements in the real thing, both hardware and operations, and the relations between them, can be reduced to mathematical statements.

The "thing" becomes a "system" that can be represented by a model, a simulator, a program on a computer, that works not on the real thing, but on the mathematical or programmed representation of it.

Incredibly small

Compared with the size of the real system, the block box is incredibly small; compared with time in the real system—say operation of it over days, weeks or years—simulator time is incredibly short (though the writing of the program may take much thought, time and effort).

So, to forecast what is likely to happen to the real system in this event or that (be it a determined or a random event), we can run as many trials as we please on the model or simulator, at relatively little cost, and without tampering with the system itself.

In this issue and the next, we will briefly describe work at Monash on the operation of two industrial systems by model or simulator, and the control of a biological process by computer.

An economist looks at the distribution of goods through a firm from factory to consumer, and a group of electrical engineers show how a digital computer is used in the control of an artificial biological process—anaesthesia.

Electrical engineers have also solved a difficulty in the representation by electronic model of a large electric power system, particularly in the simulation of the generators. This work will be described in the next issue.
Simulate: Simulation of a company

Manufacturers could make significant cost savings if they were to look upon the distribution of their products as an integrated system rather than as an amorphous collection of warehouses, transports and retail outlets.

This is one of the lessons to be learned from a study being undertaken in the Monash department of economics.

According to Dr. Peter Gilmour, a lecturer in the department, the three other main systems in a typical manufacturing concern—finance, production, and marketing—have been closely studied; the distribution system—the movement of goods through space and time from factory to consumer—has been largely ignored.

Yet, for effective management, a firm should be able to minimise the total costs of distribution consistent with the level of service it has decided to provide to its customers.

Because the distribution system is typically complex and dynamic (that is, some or all of the elements within it are likely to change with the passage of time), why not look at the system through computer simulation? The method is well enough known in other areas, particularly in engineering.

Gilmour, working with a research team at Michigan State University, USA, has done just that: developed a simulator to represent the distribution system of a national manufacturer of pharmaceuticals.

By running the model in various ways, they produced in a matter of hours a forecast of the operating results of the system over a period of 10 years, in terms of cost and customer service.

The model also revealed changes in cost and service that would accompany any foreseeable change that might be imposed by outside circumstances, such as changes in wage rates, in methods and cost of transport, or in the pattern of customers' demand.

Back in Monash, Gilmour is simplifying the model to reduce computational costs, and to fit it to the distribution networks of Australian firms. He is also working on a generalised simulator for the manufacture of goods, which, when completed, could be linked to the distribution model on one side, and to a model of materials supply on the other.

The model is a four-part simulator that requires input data from the real distribution system, and also requires inputs that describe the industrial, commercial and fiscal environment within which the firm is operating. The four subsystems of the model are: the demand and environment generator, operations, measurement, and monitoring and control.

The demand and environment generator is based on a random sample of orders drawn from the firm's records. That information is used to construct a matrix of customers' ordering habits; when further combined with sales forecasts, it is possible to assign characteristic orders to specific groups of customers. The buying pattern and changes in it can thus be fed into the computer.

Computer 2: Respiration and anaesthesia

Medicine, both scientific and clinical, finds increasing scope for the digital computer, where it is most commonly used for the efficient processing of data for rapid presentation of experimental or test results to the scientist or clinician.

So far, comparatively little use has been made of the digital computer to use those processed test results to control experiments or directly to administer medical treatment.

However, a bio-engineering group at Monash University, Mr. J. R. Coles, Dr. W. A. Brown and Professor D. G. Lampard, has succeeded (it is believed for the first time) in using a digital computer for the simultaneous and direct control of a number of biological functions in an anaesthetised animal.

Although just emerging from its preliminary stages, the Monash study has clearly shown that "on-line" computer control of some of the functions of a biological organism is entirely feasible.

It is not expected that such a system would be used in routine surgery. But, for more specialised experimental work and in very long and difficult surgical procedures, the system, which is to the anaesthetist more or less what an auto-pilot is to the aileron pilot, may well find a significant place.

The computer, a small one as computers go, was specially designed for control purposes; it was developed in the Department of Electrical Engineering as part of a project in control systems.

The computer is being used to control artificial respiration, and to administer continuously an anaesthetic consisting of gaseous and volatile agents.

In order to do this, a number of physiological variables—for example, blood pressure, proportion of oxygen in the inspired gas, proportion of carbon dioxide in the expired gas, and so on—are continuously measured using special electronic techniques; the electrical voltages representing those quantities are fed to the digital computer.

From these measurements the digital computer calculates the proportions of the gases, oxygen and nitrous oxide and volatile anaesthetic (for example halothane), that must be mixed and fed to the patient or animal.

At the same time the computer also works out the depth of respiration (size of breath) that the artificial ventilating equipment must provide.

For all those calculations, the anaesthetist sets up the computer's program in advance, aimed at automatically maintaining a desired state of respiration and anaesthesia.

Continued next page
"Don't tell me that," said Jones in argument with Smith, "I only believe what I can see." To which Smith in all fairness replied "Well have you got any brains? You can't see them; and, for that matter, neither can I."

No doubt Smith was able to produce evidence other than visual that he had brains and sometimes used them.

By the same line of argument, medical science has been able to infer evidence other than actually seeing it, that in some circumstances the body's own cells can attack and successfully destroy foreign invading cells—the notion of immunology.

Yet it was only recently that Professor R. C. Nairn and his colleagues in Monash's Department of Pathology at the Alfred Hospital were the first to see—through the microscope recorded on the time-lapse camera over several days—the progress of the attack on human skin cancer cells by the particular protective cells of the body, the lymphocytes.

That event was novel enough to enjoy high priority of publication in the British Medical Journal of December 18, 1971—"Specific Immune Response in Human Skin Carcinoma" by Nairn and his departmental colleagues. The lay press in both Sydney and Melbourne also mentioned it.

Not surprisingly, the observations were not made within the patient's body, but on a sample small enough to fit on a microscope slide to be viewed by appropriate microscopy.

The observed sample contained, within a suspending medium, the tumour cells (of skin cancer) and two or three times as many lymphocytes from the patient's blood.

In their paper in the British Medical Journal, the authors make the simple statement:

"Within an hour or two of being added to the tumour cells, some lymphocytes became firmly attached to many of the tumour cells, often no more than one or two per cell. Progressively over the course of five days such a tumour cell was totally destroyed. The sequence of events in this process could be followed in most detail by time-lapse cinephotomicrography."

The accompanying set of stills from a time-lapse cinefilm is taken from the paper.

In discussing the work, Nairn mentioned that similar studies had recently been completed on a large series of patients with the black cancer of the skin, the malignant melanoma. That work was done in conjunction with the Queensland Melanoma Project. "Queensland gets a lot of skin cancer from the effect of strong sunlight on fair-skinned people," Nairn says.

"These skin cancer findings have just been reported to the recent International Cancer Conference in Sydney; there the interesting point was made that immunological activity is much more frequent in the usual type of skin cell cancer than in melanoma.

"Perhaps this is the reason why skin cell cancer has a much better outcome, in that most can be cured if not seen too late—whereas the malignant melanoma, not enjoying quite the same immunological response, is much more dangerous.

"That is to say the virtually complete immunological reactivity against skin cell cancer may restrain it from seeding and spreading to other parts of the body long enough for medical treatment to be started and be fully effective."

As leader of the team, acknowledging the contribution of his colleagues, Nairn particularly praised the skill of his technician, Mr. C. Cusdin, who designed and assembled the arrangement of time-lapse cinemicroscope and operated it during taking of the film.