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ADAPTIVE CONTROL PROCESSES

A Guided Tour

by *Richard Bellman*. A panoramic view of what an ingenious mathematician does when faced with the myriad problems of automatic control. The author has minimized detailed rigor in the interest of making clear the basic ideas in a broad spectrum of applications. He shows how to get solutions to engineering problems which cannot be solved by conventional methods and provides ways to reformulate problems so they are amenable to machine computation. A *RAND Corporation Research Study*. \$6.50

DYNAMIC PROGRAMMING
by *Richard Bellman*. 1957. \$6.75

STABILITY IN NONLINEAR CONTROL SYSTEMS

by *A. M. Letov*. Translated by *J. George Adashko*. "A plain, unsophisticated, painstakingly thorough treatise on application of Lyapunov's direct method."
—*DR. J. P. LASALLE, Mathematical Reviews*

The author, a Nobel prizewinner, is held in highest esteem by U.S. control experts. He has added to the American translation several additional chapters not included in the original. \$8.50

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by *Douglas S. Billington and James H. Crawford*. This up-to-date investigation is especially geared to the needs of the experimental solid-state scientist. Both a stimulating introduction and a valuable reference, it includes evaluations of various experimental techniques and radiation sources currently employed. *Investigations in Physics*, 7. \$12.50

HYDRODYNAMICS

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by *Garrett Birkhoff*. SECOND EDITION, REVISED AND ENLARGED. W. M. Elsasser called the first edition, published 10 years ago, "indispensable to all those engaged in hydrodynamical research who are concerned with the type of generalization that so often in the past has let to fundamental progress." \$6.50

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Letters

Fell Swoop

With Tom Brown safely underground for some 250-odd years, perhaps one may be allowed to adapt his famous lines, and to thank Honor B. Fell for her delightful "Fashion in cell biology" [*Science* 132, 1625 (1960)] as follows:

Well do I like thee, Dr. Fell,
The reason why I fain would tell;
Since fads in cells thou dost dispel,
Well do I like thee, Dr. Fell.

F. B. HUTT

Department of Poultry Husbandry,
Cornell University, Ithaca, New York

Statistics and Legalized Gambling

Your 23 December issue [*Science* 132, 1859 (1960)] contained an excellent editorial on the value of properly weighted and applied statistical evidence. Thornton Page had an article, "Recent statistical studies in astronomy" [132, 1870 (1960)] which illustrated fine use of the method.

Unfortunately, there appeared in the same issue [132, 1879 (1960)] a prime example of the ignorant and careless use of statistics, a news note entitled, "... More is spent on [legalized] gambling than education," which included a statement by the "Council for Financial Aid to Education" to the effect that Americans spend \$20 billion a year for legalized gambling while only \$4.5 billion goes for higher education, the \$4.5 representing only half the actual cost, the other half being found in various ways by the institutions.

Neither your editor nor the council, in their zeal for drama, caught the falsity of the figures and their statistical misuse.

1) At least 90 percent of legalized gambling is on horse racing, on which there was a turnover of \$1 billion in New York and no more than a total of \$2.5 billion for the whole country.

2) This money is not all "spent"; 85 percent goes back to the bettors. Even if \$4 billion were bet, all but \$600 million is retained by the public. Of the \$600 million, about \$350 million goes for state taxes, some of which is used for higher education. The remaining \$250 million goes for upkeep of the tracks and for salaries and purses, and much of it is subject to federal income tax, a fraction of which is included in university grants.

Racing is conducted on a nonprofit basis at all New York tracks—Delaware, Aksamit, Fairgrounds, and Keeneland. The profits are donated for higher education, research, and civic

causes. Many more millions are donated each year for the same purposes by the profit-making tracks. Racing and breeding provide employment for thousands who pay taxes to keep the wheels turning.

What did the council mean by "spent" money? Did they mean wasted money? Does anyone really know about "money"? On any basis, higher education does not suffer because of legalized gambling. If all money were put into education and the mere raising of potatoes (production of essentials), we would have the Puritan New England of 1750 (and about 60 percent of our people would be out of work).

Ordinary gambling needs no justification. Those who live in the world of reality realize that it is an established human urge and that even a small wager provides a bit of romance, however fleeting, in the drab life of millions of people.

The majority of the faculty members of our universities are well informed, but all professors are not necessarily intellectuals, and all scientists are not educated, as was readily admitted in his own defense by J. Robert Oppenheimer.

Fortunately we have only a few who deserve to be called eggheads and who would have made the mistake on gambling statistics. However, when they appear they are as conspicuous as the rare drunken son of a religious leader.

More and more academicians are in the spotlight, and more is expected from them than from any other group. Scientists, previously silent, are now articulate (sometimes vociferous) on public matters, and Kennedy has gone to the universities for many high-ranking appointments (and good ones).

For the sake of the students and of the nation, we hope for our educators and scientists a complete education in the "humanities," meaning not only the proper university disciplines but also the humanities of the world at large—knowledge of things in general and of the facts of life.

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Naming Enzymes

Enzymes are usually named after the substrate used by the investigators who first describe them. The name is not necessarily stable, because further work may show that other substrates are attacked. For instance, tyramine oxidase is now called monaminoxidase because many amines besides tyramine are oxidatively deaminated by the enzyme. Such a change in name is desirable, as is any change which defines more precisely the activity of the enzyme.