Now the latter inequality is equivalent to

$$d_- + d_0 + d_1 + \ldots + d_{t-1} \leq d_+ - (d_1 + \ldots + d_{t-1}),$$

hence we have

$$d_+ \leq d_0 + d_- \leq d_+ - 2(d_1 + \ldots + d_{t-1}).$$

This can be true only if $d_+ = d_0 + d_-$ and $d'_- = d'_0 + d'_+$. If we shift block $[a, b]$ one position down from where it was in p', we obtain a new placement p'' of cost equal to p', hence p'' is optimum. Furthermore p'' is *closer* to the given placement, in an obvious sense, so the proof will eventually terminate.

It is interesting to note that the above proof does not use the hypothesis $h_1 \leq \ldots \leq h_N$; it characterises the optimum placements for arbitrary (even non-integral) h_j. If $N = 2$, with $h_1 = 100$ and $h_2 = 1$, there are actually one hundred optimum placements, namely $p_k(j) = k + j$ for $-1 \leq k \leq 99$. The additional hypothesis $h_1 \leq \ldots \leq h_N$ leads to a slightly stronger theorem, showing that the optimum placements are more constrained: When $h_j \leq h_{j+1}$, we have

$$h_j - p(j) \leq h_{j+1} - p(j) = h_{j+1} - p(j+1) + 1,$$

for j and $j + 1$ in the same block. The above proof can now be strengthened to show that $d_1 > 0$ (and hence $t = 1$) whenever p has no up-blocks. Thus, two optimum placements p and p' must have $|p(j) - p'(j)| \leq 1$ for all j, whenever the h_j form a nondecreasing sequence.

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Book reviews

The Management of Problem-Solving, Positive Results from Productive Thinking, by G. Tarr, 1973; 160 pages. (*Macmillan*, £3·95)

Management today is either self-consciously scientific or nervously aware that it ought to be: it is inclined to snatch at instant techniques ready-made for the amateur—the unqualified in pursuit of the unquantifiable. Or, it may resort to experts, but too rarely enquires whether the consultancy is itself well managed, or from what source it draws the experience it proposes to dispense. Of course, rather than expecting to have to take the advice the client may be buying an alibi, so that he can support his claim to have left unturned no stone under which efficiency might have lurked. Their clients as well as those who manage the management-problem solvers would do well to read Graham Tarr's little book. His presentation is easy but not condescending, and his prose very readable.

The book 'is intended to be wise rather than learned'; these are the author's own words and ever so slightly off-putting, but he makes good his claim, for while accepting that it is not possible to teach experience he has most helpfully distilled his own. But, what are the signs of wisdom? First, there is the author's practical scepticism about techniques-mongering, then his advocacy of insight rather than processing, his emphasis on the need to quit the trees to see the wood, the value he attaches to common sense and practical men as touchstones for the reputed jewels discovered by analysis, and his reminder of the supreme danger of believing that the solution found is the one best, instead of, at best, one of the best. Again, there is more than a whiff of experience about his comments on managing a project team, on conducting a choir of soloists, on the earnest technical dogmatism that blinkers the young analyst, on the necessity of measuring progress but the impossibility of measuring output; above all, on the need for project leadership and its importance for the quality as well as the quantity of the team's output.

But, this book is not all broad philosophical generalisations, it contains many shrewd comments on the day-to-day conduct of work and the crises of life in a group of problem solvers. It would be a particularly good present for a young man or woman recently, and rather too rapidly, promoted to team leader. Leadership cannot be learned from textbooks, it has to be caught rather than taught, but this book is no textbook, it is a sharing of experience and as such well worth reading and discussing over a pipe or a pint.

F. J. M. LAVER (Sidmouth)

Information, Computers, Machines and Man, edited by A. E. Karbowiak and R. M. Huey, 1971; 347 pages. (*John Wiley and Sons*, £4·50)

This book consists of a series of papers written by the staff of the University of New South Wales with the object of illustrating the methods and concepts that can be applied in the field of systems engineering. It is based upon courses run for 1st and 2nd year students of Applied Science and Engineering, but has been extensively broadened and modified to make it pertinent for those with a more general interest.

The book is structured into three sections which may be referenced independently. Initially the elements and concepts of systems engineering design are covered, with some useful definitions and explanations of the logic and mathematics involved. References are made to analogous biological systems, and there is a valuable chapter on Human Systems, outlining some of the problems in the control of multi-discipline teams and the interaction between professional non-technical management and specialist teams.

The second section covers the more scientific and technical aspects of engineering systems, with detailed accounts of some of the more important materials and components used in control systems. It also includes two chapters on computer architecture and programming which—although unduly IBM 360 oriented—give a useful summary of these topics to the professional engineer who wishes to use or even program a computer, but without the obligation of becoming a computer man.

The final section consists of a discussion of actual systems, including biological, and endeavours to draw together the concepts and material technology developments previously covered. It outlines the likely growth in the application of technology to our way of life, and emphasises the importance of proper planning for change, insisting upon the overwhelming need to consider human factors when inducing such change.

Information, Computers, Machines and Man, despite its over-comprehensive and somewhat pretentious title, is in fact a useful introductory text on systems theory, enhanced by comprehensive examples and an explanation of the fundamentals of systems engineering. It does however suffer from a lack of co-ordination and relevance in many places. This might not be important when it is placed within the wider environment of a degree course, but will be troublesome to the general reader who might justifiably think, from both the fly-leaf and the introduction, that he has acquired a consistent study text on systems engineering. Nevertheless the approach taken is sufficiently broad that both computer professionals and engineers will find it helpful for the analogies drawn, the future developments suggested, and the human and organisational problems outlined.

J. WOODS (London)

Short notice

Computers and Society, by A. S. Douglas.

This is the text of Professor Douglas's inaugural lecture to the London School of Economics and Political Science, on his appointment to the Chair of Computational Method at the LSE.