and assisting with the development of the compiler. For extensive use of the computing facilities available in Cambridge it is our pleasure to thank the Director and Staff of the Mathematical Laboratory.

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Book Review

New Methods of Thought and Procedure, edited by F. Zwikcy and A. G. Wilson, 1967; 338 pages. (*Springer*, 79s.)

This book contains contributions to a Symposium in Methodologies sponsored by the Office for Industrial Associates of the California Institute of Technology and the Society for Morphological Research, held at Pasadena in May 1967. The contents include a short prologue by Zwicky, six sections on Operations Research, Systems Engineering, Dynamic Programming, Information Theory, Game Theory and Morphological Research ending with an epilogue by Wilson.

The opening paragraph of the epilogue perhaps best sums up the aspirations of the organisers. Wilson says 'A primary purpose of this conference has been to consider whether the various methodologies employed in solving problems when taken together constitute in themselves a useful scientific and technological discipline. The descriptions of the several approaches to problems that have been presented here—Operations Research, Systems Engineering, Morphological Analysis, etc.—have made visible some common principles which have been independently developed for structuring, analysing, and solving complex problems of many types. Though using different names and terminologies, the identities and overlaps contained in these approaches, taken with the fact of their independent discovery in many diverse contexts, strongly suggest the developability of a useful discipline that we may call 'methodology'. Although the presentations during this conference have only partially defined the subject area of methodology, thay have demonstrated that it would now be meaningful to take steps towards systematic definition and organisation of the concepts so far developed and establish a formal discipline.' Zwicky in the chapter of Section VI on Morphological Research defines his approach thus: 'The morphological approach to discovery, invention, research and construction has been conceived and developed for the purpose of dealing with *all* situations in life more reasonably and more effectively than hitherto. This is achieved through the study of all relevant interrelations among objects, phenomena and concepts by means of methods which are based on the utmost detachment from prejudice and carefully refrain from all prevaluations. Applications of the morphological methods of the total field coverage, of negation and construction, of the morphological box and others to technical problems in particular and to human problems in general are described. These not only illustrate how discovery, invention and research can be conducted most effectively but also how the morphological approach makes possible the clear recognition of those fatal aberrations of the human mind which must be overcome if we are ever to build a sound world.'

So far as the individual contributions are concerned, I doubt if the Conference was really a success from the standpoint of the editors. Each section contains at least one contribution of real merit—Bellman's chapter 'Dynamic Programming: A Reluctant Theory' is, to me at any rate, a wholly convincing and delightful description of how he got into Dynamic Programming, but like most contributions appears to add little to realising the aims of the Symposium, unless it is the claim that almost every problem involving decision-making is a problem involving multi-stage decision-making to the solution of which dynamic programming provides a comprehensive approach.

Most Operational Research workers would probably agree that problems need to be approached from many angles and can seldom be isolated completely from their context. Not enough people trying to instal computers in industry and commerce realize that the accounting systems, techniques of stock control and other management sciences which they seek to computerize are in fact devices to control a working system; the implementation processes involve the destruction of the former control system and the creation of a new one which when embedded in the working system interacts with it and more often than not causes it to change. This failure to appreciate the 'ecological' balance between various parts of a system explains, in my view, many of the failures of industrial and commercial computer installations. Thus, it must be concluded that Zwicky has a case to argue. In his own chapter, however, I believe he goes too far, at least in so far as his description of devising a missile launching system is concerned. For he proposes that the morphologist will study the whole class of possible solutions to the problem, before reaching a decision. There is a danger in this that no progress at all will be made since the results of all possible research—future as well as past—have to be considered.

Having suggested that the contents of the book do not, as a whole, achieve the editors' purposes, I can nevertheless recommend it to readers. Most of the individual contributions have a value in their own right and are well worth study. No one could fail to profit by reading the excellent papers on Systems Engineering by Dean Gillette of Bell Telephone and on Games Theory by Oscar Morgernstern.

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