

which I have often supported. For example (page 32), the importance of partial ordering of intuitive probabilities is emphasized: and (on pages 212–213) Hacking expresses simultaneous admiration and dissatisfaction with de Finetti's explanation of physical probabilities in terms of subjective probabilities. He has privately apologized for misrepresenting me on page 110. I. J. GOOD

PLANNING AHEAD

Manpower Planning

Operational Research and Personnel Research. (A Conference under the aegis of the NATO Science Committee, Brussels, 17–20 August 1965.) Pp. v+291. (London: English Universities Press, Ltd., 1966.) 55s. net.

THERE is much of interest to manpower planners, at the level both of the company and of the national economy, in this volume of conference papers. The authors describe a part of the military experience of a number of member countries of NATO in dealing with problems of recruitment, training and the efficient use of human resources. It is not for the first time that war—or the preparation for war—has meant that a particular management problem has been taken seriously; and it is not surprising that a quarter of the conference papers should be concerned with the operational research techniques themselves, rather than with the subject matter to which they might be applied.

Two of the discussions at the conference centre round the human element in personnel planning. The selection of an individual for employment, or enlistment, often occurs before any judgment can be made about the successful fitting of man to job. No personnel or recruiting officer can avoid applying tests, whether objective or subjective, at the interview. Co-operative investigation by psychologists and operational researchers should in the future indicate the attributes of human personality which ought to be tested and the criteria that should be used for later performance—questions to which, at the moment, only partial answers may be possible.

The training of the individual to a pitch of proficiency required by the job is the second subject discussed. This is something to which military manpower planners apply quantitative techniques, and it is from this subject that programmed learning stems. For those to whom the idea of such a technology of training is still novel, there is a detailed and fascinating comparison in cybernetic terms between a closed loop system (in which the performance of the trainee feeds back to determine the training stimulus) and the open loop system characteristic of conventional training courses. Training officers in industry could well take note, if they have not done so already, of the principles that emerge from this idea: rigorous job analysis, specific objectives to any training course, a variable training period and a fixed end-result (rather than fixed training period and variable end-result).

The employment of human resources, considered as a group rather than as individuals, poses two types of problems for the manpower planner, one of which is discussed explicitly. This is the natural or induced rates of participation in a certain form of employment, in this case membership of the armed forces; and the geographical and hierarchical mobility required or made possible by the strategic location and command system of the armed forces. Solutions to the analogous industrial problems are suggested here: the industrial labour market may, for example, yield similar measurable supply curves which indicate pay-setting procedures effective in obtaining adequate labour.

The conference was almost entirely silent on the other main problem of manpower planning, though there were signs that it had not been neglected. This is the estimation of future needs for various types of men. The in-

redients for a solution must be: future military budgets, the technology of future weapon systems, and the needs that these imply for servicemen of different ranks and skills. Clearly a considerable integration of the personnel and technological planning activities takes place—you do not design a warship without detailing its crew's accommodation or an electronic tracking system without its maintenance staff—and this consideration greatly simplifies the problem of forecasting the manpower needs of future techniques in a military context. The need for military secrecy may hide the details of how such tasks are carried out, but the lesson for civil manpower planners is the need to co-ordinate economic, technological and manpower information relating to the future.

Finally, it should be said that the price of this volume seems excessive. It is adequately but by no means elegantly produced, being in fact offset reproduction from unjustified typescript. It is a conference volume, and so it seems likely that royalty considerations would not loom very large. And it is sponsored by an international organization which, in organizing conferences, must be mainly concerned with the exchange and dissemination of ideas.

RICHARD STONE

BODY FLUID CONTROL

Electrolytes, Fluid Dynamics and the Nervous System

By Joseph Henry Cort. Pp. 228+3 plates. (Prague: Publishing House of the Czechoslovak Academy of Sciences; New York and London: Academic Press, 1965.) \$10.

TITS is an unusual book on fluid and electrolyte metabolism. The chemical structure and routine analysis of the body fluids are not dealt with—no matter as there are many excellent texts available—but what is unique is the comprehensive and detailed consideration of the control of the fluids and electrolytes of the body and especially mechanisms which may be involved in the control of extracellular fluid volume. The important chapters are Chapter 3, "A Selective Review of Those Parts of the Nervous System thought to be involved in the Regulation of Body Fluids" (eighteen pages); Chapter 4, "The Innervation of Separate Organs in relation to Their Interactions with the Extracellular Fluid" (thirty-one pages); and Chapter 7, "'Volume' Reflexes, or the Relationship of Haemodynamics to Na Balance" (seventy-nine pages).

One of the crucial observations considered in Chapter 7 is the rise in water and sodium excretion which occurs when both common carotid arteries are occluded. Cort believes that this natriuresis depends partly on afferent impulses arising in the thorax, as the response is reduced after cervical vagotomy. The fact that vagotomy also augments the pressor response to carotid occlusion makes it unlikely that it is the rise in filtration pressure which causes natriuresis. Furthermore, the posterior nucleus of the hypothalamus appears to be involved in processing the afferent nerve impulses from the various baroreceptors, because after destruction of this region an animal goes into negative sodium balance and the natriuretic response to carotid occlusion is abolished. The onset of the natriuretic reflex is rapid and the reflex can be elicited after adrenalectomy; it can also be obtained during infusion of aldosterone, vasopressin or angiotensin in amounts which are large compared with the amounts produced endogenously; finally, denervation of the kidneys or administration of dibenzylamine does not seriously affect the response. Thus the efferent signal to the kidney is probably humoral, though neither aldosterone, vasopressin, angiotensin nor the catechol amines are involved. As a working hypothesis Cort suggests that the natriuretic response involves "1. inhibition of release of an anti-natriuretic factor (? vasotocin) related to inhibition of