drift (cubic yd./yr.) to maximum spring tidal flow (cubic yd./sec.) is greater than 200–300, sand generally crosses the inlet on a submerged offshore bar: if the ratio is less than 10–20 the transfer of sand across the inlet involves the movement of tidal channels, and there is no stable offshore bar.

The book ends with a short section on the design of tidal inlets, and it is pointed out that, for stable inlet conditions, the tidal prism and the maximum tidal flow must be large in comparison with the littoral drift and that a suitable stability shear stress must be chosen. A comprehensive bibliography is included.

Stability of Coastal Inlets can be recommended to all those interested in the design of new inlets, or the improvement of existing inlets and estuaries.

W. J. REID

MATHEMATICAL STUDIES IN THE PSYCHOLOGY OF WAR

Statistics of Deadly Quarrels

By Dr. Lewis F. Richardson. Edited by Quincy Wright and C. C. Lienau. Pp. xlvii+373. (London: Stevens and Sons, Ltd., 1960.) 63s.

Arms and Insecurity

A Mathematical Study of the Causes and Origins of War. By Dr. Lewis F. Richardson. Edited by Nicolas Rashevsky and Ernesto Trucco. Pp. xxvi+307. (London: Stevens and Sons, Ltd., 1960.) 63s.

The Strategy of Conflict

By Prof. Thomas C. Schelling. Pp. vii+309. (Cambridge, Mass.: Harvard University Press; London: Oxford University Press, 1960.) 50s. net.

WARS begin in the minds of men. Hence the study of war is essentially a task for psychology, and as such demands scientific treatment. Specialists in other fields have been ready with explanations based on some cherished concept of their own—the instinct of pugnacity, the growth of population or the expansion of trade, the ambitions of nations or their leaders, a society based on acquisitiveness and aggression, carried away by emotional forces similar to those that generate conflict and disharmony in the mind of the individual. But, until quite recently, no one has specialized in research on war psychology as such, or attempted a systematic analysis of the available data to check and verify these alternative theories by the methods of empirical science.

The pioneer in this newer approach was Lewis Fry Richardson. A Quaker by upbringing and a physicist by training, his guiding principle was to study war and peace by the same quantitative techniques that he developed for the solution of apparently intractable problems in the field of physics; and as early as 1919 he published a short pamphlet on *The Mathematical Psychology of War*. His best-known work was in applied mathematics and meteorology. His highly original paper on "The Approximate Solution by Finite Differences of Physical Problems Involving Differential Equations" anticipated the method of 'relaxation'; and his book *Weather Prediction by Numerical Process* has been acclaimed as "the first textbook on dynamic meteorology".

In 1926 he was elected a Fellow of the Royal Society; and shortly afterwards, at the age of forty-eight, took an honours degree in psychology. From 1930 until his death in 1953 he devoted himself almost

entirely to what he called "generalized foreign politics". His various investigations were collected and embodied in two major books, which, thanks to the generosity of United States scholars and the Littauer Foundation, have now been edited and published.

The first is concerned primarily with the problems and consequences of an 'arms race'. Richardson's plan is to express the underlying tendencies in the form of two differential equations. From these he deduces a variety of corollaries which he then seeks to verify by comparing the theoretical 'predictions' with the actual data for the periods that ushered in the two World Wars. A further deduction, based on the usual method for determining a position of equilibrium, enables him to formulate the conditions that are most likely to ensure a stable balance of power.

His second book treats war as a "large scale example" of what he terms "deadly quarrels"—a phrase which includes any form of human conflict issuing in the death of one or more of the contestants—murder, gangsterism, and banditry, as well as the wars of history. With amazing industry he has compiled a mass of information relating to the causes of the various outbreaks during the years 1820–1929, and supplements it by the data collected by Prof. Quincy Wright for the "wars of modern civilization". He then attempts to estimate the relative importance of the causes commonly alleged by an exhaustive statistical analysis. His chief conclusion is that wars are due to a wide variety, and usually to a plurality, of predisposing and precipitating factors. The mistake of previous theorists was to single out and over-emphasize just one of many. Of the three main groups he considers geographical conditions more important than economic, and psychological more important than either.

Both volumes, however, are restricted to conditions obtaining before the Second World War, and are therefore of greater interest to the historian than to the student of contemporary politics. Dr. Schelling, who is professor of economics and an associate of the Centre for International Affairs at Harvard University, is concerned with newer problems arising from the development of nuclear bombs and intercontinental missiles. His method is to estimate probabilities rather than to measure causal forces; and his mathematical techniques are those of the economist rather than the physicist. He points out that the present situation is no longer one of "pure or absolute conflict", but of "conflict resting on a basis of certain common interests". On either side the policy that results is a series of competitive manoeuvres in which each tries to win the maximum advantage for himself without necessarily inflicting an equal disadvantage on the other. In simplified form such situations are dealt with in the 'theory of games' where the game is of the 'non-zero sum' type. The conclusions to which his arguments lead are often unexpected, sometimes paradoxical, but always instructive. He warns us that the analysis he adopts assumes that both sides argue rationally, whereas in practice the behaviour of rival powers is largely influenced by a variety of irrational factors—personal, emotional, or even wholly accidental. This, however, presents problems in political psychology, varying from moment to moment, rather than in political arithmetic. The moral of it all is that, if you want peace, it is not enough to prepare for war, you must seek to understand it.

CYRIL BURT