Science and Statecraft

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THE EVENTS OF THE PAST FIVE YEARS have touched the lives of us all in ways both unforeseen and strange. With few exceptions we have been drawn aside from our chosen paths into activities different in kind and purpose from those naturally congenial to us. Now, as we turn our steps once more in directions fixed upon the goals we have had to abandon for a time, each of us must look upon his experiences during the war years with a still unsatisfied desire to appraise accurately their deeper significance, in both a personal and a general sense. There are few, I dare say, who do not know of lessons which could and should be drawn from their own experiences.

There must be many who share my impression that the formation of new and intricate bonds between science and statecraft is a feature of recent history which merits particularly careful analysis. The significance of developments along these lines for the scientist and the statesman, as well as for the future of mankind, needs to be comprehended, I believe, with a thoroughness which can be achieved only through the summation of limited and imperfect contributions like the one I am about to offer.

Let me begin by emphasizing the broad use I intend to make of the term "statecraft." The word "politics" in its antique acceptation would serve as well, were it not that its current meaning would introduce a certain confusion by too insistently directing attention to the minor and often ignoble tactical devices of politicians. What I wish to discuss is, rather, the high art of guiding human affairs at the level of complexity represented by the elaborately organized modern state; and I believe that in applying the term "statecraft" to this art I can suggest both its practical nature and its high place on the scale of human activity. Statecraft, thus broadly conceived, includes the handling of both domestic and foreign affairs and, by implication, also embraces the military art. It is necessary, I fear, to dwell a little upon the latter point, since it is an American habit of mind to draw a sharp distinction, practical as well as moral, between the statesman's part and that of the soldier. We are extremely reluctant to admit the lesson of history that tensions and conflicts are the rule in international affairs as in the other affairs of men; and we are even more reluctant to accept the implications of this lesson for the statesman's role in war and peace. The Teutonic directness of Clausewitz' doctrine, asserting that war is the continuation of national policy by other means, we find repellent. As for the inverted form of this doctrine, which might be phrased to assert that "peace is the opportunity for aggression by other means," even direct observation of its practical application in our times appears to fall short of carrying conviction to the American mind. Yet any objective consideration of the nature of statecraft, whether couched in universal or in national terms, must lead to the conclusion that under the circumstances of our epoch the statesman must understand both phenomenologically and theoretically the application of military force in relation to international conflicts. It is, indeed, no accident that history often reveals the great statesman and the great general combined in a single person, since the understanding of the behavior of complex societies probably meets its most direct, if not its most fundamental, challenge under the conditions of a bitterly contested war. In any event, there can be no question that the waging of a great war brings a wide range of social phenomena under a detailed scrutiny such as would normally be foregone in times of peace and which, nevertheless, provides insights of the utmost potential value for the guidance of men's peaceful affairs. It is this connection between statecraft and the military art which has particular significance in the present context, quite apart from the more basic connections mentioned above.

At no time in history, I venture to say, has our organized knowledge been brought so fully to bear upon a single, immense human undertaking as it was during the prosecution of World War II. It is hardly necessary to review the contributions made by scientists in the various warring nations to the development of military material of extraordinary variety and effectiveness, or to repeat that the fantastic achievements of science in the fields of radar, long-range missiles, and atomic explosives spell out a profound alteration of our military capabilities. To do so would, indeed, draw attention away from other aspects of the relation between science and the military art which, to my mind, have at least equal importance and which for various reasons, good or bad, still remain in relative obscurity. While it is generally recognized that a vast effort of an intellectual order was exerted in the provision of physical means for waging war, there is as yet no adequate public realization or appreciation of the comparable effort devoted throughout

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the war to the planning and execution of military operations of every kind. Whatever appeared to be of relevance in earth science, psychology, economics, or any other branch of organized knowledge was applied for military purposes with refinements of calculation which no doubt mark a significant transformation in the military art itself. Selection and training of personnel for specialized tasks, choice and adaptation of the means to be employed under the most varied circumstances, development of tactics appropriate to the shifting realities of combat, designation of objectives at both tactical and strategic levels, analysis of the actual performance of men and of material under field conditions, and evaluation of the results achieved in specific operations were all undertaken to a surprising extent in the scientific spirit and with an extremely intelligent use of the resources of organized knowledge. In the domain of grand strategy the nature of total war manifested itself in the urgent need at all times for accurate current estimates of the total state—economic, political, psychological, and military—of each hostile power, and in the equal need for continually revised calculations of the optimum application of forces designed to encompass its eventual surrender. It is probable that no more serious or intensive attempt to arrive at a total evaluation of the dynamic state of a complex social organism has ever been made than was done under the compulsion of military necessity. It would be too much to claim that the applications made of organized knowledge were perfectly adequate to all the demands made upon it for military purposes. On the contrary, anyone familiar with one segment or another of the facts could cite many instances where relevant knowledge was overlooked, inefficiently applied, or deliberately ignored, and equally many where the imperfect state of our knowledge was clearly revealed in the light of specific military requirements.

To dwell upon such imperfections here would be both unnecessary and somewhat misleading. It is far more important to emphasize an extremely significant aspect of the rational approach to military problems which I have attempted to describe in the preceding remarks. I refer to the fact that by its very essence military planning constantly involves predictions which are subject to the immediate test of the battlefield. The ultimate penalty for error is disaster and defeat. In consequence, accuracy of observation, closeness of reasoning, and care in execution stand at a high premium in the military sphere. For all those branches of knowledge which have become allied to the military art during the recent war, this has profound implications.

It has often been observed that war accelerates and intensifies the development of new devices and new methods to an extent difficult to attain under the conditions of peace. I believe that something of the sort has occurred during the recent war with regard to the applications of science and scientific method to the problems of statecraft. In so far as those problems are of a military nature, there can be no question that the war did open up new possibilities and did afford us valuable experience in exploiting them. I have little doubt that the lessons of that experience have, at least potentially, direct significance for some of the problems of peace.

For example, the development of territories still in a wild or partly wild state, like Alaska, the Amazon Basin, or portions of Siberia, is the proper concern of statesmen and under modern conditions must apparently be contemplated in a spirit somewhat different from that which animated the explorers and pioneers of earlier generations. It seems to me reasonably clear that successful colonizing operations require organization and preparation along lines not too different from those followed by our armies in order to establish themselves in the wilderness of New Guinea. Colonization resembles a military venture even with respect to the swiftness of the retribution which may overtake erroneous appraisals of the obstacles to be mastered, as history clearly shows. A second illustration of an entirely different kind is to be found on the border line between economics and engineering, where it is becoming evident that we need a considerably improved understanding, at a strictly technical level, of the whole process of production in an industrialized society. The war confronted us with at least two major problems which made extremely heavy demands upon our knowledge in this domain: that of managing our own productive processes with maximal efficiency in relation to our total wartime requirements, and that of throttling those of our enemies in the most effective possible way with the means at our disposal, especially by strategic bombing and by submarine warfare. I believe that the experience gained in working with these wartime problems, with their definitely military character, can be used to guide our study of production under peacetime conditions for peacetime needs. If the time should ever come when it will be possible to predict with accuracy the effect upon production of variations imposed at specified points of the productive network, some of the most serious uncertainties which now confront the statesman would be removed. Some new steps in this direction can reasonably be expected in the years to come.

Leaving aside any impetus originating in the experiences of the war, I should like to suggest that there are inherent reasons why modern statecraft must move in the direction of a more scientific technique. As the integration of our great industrial societies becomes progressively tighter and their productive potentials ever greater, the acts of the statesman tend to have ever wider, deeper, and more decisive influences upon the course of events. The effects of such acts are propagated more rapidly to all parts of the social structure and are likely to be felt by the individual member of society as something of greater and more direct personal importance

than was the case under older and looser forms of organization. In these circumstances it is inevitable that the stateman should calculate with increasing care the probable consequences of his acts, and that he should thus find himself forced into the position of requiring the aid of theories enabling him to predict as closely as possible the results which will flow from any course of action he may propose or adopt. Like the soldier, he realizes that his decisions may lead not merely to some form of personal failure but also to a disaster involving the entire society which he serves and guides. Accordingly, he is inclined to look favorably on the means which will help him to avoid the dangers and the pitfalls which lie ahead. Such an emphasis upon prediction as an increasingly important element in statecraft inevitably links statecraft with science, for the true distinction between science and other forms of organized knowledge lies in the concern of science with the possibility of accurate prediction. In so far as the statesman attempts to organize the knowledge relevant to his particular tasks in such a manner that he will be able to forecast the trend of events with an accuracy sufficient for his needs, he adopts the scientific attitude and gives science itself new scope.

My argument has now been developed to the point where it is necessary to weigh an objection frequently raised against attempts to consider history or politics in a scientific spirit. It is alleged that human affairs are essentially unpredictable and beyond the reach of experiment, thus falling outside the scope of scientific inquiry. I would contend that the experience of the war years does, in fact, run strongly counter to this allegation. Be that as it may, there is also room for rebuttal on logical grounds. An analysis of the objection as it is usually elaborated will show that it reposes essentially upon certain misunderstandings of the nature of modern science and, in particular, of scientific method. The science which, in this objection, is declared incommensurable with the essential character of history or politics proves upon examination to be that perfectly deterministic science with unrestricted capabilities of experimentation which constituted the philosophical ideal of the 18th and 19th Centuries and which reached its most complete expression in classical physics. It is well known, if not adequally appreciated, by everyone who discusses science that since 1900 physics has been subjected to a radical revision reaching down to its most fundamental principles. As a result it has to be conceded that, in principle as well as in practice, (1) it is not possible to know at a given instant of time all the factors which will prove to be relevant to events observable at a specified subsequent instant; (2) it is necessary to place all predictions on a statistical basis, at a sacrifice of determinism of the classical variety; and (3) it is impossible to conduct an experiment in which the experimental process does not influence in some measure the phenomena to be observed, altogether contrary to the convenient fiction that the system to be observed can be absolutely isolated from the rest of the universe throughout the experimental period.

In the case of physics there were both technical and psychological reasons why concessions along these lines were difficult to make, but in other branches of science, such as biology, psychology, and meteorology, they appear to be natural and obvious. Thus, it seems to me that, except for a matter of degree, we find science proceeding in its various recognized branches along the very lines which the skeptics consider inaccessible for the scientific method as soon as its application to history or politics is suggested. I am glad to say that the illogic of the skeptical position is beginning to be appreciated by workers in the field of social studies. As an instance, I might cite the lengthy discussion offered by Morgenthau under the title *Scientific man vs. power politics*.

A second objection to the extension of scientific method into the domain of social thought is more clearly of psychological origin and has, accordingly, less substance. This takes the form of characterizing all existing techniques as inadequate and simultaneously rejecting all innovations as speculative or unsound. There cannot be any logical answer to an objection of this order, but it might be worth pointing out that the techniques suitable to a particular field have been developed in the course of actual investigations quite as often as by transfer from other fields. It seems to me that the social sciences will have to devise many scientific techniques of their own in addition to those which can be borrowed from the more fully developed branches of science. On this point it is instructive to examine the very interesting approach to the mathematics of competition outlined by Von Neumann and Morgenstern in their recent book, *The theory of games and economic behavior*. To my mind their contribution illustrates very significantly the possibilities of designing new methods appropriate for the theoretical treatment of social phenomena at a scientific level.

Coming to the final stage of my argument, I should like to present the hypothesis that the moment is ripe for statecraft to draw enrichment on both the practical and the theoretical sides from contact with the spirit of science, and on this hypothesis, to discuss some of the developments which seem to me to be implicit in it.

On the theoretical side I would anticipate that the demands of statecraft would greatly accelerate the introduction of scientific method into the social studies. It is quite clear, I think, that, once the social studies truly commit themselves in accord with the exigencies of our times to a serious attempt at prediction in the field of social phenomena, they will incline to loosen their ties with the fields of belles-lettres and moral philosophy—to their own considerable advantage.

On the practical side there should be greatly enlarged opportunities for the testing and revision of social and

economic theories, with extremely beneficial results for both the pure and the applied branches of social science. Social scientists have certainly been at a very great disadvantage in finding themselves too generally cut off from direct experience with statecraft and deprived of the means for checking such applications as may have been made of their theoretical contributions. During recent times, when a marked modification in this state of affairs has been quite evident, many theorists have seemingly used their opportunities primarily to put their theories into practice in a reformist and somewhat doctrinaire spirit, without any real interest in the actual as opposed to the fancied consequences of so doing. If I am right in thinking that the potentialities of disaster are slowly forcing statesmen to a much more careful reckoning of the consequences of their acts, then I would anticipate that in the future both theory and practice in the social studies would assume a character considerably more objective than this and more nearly consonant with their claims to rank as branches of science. I would expect that this practical influence would prove more potent than any purely philosophical arguments concerning the essentially scientific nature of the social studies; in referring to it earlier in its military aspects and in now mentioning it again, I stress the likelihood that this influence will indeed be a profound one.

The problem of matching theory and practice is difficult, even in the fields of physics and engineering, and becomes formidably so in the domain of statecraft. In general, this problem has been badly neglected in the past, apparently on the assumption that any clearly stated theory would somehow be reduced by practical men to practical utility without the intervention of any agency specifically designed to facilitate and accelerate the process. During the war, however, a great deal of experience in the conduct of highly technical military operations has shown that a rapid adjustment between theory and practice, such as was desperately needed in many situations, can best be attained by organizing teams to work specifically and directly with this kind of problem. Something of the same kind must be done, I think, in the domain of statecraft, if theory and practice are to be brought successfully together. At best, scientific theories uniformly present a rather fragmentary and somewhat idealized synthesis which provides only a more or less approximate understanding of any specific concrete problem; and this is particularly obvious in the case of the social sciences, dealing as they do with the most complex phenomena of all. It thus appears to be in the nature of things that there should be created a new art devoted to the skillful interweaving of theoretical insights with practical experience in a variety of domains, including that of statecraft.

In conclusion, I should like to mention a concrete problem upon which the scientist and the statesman have already begun to collaborate. This is the problem of understanding and controlling the impact upon society of the discoveries made in the physical and biological sciences. The recently formed Atomic Energy Commission is, no doubt, primarily intended to provide for a properly safeguarded engineering development of atomic power, but it will obviously have to consider many questions which fall within the domain of the social sciences. It seems to me important that similar attention should be given to the social effects of the many other innovations flowing in an ever-widening stream from our laboratories. Some of the proposals for a National Science Foundation contemplate the creation of a branch or section of the Foundation which should be devoted to work in the social sciences. I should like to suggest that such a branch could most fruitfully concentrate its attention and resources upon the problems to which I have just alluded. It seems clear that successful scientific work on this problem is not beyond our present capabilities and would go a long way toward laying the foundations for that broad and intimate union of science and statecraft which, in my opinion, must ultimately be formed.