MILITARY DEMONSTRATION AND DISCLOSURE OF NEW WEAPONS

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MILITARY demonstrations could conveniently be classified according to objective under two major headings: (a) those intended primarily to convey *purpose* or *intention*, and (b) those intended primarily to convey *capability*. The latter type is generally free of the political risks which often attend the former. Both types, but especially the former, may be effected without necessarily disclosing new advances in the use, design, or performance of weapons. In the latter type, however, there may be a strong temptation—or a strong justification even in the absence of temptation—to parade a new or improved weapon or weapons system which reflects both technological achievement and enhanced capability.

Whether the temptation is yielded to, or the justification is suppressed, more often than it should be is not at the moment at issue. What we are concerned with in this article is the simple fact that there is a continuous conflict, which occasionally poses a specific problem of decision, between the legitimate ends of security in military technology and of disclosure for the sake of demonstration potential. The needs of security may conflict with many other desirable ends as well (e.g., accelerating the rate of scientific progress), but we shall rule such considerations out of the present discussion, except insofar as they may be supplementary to the considerations governing a decision to disclose for the sake of demonstration value, or to refrain from so doing.

Perhaps the greatest and most portentous military demonstration in recent times was the explosion of the two atomic bombs over Hiroshima and Nagasaki.[1] This demonstration at once gave

[1] I am assuming here that an action which bears all the markings of a demonstration is not deprived of that identification simply because it occurs during wartime and is adjunct to the ordinary operations of war. Nor do we need to take account of some speculations that the Hiroshima-Nagasaki explosions were intended to impress the Russians. They were intended at least to impress the Japanese, and the fact that the objective in dropping those bombs was distinctly that of creating or powerfully imple-

away publicly the most important single secret about the atomic bomb—the fact that it existed. The Russians had already learned about it, first through their own channels and then by word of mouth from our representatives at Potsdam, but even they must have been impressed by the revelation of actual use. The circumstances under which the main secret was exposed also made inevitable—by virtue of the fact that a foreign city, even if occupied by us, could not be sealed off from foreign observers—the disclosure of much specific data on the destructive power of the bomb and even of its physical characteristics and tactical employment. It also tended to encourage a weakening of security with respect to further data, the disclosure of which was not inevitable (e.g., the Smyth Report).

Of hardly less demonstration value was the first peacetime Soviet atomic explosion. There can be little doubt that the Russians wanted that explosion to be detected abroad, but even if they did not they must have regarded the political consequences of the detection as very large compensation for whatever they lost by the disclosure. In any case, they lost nothing in demonstration impact from the fact that the event came to world-wide notice through being announced by the President of the United States rather than by them.

Similarly, though on a much lesser scale, one may surmise that a good deal of the publicity given recently to the performance of new types of aircraft, rockets, air refueling devices, and the like has been motivated at least in part by something other than the desire to enlighten the American taxpayer. Conversely, we may assume that decisions have often been made in the opposite direction—that is, of avoiding for the sake of security such disclosures as might have real demonstration value. In fact, since the disclosure of almost *any* advance in military technology is likely to have some demonstration value, one might say that the conflict between security and demonstration value is not simply recurrent but constant. This is true whether or not the decision-

menting an impression, rather than of merely adding to material damage wrought by conventional means—as is borne out by the fact, among others, that the two bombs used were the only ones in existence at the time, with only one other at an advanced state of readiness—is what warrants identifying the act as a demonstration.

maker is actually conscious of the issue at the moment of making the relevant decision. It therefore behooves us to examine this ubiquitous problem rather more systematically than it appears to have been considered thus far, especially with reference to the history and uses of security concerning new weapons.

Disclosure in the Nineteenth Century

The present practice of enveloping in secrecy new advances in military technology is so automatic and overriding that it is difficult to realize how recently it has developed. The habit is in fact scarcely as old as the present century. Throughout the nineteenth century, an era of very considerable technological advances in the military field, especially in the tools of naval war, complete disclosure with respect to such advances prevailed almost universally. There were still in the field of technology such things as trade secrets, sometimes most jealously guarded, but not military secrets—that is, little visible effort on the part of governments to hold knowledge about new military implements within their national frontiers.[2] To the person accustomed to today's practice, the freedom of the nineteenth century in this respect seems to reach comic-opera proportions.

One will find, for example, in the pages of *Engineering* (a weekly begun in London in 1866) frequent notes concerning the

[2] Although one can find certain partial exceptions in the literature, the extent to which these exceptions departed from the normal has been much exaggerated by some authors. Thus Mr. James R. Newman, who seems to be not at all aware of the difference between the nineteenth century and the present with respect to secrecy in weapons, describes the famous *Mitrailleuse* (a kind of machine gun) as having been invented and developed in utmost secrecy by a French officer named Reffye under the orders of Napoleon III (*The Tools of War*, New York, 1942, p. 52). The facts are that the gun was designed by a Belgian, Montigny, who had based his work on that of another inventor of some twenty years before and who constructed several of the guns to supplement the permanent defenses of the Belgian fortresses. Staff officers from several European armies, including the Prussian, had inspected the gun at Brussels and were quite familiar with its design and performance. However, it is true that when the French adopted it, in 1869, they attempted to cloak in secrecy the fact that they were building it in substantial numbers at Meudon. Since the French adoption preceded by only one year the wholly expected Franco-Prussian War of 1870-1871, one may surmise that what the French were trying to keep secret was not the design of the gun, which they must have appreciated to be widely known, but the fact that they intended to employ it in numbers and place heavy tactical reliance upon it. See G. S. Hutchison, *Machine Guns: Their History and Tactical Employment*, London, 1938, pp. 9-11; and M. L. Johnson and C. T. Haven, *Automatic Guns: Their History, Development, and Use*, New York, 1941, pp. 11, 13.

current revolutionary developments in guns, armor, naval architecture, and warship engines. These items not only describe performance in detail (e.g., armor-piercing tests with new guns currently proceeding at the testing grounds), but also include detailed drawings, including cross-sections, of the guns and engines described. Deficiencies in performance or mistakes in design of new ships being added to the Royal Navy are paraded and discussed. Similar disclosure obtained for foreign ships and armament, many of which were indeed built in England for foreign account.

Nor was the situation especially different during wartime. A rather amusing instance is to be found in the same journal early in 1868 (Vol. v, p. 84) when the inventor John Ericsson in a letter to the editor indignantly denied the insinuation of another correspondent that the building of the monitor type of vessels (including the original *Monitor*) in the United States during the Civil War had been somewhat cloaked by security. Ericsson insisted that all the monitor vessels "were built under sheds open to the public; the entire engineering fraternity of the country, thousands of artisans, foreign naval officers and engineers in great numbers, watched the progress of the work. In addition to this publicity, several foreign governments were furnished with minute working drawings of every part of these vessels."

The situation in *Engineering* is of course duplicated in other technical journals and books of the time. In 1880, for example, Lieutenant Edward W. Very, USN, published in New York a book entitled *Navies of the World: Giving Concise Descriptions of the Plans, Armament and Armour of the Naval Vessels of Twenty of the Principal Nations: Together with the Latest Developments of Ordnance, Torpedoes, & Naval Architecture.* The book, complete with drawings and diagrams, lives up completely to the promise of its title page. Down to the very end of the century, the U.S. Office of Naval Intelligence was regularly publishing its *General Information Series,* a group of small volumes in numbered sequence designed to keep its (unrestricted) readers completely up to date on ordnance and other developments at home and abroad.

This policy of complete disclosure, it should be noted, was being followed during a period of genuinely revolutionary development, particularly in ordnance and naval architecture. During the thirty years between 1855 and 1885, guns and warship design were changing at a greater rate than has characterized any comparable period before or since. Battleships changed during that time from wooden, unarmored, broadside, sail-driven vessels to iron and steel steam-driven, heavily armored, turreted monsters. Ships' guns progressed during the same time from smooth bores of a maximum weight of about five short tons to a British 16.25-inch rifled gun of 111 tons and a Krupp gun of 119 tons. Mines, torpedoes, and submarines were also undergoing considerable development. In the 1860's advances in gun design were so rapid that ships were being declared obsolete at the time of their completion, on the grounds that the armor around which they were designed was wholly inadequate to contemporary combat. In the implements of land warfare progress was for obvious reasons not quite so striking; nevertheless, the same period practically spans the change from muzzle-loading muskets to breech-loading rifles, from smooth-bore field guns of bronze or cast iron to rifled, breech-loading pieces made of steel, and covers also the introduction of rather effective machine guns. Certainly, secrecy was rejected on grounds other than that there was nothing to hide.

Certain famous historic instances of surprise allegedly being achieved on nineteenth-century battlefields through the use of new weapons break down under scrutiny into examples of bureaucratic obtuseness on the part of the loser, rather than of secrecy on the part of the victor. For example, the main tactical factor aiding the Prussians to defeat the Austrians so overwhelmingly at Sadowa in 1866 is supposed to have been the needle-gun (which permitted breech-loading and hence ability to load and fire rapidly from a prone position). The needle-gun had in fact been invented a full thirty years before; it had been adopted by the Prussians by 1851 and had been used successfully by them when they were allied with the Austrians against the Danes in 1864; and King William's delight with the gun

during the Danish war had been so great that he ennobled the inventor. The Austrians had had every opportunity to observe its advantages and adopt it, but they had failed to do so.

One of the curious things about the absence of secrecy concerning weapons in the nineteenth century was that the issue scarcely arose for discussion. Disclosure was taken completely for granted, even though in respect to such matters as troop movements during wartime secrecy was quite the rule. No doubt, the fact that armaments manufacture was mainly in the hands of private enterprise purveying to an international market had a great deal to do with it. Governments doubtlessly felt that it was in their interest to encourage armaments manufacture within their national territories, and that such encouragement necessitated enabling their armaments firms to compete in foreign markets. Also, the liberal traditions of the time, which especially in Great Britain forbade on a doctrinaire basis any interference by government with private trade, largely accounts for the absence of any real questioning of the disclosure principle. Great Britain, the most liberal nation of the period, was for a long while not only the leader in technological developments in naval guns, ship design, and naval engines, but actually the chief source of supply of such instruments for many foreign navies. As late as 1905, at the battle of Tsushima, the victorious Japanese ships were entirely British-built and the Russian ships which were sunk had engines made in Britain. If the technological leader of the times did not see fit to impose secrecy, other countries—especially rival countries—were not likely to inaugurate it.

Governments generally refrained from pressing for secrecy even when, as often happened, they were involved in weapons development jointly with the private manufacturer. When Frederick Krupp began in the 1870's to develop his powerful forged steel guns, the German government turned over to his use its vast testing ground at Meppen. Thereupon Krupp began to invite to Meppen artillery experts from all the principal nations of the world, offering not only to sell his guns to any purchaser, but even to set up his special factories in foreign

countries. Similarly, when the same House of Krupp developed in 1895 its so-called "New Process" armor, which at the time of its appearance revolutionized the ballistic standard for heavy armor plate, that armor was within three years being applied to new ship construction in all the navies of the world. Purchases of this armor by the U.S. Navy were from the Bethlehem and the Carnegie steel companies, which had obtained from the Krupps the process and the license to manufacture it.

The practice of disclosure permitted one government to leave a particular field of experimentation to another government in the comforting knowledge that the fruits of that experimentation would promptly be made available to all. At the turn of the century Grand Admiral Von Tirpitz, State Secretary of the German Imperial Navy, stubbornly opposed the adoption of the submarine by Germany, one of his reasons being that the "wasting" of money on experimental vessels should be left to wealthier states like Britain and France. At a time when France, Great Britain, Russia, the United States, Italy, and Japan had between them some two hundred submarines, Germany had none. It was only when the Krupps proved with the *Karp* class built for Russia that a submarine of real fighting value had been developed that Von Tirpitz in 1905 sanctioned the purchase of one of this type. And of course the first German model was fully representative of the best in diving-boat performance of that day.

It is difficult to say just when this practice of disclosure came to an end, but by 1906, the year of the construction of the British ship *Dreadnought,* it was rapidly on its way out. The *Dreadnought* was the first British ship built under a security cloak (though in armament and design it represented a far lesser advance than did many of its predecessors). This fact aroused considerable misgivings in Parliament and in the press, where it was argued that this stimulation to secrecy abroad would redound to the disadvantage of a peace-seeking nation like Great Britain. One may recall also that the recuperator or recoil mechanism of the famous French 75-mm. gun, designed in 1898, was kept secret by the French, who in fact refused through

World War I to share the secret with their allies. At any rate, by the time of the outbreak of World War I, strict secrecy concerning new weapons was as universal a practice as disclosure had previously been, a fact which permitted the Germans at the outset to introduce a complete tactical surprise in the form of the 11-inch and 16.5-inch howitzers which successfully reduced the Belgian fortresses. Even so, the great tactical surprise of the onset of the war stemmed from the machine gun, which was certainly no secret as a mechanism, but a completely confounding device as an instrument of war.

The Uses and Penalties of Secrecy

There is no doubt that the utility of modern secrecy concerning weapons was in large measure a discovery, just as many techniques of total mobilization, including the intricate ways of war-financing that we now know, represent real administrative discoveries or inventions comparable to technological inventions. We should not assume that the nineteenth-century attitudes on military inventions described above represent either a higher or a lower rationality than the present practice. A rigid, non-reflective attitude favoring universal disclosure seems in the field of military technology to have been replaced by a comparably rigid, non-reflective attitude favoring secrecy. We are here concerned with the margin between disclosure and secrecy, and with the conception that political and strategic costs may be involved in one's own policies either of disclosure or of secrecy. More particularly, insofar as a military demonstration may entail a certain amount of disclosure of weapons otherwise held secret—or conversely, insofar as a specific disclosure may in itself provide a desirable kind of demonstration—we should like to have in each case some basis for considering advantages against offsetting costs.

The costs and risks of gratuitous disclosure are, in the modern world, sufficiently obvious to justify the prevailing bias in favor of non-disclosure. The burden of proof is legitimately on those who favor a specific disclosure in order to realize certain gains which will allegedly offset the costs. The inherent costs and

risks of a policy of secrecy are, on the other hand, relatively complex and subtle. The issue has been confounded of late particularly by controversy over the atomic bomb, but the points raised in that connection will be discussed in a later place.

No doubt, the issues will be clarified if we attempt to classify and summarize the kinds of advantages which may be sought from a policy of non-disclosure with respect to advances in weapons technology.

(1) During war or imminent threat of war, a new gadget may offer an immediate tactical advantage, perhaps even a decisive one, even if its design or characteristics are such that it is easily copied or countered. In the case of such inventions, the essential purpose of secrecy is to assure that there will be the maximum possible time interval between the first use of the gadget and the enemy's devising means of coping with it. A derivative purpose is to secure on the battlefield such surprise as will result in a discomfiture to the enemy greatly disproportionate to the real intrinsic value of the weapon which stimulates it. Examples of such weapons are to be found from antiquity (e.g., the *corvus* introduced by the Romans in the naval battles of the Punic Wars, and the *harpago* used by Agrippa in the Sicilian War against Pompey) to the present (e.g., the Q-boat and the use of chlorine gas in World War I, and the V-1 of World War II). Such weapons or gadgets are usually simple, and in some instances it is difficult to say that we are dealing with a new gadget at all. For example, chlorine gas dispensed into the air from stationary containers could hardly be called a "new gadget" when first introduced on World War I battlefields, since the same gas in almost identical containers had long been used in peaceful pursuits. It was really the decision to use it in war which constituted it for the moment a new weapon, and, while it was rather quickly and very easily countered by defensive and retaliatory measures, it was extremely effective on the occasion of its first use. Such inventions usually reflect the inspiration of the moment of crisis, or they may be characteristically the offspring of that necessity which is wrongly supposed to be the mother of all invention.

(2) Contrasting markedly with the ingenious though usually simple weapon of surprise described above is the kind of development which results from accomplishments in science and engineering extending over a considerable period of time and usually drawing heavily upon antecedent and concurrent advances in the peaceful arts—for example, the development of an airplane or tank of better performance than preceding airplanes or tanks. It is characteristic of these inventions (which are as likely to be inventions of peacetime as of war) that they are not easily copied or countered even when their performance and general design characteristics are disclosed. The purposes of secrecy with respect to such weapons are generally: (a) to avoid stimulating the prospective enemy to emulation; (b) to avoid making his task easier in the event that he learns of it and attempts emulation—i.e., to retain and maximize one's lead; (c) to avoid disclosing the tactical and strategic conceptions which are responsible for pushing certain kinds of developments and which are likely to be reflected in those developments; and/or (d) to retain as much as possible of the surprise element which is the whole reason for being of the simpler kind of gadget described in the paragraph above—i.e., to maximize the enemy's discomfort when he first meets the weapon and to delay as long as possible his efforts to find a countering device.

The preceding two paragraphs are intended to be suggestive rather than exhaustive. One can easily think of inventions or developments which fall somewhere in between the two general categories described above, and perhaps one can also think of additional reasons for secrecy besides those mentioned—especially since the attitudes of allies and of one's own people may be equally important to those of the prospective enemy. At any rate, let us test the utility of this classification as far as it goes.

It is clear at once that the first category of weapon or gadget should rarely or never be disclosed for the purpose of making an impression—i.e., for demonstration value. How greatly incidental disclosure, as a result of demonstrations proceeding for other reasons, needs to be guarded against depends on how intrinsically important the weapon is deemed to be. But, almost

by definition, this kind of weapon is not complicated enough to impress anyone with one's own technological skill or leadership in having devised it. And, again almost by definition, it is rather easily countered. In short, an instrument or weapon which is not technologically impressive (however important tactically) should rarely or never be used for purposes of demonstration. Similarly, a weapon which, once known, can be countered or adjusted to in relatively short order should rarely or never be disclosed for the sake of demonstrations.

Exceptions are to be found in the following unlikely but certainly conceivable situations: The rival may be known or suspected to be contemplating an attack on oneself in which he reposes hope for quick victory on some special arm. One may have a gadget which, if known to him, would cause him to lose that confidence, at least for the date on which he had planned to make the attack. Even if the feasibility of a countering device be immediately apparent, it might take some months for him to develop it and distribute it in the necessary numbers. One may consider it so important to oneself to secure a delay (perhaps in the hope of avoiding rather than merely postponing the war) as to pay the price of disclosure in order to encourage the rival to delay.

Or, conversely, the aggressor might by disclosing a new and tactically formidable weapon secure the yielding of an opponent on an immediate political issue, even if the latter could see a way of countering the device if given even a short time (the latter situation is not too far afield from that envisioned by those who picture A-bomb or H-bomb blackmail through sudden disclosure by the aggressor that he has merchant ships carrying such bombs in all the opponent's harbors). Perhaps the paucity of historical examples has been due as much to the extreme aversion of the military to displaying its secret gadgets as to the lack of opportunity to make such display usefully. It is doubtful that the British ever even considered disclosing their search radar in order to cause Goering's confidence in the Luftwaffe to drop a notch, or that the Germans considered disclosing their magnetic mine in order to scare the British more

effectively in 1939. No doubt, in both these specific cases the retention of secrecy was fully justified on the grounds that in neither case would disclosure in itself have been sufficiently impressive to make the difference between war and peace—which simply confirms the statement made earlier that these exceptions are unlikely.

The second category of inventions described above represents the main current of technological progress in weapons-making both in war and in peace. A technologically advanced country like the United States is likely to be able to acquire a commanding lead over all rivals so long as it devotes sufficient effort to doing so, and so long as the work of its scientists and engineers is not unduly circumscribed by frozen tactical and strategic conceptions on the part of its military leaders. That we can acquire such a lead under pressure is indicated by the experience of World War II, when despite our very late start we ultimately outstripped our enemies and our allies not only in production, but also in the design and performance of weapons and other military instruments in almost all the major departments of ordnance, ship, and aircraft design, and electronics. There were exceptions, to be sure—we were generally behind Germany and Japan in torpedoes and behind Russia and Germany in tanks, and missed out entirely on the jet engine—but, taking the whole range of military technology, it did not require the atomic bomb to demonstrate the terrific potentiality of the United States for leadership and achievement in this field.[3]

We may thus assume (especially since the prevailing attitude today toward preparedness and progress in weapons is very different from that in the period between the two world wars) that the United States has and will continue to have weapons and

[3] It was inevitable during the war that our failures should have received a good deal more publicity than our successes. One of the important areas where we especially outclassed other nations was in the fire-control devices for our ships' guns. Our naval anti-aircraft batteries were the envy of our allies and, quite apart from the VT fuze used on our 5-inch and later our 6-inch guns, accounted in large measure for the fact that Japanese aircraft were far less effective against our ships than our aircraft were against theirs. Most of the essential developmental work in fire control had been done before the war, though few of the warships available at the time of Pearl Harbor had the most modern equipment and none of them had anything like enough anti-aircraft guns.

weapons systems which it has good reasons to believe are unique or at least substantially in advance of those of other countries. Such weapons or systems have a potential demonstration value of greater or lesser degree. The actual degree of demonstration value will depend upon several factors already mentioned—i.e., the feasibility of and the time required for matching or countering it—and also upon the specific tactical or strategic capability reflected in it. For example, a new American bomber plane of a range and speed performance sufficient to give it a high capability for penetration with atomic bombs deep into the Soviet Union (from presently available bases) would give the Russians a much sharper impression of our capacity to injure them than the most revolutionary kind of American submarine possibly could. The latter would probably have the reverse effect, since the Russians could legitimately hope to copy it and since the submarine is, in the net, a far more useful weapon to them than to us. Obviously, too, the demonstration value of a new type of weapon depends heavily, for any given period of time, on whether it is disclosed to exist only in prototype, in production model, or in substantial numbers.

It should be noticed that of the four main reasons for secrecy mentioned in the paragraph numbered (2) above, all but (b) are to some extent compromised by the mere disclosure that a particular weapon exists with roughly such and such characteristics. To take the atomic bomb as an extreme example, the Hiroshima explosion at once stimulated in the Russians the intense desire to copy it, implemented their impression of the immense importance we attached to strategic bombing in general and especially to bombing with this new type of weapon, and assured that they could never be wholly surprised by its being used against them. From that moment on, the secrecy with which the whole atomic enterprise was shrouded could have little purpose other than delaying the advent of the first Soviet atomic bomb and helping to assure that neither their bomb nor their methods of manufacture would be as efficient as ours of the same date. Of course, the secrecy attached to the size of our stockpile, our continuing rates of production, and the actual per-

formance of later models of the bomb helped keep them somewhat in the dark about our actual strategic capabilities with this new weapon, but enough was disclosed under our democratic processes to give them some pretty good guesses even on that.

The corollary to the point just made is that, once the existence and general characteristics of a new weapon are disclosed, the rival is not likely to learn much more of value to him about it unless he is furnished a great deal of specific data in the form of blueprints, detailed photographs, accounts of research difficulties and their solution, description of production processes, or actual models of the weapon. In other words, there is a great hiatus between mere disclosure of existence on the one hand and details of operation and production on the other, and this hiatus allows considerable room for leniency with security. An example of how little this may be understood by authorities is provided in our World War II experience with radar. Long after it was completely known to us not only that the enemy was aware of our radar but that he was actually using it himself, officers in the armed services were forbidden even to mention it, on the grounds that if they were permitted to say anything about it they might say too much.[4] But it is doubtful whether at that point the enemy could possibly have been benefited by anything communicable by word of mouth or by casual writing. Besides unnecessarily depriving our propagandists and others of useful materials, in a field in which we retained throughout the war a commanding lead, this kind of security tended to compromise all legitimate security by making itself appear ridiculous.

The decision whether or not to disclose deliberately the existence of a new weapon for demonstration purposes must of course be greatly affected by considerations of the inevitability of such disclosure. A prototype of a radically new kind of aircraft may quite likely be a proper subject for close secrecy, but when this model has entered into large-scale production, when a

[4] The present writer, after being permitted by the Navy security authorities in 1943 to mention radar in one large printing of his *Layman's Guide to Naval Strategy* (Princeton, N.J.), and after *Life* had run a descriptive article on the subject, was required in a subsequent printing to delete those same references.

great many young men have been trained to operate it, and when it is actually flying about the country in the full view of masses of people, the justification for the original secrecy is obviously attenuated. On the other hand, one can be too defeatist about this—the records do indicate some amazing security successes. The Japanese began work in 1922 on a torpedo charged with pure oxygen rather than air for its combustion (thus giving it greater speed and/or range), but until we were well into the war against them we remained quite ignorant of this development. The Germans appear to have been equally ignorant of British search radar until their bombers encountered it in the Battle of Britain in 1940. Our own VT or "proximity" fuze was kept hidden not only from the enemy, but also from large numbers of officers in our navy after it had been in large-scale use in the fleet for over a year.[5] Here is clearly a field for careful and systematic investigation: When and under what conditions does disclosure of a new weapon or weapons system become "inevitable"?

We come finally to a consideration of those other reasons for disclosure (i.e., penalties of secrecy) which may support the considerations favoring disclosure for demonstration purposes and, in fact, tip the scales in favor of such disclosure. Here we encounter a great deal of excited, doctrinaire, and frequently fanciful expostulation. We also encounter some abiding truths which are often not taken as fully into account as they deserve

[5] The VT fuze is an example of a weapon kept so secret that it was not even used against the enemy in many areas in which it would have been highly effective. For almost two years following its introduction into war operations, it was restricted to use by ships at sea against enemy aircraft, on the grounds that (a) warships are almost never captured; (b) shells fired against aircraft over the sea are never recovered; and (c) it did not automatically disclose itself to the airmen against whom it was fired—if the shell came close enough to be fired at all it would probably destroy the aircraft and its crew, and if it did not the enemy airmen would have no especial grounds for feeling that they had witnessed anything other than remarkably accurate fuze-setting. Although the fuze promised greatly enhanced effectiveness in land artillery operations by giving an entire new utility to shrapnel (which had practically dropped out of use during and after World War I), it was not so used until the Battle of the Bulge of December 1944. By that time, the war was obviously too close to its end to warrant many worries about the secret falling into the hands of the enemy. In view of what the Germans might have accomplished against our strategic bombers (and of course our land forces) had they had the secret earlier, this extreme form of security was probably fully justified.

to be. These additional considerations will have to be considered quite briefly.

One of the arguments most frequently heard is that "secrecy strangles science," that is, that the only kind of climate in which scientific progress can flourish vigorously is one in which wellnigh complete openness prevails concerning the activity and findings of the scientists.

It is obvious that secrecy must interfere to some extent with that interchange of findings, ideas, and insights among scientists which is so necessary to providing stimulus and direction to their efforts. But the religiosity with which the assertion is so constantly repeated brands it as doctrinaire and thus probably of only partial validity. The important scientific accomplishments of the Manhattan District Project indicate that, while secrecy may on occasion inhibit or impede scientific endeavor, it certainly does not paralyze it. In short, we are speaking here of a cost of secrecy which has to be measured, appraised, and balanced against the gain, and rote formulae of an absolutistic character are not likely to provide us with the answers. One may even wonder whether the effects of secrecy upon scientific endeavors are always negative, or, where they are clearly negative, whether it is necessary that they be so. Certainly, much depends on specific arrangements, and the whole subject deserves careful study. At any rate, to the layman the assertion frequently made by scientists that the national security would gain more than it would lose from a policy of complete disclosure in the atomic energy field appears on the face of it quite rash.

Besides, the secrecy covering many weapons and weapons systems concerns gadgetry rather than scientific principles; and whatever may be the ethical impermissibility of trammeling science, there surely is no law of nature demanding the utmost progress in gadgets. And what is militarily important about weapons is not that they be the best which human ingenuity can devise, but that they represent the maximum *competitive advantage* for oneself as against the opponent.[6]

[6] Lord St. Vincent (Admiral Jervis) was not so simple as historians have made him appear when he observed in 1805, apropos of Pitt's encouragement of Robert Fulton's

Similarly, the nuclear physicists and other scientists who cried over and over again that there was "no secret about the atomic bomb"—by which they meant that the Russians could solve for themselves the problems we had already solved and that they would therefore have the bomb sooner or later—forgot that there was a potentially great political significance in the difference between "sooner or later." A secret destined to be of only short duration may still be very much worth keeping. In the specific instance of the atomic bomb, a rather substantial amount of information was divulged gratuitously in published materials and a good deal more leaked through the operations of informers and spies. How much these divulgences hastened the Russian development of the atomic bomb we shall probably never know, but it is dogmatic in the extreme to assert, as some do, that (a) in a large-scale operation like that of developing and manufacturing the A-bomb such leakages are inevitable, and (b) they did not help the Russians much anyway.

The controversy over A-bomb secrecy provides still another example of a somewhat fanciful but politically important attack upon the security principle. The late Senator Brien McMahon, among others, argued that secrecy concerning the current production rate of atomic bombs keeps from the Congress and the public knowledge indispensable to an intelligent appraisal of our over-all security needs and of our current military policy. There is of course some important truth in this proposition—the importance of maximizing intelligent lay criticism of our military policies can scarcely be exaggerated—but it overlooks the fact that by and large neither the Congress nor the public are equipped with the other kinds of knowledge and strategic insights into which the withheld data would have to be fitted if

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experiments with submarines, that "Pitt was the greatest fool that ever existed, to encourage a mode of war which they who commanded the seas did not want, and which if successful would deprive them of it." That indeed was an age of disclosure, but the remark may conceivably retain some pertinence even to an age of (not always impenetrable) secrecy. Thus, where Mr. Vannevar Bush berates the naval officers of all countries for failing to develop a homing torpedo in the interwar period (*Modern Arms and Free Men*, New York, 1949, p. 74), we may conclude that while our own officers were certainly blameworthy in this respect, it may in the net have been a good thing for us that they were.

genuinely positive results are to follow. In fact, disclosure might, by providing apparent support to some current and quite superficial bias, create pressures from the public which would have a decidedly negative effect upon our military policy.

One must distinguish between informing the public with respect to issues on which it exercises a real decision-making responsibility and disclosure which simply satisfies general curiosity. It is all too easy to beat the drums for fuller realization of the democratic process when that issue is really not involved. As for those few outside the defense establishment who interest themselves in military problems in something other than a casual way, they will of course be handicapped in their critical function by their enforced ignorance of important and perhaps even vital data. But they are not thereby crippled in their function, and in any case ways could be found to bring them discriminately into the fold with respect to selected data.

On the other hand, one may expose as hollow many of the arguments raised against security and neglect entirely what is most important about those arguments—the fact that they reflect dissatisfactions. However irrational in whole or part have been the anti-secrecy views of the scientists engaged in nuclear energy developments, their dissatisfaction with affairs as they stand (and especially as they stood during the Manhattan District Project) has added greatly to the cost of security in the field, for those scientists represent a skill group whose collaboration was and is indispensable to progress and at the same time obtainable only on a voluntary basis. The fact that a certain kind of employment entails obligations to secrecy will for many persons, representing a considerable range of skills, be a sufficient reason for avoiding such employment. In a society such as ours, this must be a powerful consideration in favor of seeking always to reduce security safeguards to the essential minimum.

There is another consideration somewhat more subtle, though no less important. Security safeguards tend in general to act as a convenient screen behind which tactical and strategic conceptions can freeze and ossify. And the "secret weapon" is often the one upon which too much reliance is placed. That was true

of the British Asdic or super-sonic submarine detector, which encouraged the British to neglect their production of destroyers and convoy-escort vessels. It was secret enough to prevent any general discussion of its limitations as well as its merits. One cannot be dogmatic on these matters. Some devices which were well worth keeping secret have been successfully concealed for astonishingly long periods of time. Some have been quite prematurely revealed. Others have been kept secret much longer than they deserved to be, or at least much longer than was good for those "in the know." But it is in general a valid assumption that the reasons for secrecy about a particular weapons system are subject to the same process of obsolescence as the weapons system itself, though not necessarily at the same rate. Here is obviously an area for the utmost discrimination and judgment.

Findings and Operational Principles

(1) New developments in military technology have a potential value for demonstrating specific military capabilities on the part of the possessor nation, and of emphasizing its technological leadership in the tools of war, such value often being realized by the mere act of disclosure.

(2) The potential demonstration value will depend on the intrinsic characteristics of the weapon or weapons system in question, on its tactical efficacy, and especially on the pertinence of that efficacy to the entire strategic situation as appreciated by the persons toward whom the demonstration is aimed. It will likewise depend on the context of events and on the particular technique of making the disclosure.

(3) Demonstrations of military capabilities (as evidenced by technological achievements) are usually free of the kinds of political risks which may attend demonstrations of intention. That risk is replaced by the various kinds of penalties which proceed from disclosure.

(4) A weapon which, once known to the opponent, could be countered by him in a relatively short time should as a rule not be disclosed for demonstration purposes, however great may be its immediate tactical efficacy. Conversely, a weapon which dra-

matically increases capabilities and which is not easily countered (e.g., atomic bomb, long-range rocket, radioactive gases) lends itself readily to demonstration uses.

(5) The most important secret about many weapons or systems is simply the fact that they exist. Once it is ascertained that that fact is known to the opponent, there is little likelihood that he will be assisted appreciably by further disclosure which falls short of providing him with details of performance and the manufacturing process. That is especially true where the weapon or system entails highly complicated and refined mechanisms. Where the disclosure of existence has already occurred or where it is more or less inevitable, a wide area is opened up in which further disclosure for demonstration value may be exploited without incurring serious penalties from such disclosure.

(6) The demonstration value of disclosure is enhanced, and the penalties reduced, as the phase during which disclosure occurs moves from prototype through production model through possession in substantial numbers.

(7) The demonstration value of a particular weapon is likely to depend far more on how it fits into the over-all strategic situation than on its individual tactical efficacy. Thus, for the United States vis-à-vis the Soviet Union, an A-bomb carrying bomber of very high speed and, at the same time, substantial range will have much greater demonstration value than an atomic-powered submarine. Similarly, a weapon which greatly aids the defensive in land operations (e.g., radioactive gases, tank destroyers) will, under the circumstances likely to obtain for some time, be of much greater demonstration value than a weapon which aids the land offensive.

(8) In every military demonstration there is an audience other than the target audience. A weapon the disclosure of which is intended to frighten the opponent may frighten even more one's allies and one's own people. These are the political risks attending demonstrations of capabilities. On the other hand, disclosure may have the primary utility of reassuring one's allies and the domestic population rather than of impressing the opponent.

(9) Disclosure should never be inadvertent (as frequently happens), but always considered, deliberate, and for a purpose. The prescription is thus not for less care in security, but for more flexibility of policy on the part of the security guardians. Decisions with respect to secrecy or disclosure of weapons are decisions of high political as well as military policy, and should be so treated. The post of security officer, especially on higher levels, must be regarded as requiring great discrimination and sensibility rather than mere stubbornness.

(10) Disclosure will obviously be more effective for demonstration purposes during a period of tension than during one of relative tranquillity. But the method of disclosure, once it is decided upon, is also important. Disclosure may be made to appear an inadvertent result of war games, or a concomitant of conventional military demonstrations, or it may be "leaked," or it may take place with considerable fanfare and histrionic effects (e.g., Bikini). Each method may, under the specific circumstances prevailing, maximize the demonstration effect.

(11) There are likely to be various pressures for disclosure of a weapon or weapons system which have nothing to do with demonstration purpose but which will implement the considerations in favor of demonstrative disclosure. These pressures must be carefully considered to determine whether the alleged advantages to be gained are real or fictitious.