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STRATEGIC THINKING AND AIR INTELLIGENCE

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My purpose in this article is to discuss, in very broad terms, some of the significant aspects of air strategy for the future and the vital functions that intelligence must perform in order to insure the success of future air operations. The suspicions currently entertained that the Soviet *sputnik* may be getting intelligence of both meteorological and cartographic nature required for accurate firing of ICBMs illustrate some of the possible relationships between air power and intelligence. In a rudimentary way, even the first earth satellites point up the tasks and capabilities of future intelligence systems required for survival under conditions of international technological competition — intelligence systems which must meet three basic criteria: global coverage, instantaneous discovery, and absolute accuracy.

I believe that we have a reasonably good understanding of past and present concepts of air warfare and the relation of intelligence to those concepts. It is far more difficult to look into the future and to do so with the precision and clarity needed to prepare ourselves effectively for the trials and dangers ahead.

The reason for this basic uncertainty is not that many people have neglected the problems of aerial technology and its strategic implications. The reason is rather that we are in the midst of a technological revolution. Changes are becoming so rapid, so penetrating and, in many instances, so contradictory that the direct and indirect results of the technological revolution tend to control — and at the same time to confuse — the nature and application of tomorrow's air strategy. Nevertheless, it is in this setting of dynamic technical change and a world beset by what often seems an unlimited number of related and unrelated political, economic, and military problems that we must attempt to examine the future direction of air power.

To begin with, we already have seen major alterations in the basic nature of air forces since World War II. The transition

to jets, nuclear weapons, sonic speeds, countless black boxes, and, to a degree, missiles typifies the changed environment which governs today's air capabilities as compared with those of 1945.

Fifteen years ago the RAF qualitatively was the world's leading air force. Today it is in third place. More important, it is not in a class, by a broad margin, with the air forces of the US and the USSR. It has neither the aircraft, the equipment, the bases, the research and development, nor the funds to become again a truly self-sufficient force, with strategic capabilities as required by world conditions.

Fifteen years ago the Soviet Air Force was an adjunct of the Russian army. Statistically it represented a force in quantity, but it had poor operational know-how and no strategic capability. Its aircraft were fair, at best. Today the Soviet Air Force is the largest in the world. It is equipped with modern weapons, some of them as advanced as those of any other nation. It has a well-funded and aggressive research and development program. Although it still has many weaknesses, the Soviet Air Force is making a bid for world air mastery.

The US Air Force also has come of age in the postwar period. It has held the quality lead for most of that time and still holds it for most of the important equipments. Its personnel are superior in training and efficiency. But the USAF has problems, especially in areas outside the SAC program. Its progress is not to be belittled, but in some areas its progress perhaps has not been so fast or so forward as we would like it to be.

The fortunate aspect is that during the postwar period the USAF has grown to be a global force. In fact, to this date, the USAF — not forgetting its naval support — is the only global force extant. This American capability is a fact of overriding importance. It will remain a controlling factor in the international power equation, to a certain extent, irrespective of technological slippage and of the inevitable acquisition by the Soviet Union of a global missile force.

The most important single change since World War II is that atomic airpower has become the dominant military force. The only way a nation can deliver nuclear firepower over long distances and in a short time is through the air. Sea and ground delivery of nuclear warheads is important, particularly in special situations. But in terms of a global nuclear war, these

systems — and some of the secondary means of aerial delivery — can do no more than furnish local, regional, and tactical support to the strategic air strike forces.

One of the changes upon us deals with defense in nuclear aerial war. Whereas the offense still seems to have outdistanced defense, the old axiom that like weapons are the best defenses against like weapons again could become true.

For the moment there is very little one can do when an atomic explosion occurs except to be underground, fully equipped with food and non-contaminated water or, preferably, plenty of Irish whiskey. Nevertheless, the very possession of nuclear weapons for defensive purposes may act as a "preventing" factor — not because even the best defense would be capable of halting an attack, but because a good defense system would boost the force requirements of the attacker, lower the probability that he can execute his plan with full success, and thus, in some cases at least, tend to induce him to delay his aggression until he has reached the required force and technological levels. It is in the nature of a "race," that the aggressor may be unable to achieve such a posture of superiority that he can dare take the risk of nuclear attack. If this should be a vain hope, for example, because the defender has failed to keep up with the pace of the race, the actual use of nuclear warheads against incoming vehicles should reduce the effectiveness of the offense.

Some of our forward looking scientists are optimistic about the feasibility of employing anti-ICBM missiles, which would take advantage of the greatest point of vulnerability of the early ballistic missile, its fixed trajectory. Many ideas have been proposed about nuclear predetonation and sophisticated employment of modern electronics to interfere with incoming nuclear attack.

There are a number of passive defensive steps which could be taken to lessen the vulnerability of our retaliatory force. These include the dispersal of aircraft and missiles, shelters, and other forms of base hardening, short exposure times, rapid reaction procedures, and maintenance of a substantial portion of the alert force in the air at all times.

Unfortunately such systems can be very costly. They are limited in their coverage and may not be reliable enough for

the safety of personnel and certain equipment. Elaborate passive defenses tend to disrupt and slow the ability of an air force to retaliate as rapidly as required. For these reasons the strategic effectiveness of passive defense is predicated upon effective warning. By warning I refer to technical alarms such as radar and infrared sensing and to interrelated strategic and tactical indications intelligence.

The true effectiveness of defense will be a function of the scope, size, quality, and mental effort put into requisite weapons systems needed to furnish capabilities for protection, warning, interception, and countermeasure tasks. It may be dubious whether or not even the best defensive system pitted against combinations of different types of attack weapons ever will attain a high kill rate, but this may not be the critical point.

Rather, countersystems embodying nuclear warheads and built around effective warning and reaction responses suggest that a nation may be able to close the gap between the power of the offense and present limitations on defense. Such systems could pre-empt the advantage of surprise by sneak attacks by an aggressive nuclear delivery force. They would force the attacker into more elaborate and costly delivery means, primarily large and massive raids which are susceptible to strategic and tactical detection and to interception measures.

Through all these means and measures the offensive may not necessarily be priced out of business, but its effectiveness should be reduced against its primary objective — the opponent's retaliatory force. Thus, it would be hoped, the attacker would be induced *not* to strike because of the uncertainty over the success of his initial blow and also because he would have to risk his main force at excessive loss rates. In nuclear war the first blow must be decisive: the retaliatory force must be killed.

It is quite clear that intelligence influences the effectiveness of defense. Whatever the technical proficiency of a defense system, it can be improved by better intelligence, whereas even the technically most promising defenses can be invalidated through intelligence failure anywhere along the "assembly line" — from scientific intelligence to tactical warning. Perhaps it should be observed that good intelligence would allow the utilization of foreign scientific and technological achievements for the improvement of our own posture. Beyond pro-

viding us with better design patterns, such intelligence also would enable us to build our equipment to such specifications as to optimize its capabilities against the enemy's weapons.

I should like to turn now to a discussion of various technological factors, some of them here now and some on the horizon, and try to relate them into a strategic pattern.

During the years ahead we shall be approaching practical terminal limits in certain key parameters of weapons systems. We already may have reached what could be called terminal explosive power, not that it would be impossible to achieve higher yields.

Within the next few decades we probably will attain terminal speeds, at least for terrestrial operations. We cannot exceed certain speeds without being forced from the earth's gravitational field. Before we achieve theoretical terminal velocities we should reach a far lower practical speed limit for operations directed against targets on the ground. We must remember that the attainment of maximum speed in flight may require more time than would be necessary to reach a terrestrial target at lesser speeds.

We certainly shall be capable of terminal ranges in the sense that future air and missile systems will be able to circumnavigate the globe at least once. I am convinced that there will be no practical limits to altitude, although there may be temporary barriers to surmount before manned and powered space flight becomes a reality. Such restrictions could occur in metallurgy, engines, communications, aero medicine, and nuclear components, among other fields.

Let me dwell for a moment on the relationship of altitude to tomorrow's air strategy. In the immediate future, altitude essentially will be a matter of tactical advantage inasmuch as, with respect to powered flight, we still shall be competing in heights measured by thousands of feet. We have come to recognize that the attack force with the higher altitude capability, generally speaking, is the force with the greater penetration capability. To achieve tactical altitude advantage we are moving into speeds up to Mach 3 as a result of improved rocket fuels, higher thrust engines, aerodynamic advances, and even newer black boxes. I am talking about situations up to 100,000 feet.

But today we also stand on the threshhold of entirely new altitude dimensions. Space vehicles already have been climbing to heights of 600 miles, and unpowered satellites, or *sputniks*, are flying around the earth approximately every hour and a half, at heights up to over 1,000 miles. This altitude is by no means a limit but soon will be exceeded. Disregarding the future development of orbital flight, even at this point the significance of the recent quantum jump is that we are acquiring the capability of staying in the air.

This overriding technological fact will have the most profound impact upon military operations. At present altitudes, the airman must worry about hurricanes, fog, winds, and other weather factors characteristic of the dense air which lies just above the earth. Tomorrow's space flyers must be concerned with meteoric showers, cosmic radiation, electronic barriers, and Buck Rogers' conditions within his cabin. Instead of using flight as a means of traveling from one point on the earth's surface to another, either for friendly or unfriendly purposes, the new problem will be to reach an orbit, maintain it, and utilize nonpowered flight for scientific, military, and probably economic purposes.

The flying machine of outer space will not spend 90 percent of its time on the ground, but 100 percent of its time aloft. In simple statistics, we are moving from transonic speeds and periodic flights of several thousands miles in length into an environment where speeds will be of the order of 16,000 knots and "ranges," depending upon the height and shape of the orbit, easily may exceed 1 million miles per day and hundreds of millions of miles per year.

The development of terminal weapons — in terms of explosive power, range, endurance, and speed — will not bring the technological race to an end. Strategies will capitalize on the new dimension of altitude and perhaps endurance rather than distance as a decisive area of military competition. Military superiority will be dependent upon relative advantages in electronics, warning, and deception. Thus the sciences of instrumentation and intelligence will become truly decisive elements in the equation of a strategy in which the chief maneuvers seek to conquer altitude and achieve enduring control from the ground to outer space.

Modern air strategy will be affected by a number of additional problems, each of which could become crucial in varying circumstances. There is, for example, the requirement that a portion of the aerial strength must be on constant readiness status. A strike force that requires one or two days to get ready is a military liability. Even in today's war it would be caught on the surface.

An effective air force must be numerically strong and able to get its combat aircraft into the air in time. It must be located on a large number of bases, preferably distributed on several continents and located at varying distances from the enemy. Moreover, it must be supported by reconnaissance forces operating vigilantly around the clock. Only such an air force is in a position to achieve a strategic, though not necessarily physical, invulnerability.

In former wars, material strength was the decisive factor. The speed with which fire power could be delivered was an important but still a subsidiary element. The nature of a future war is essentially no longer a dispute about territory but a competition for gains in the time dimension. This is because, in the first place, technology is a variable in time. The speed with which this factor varies will continue to increase as long as technological progress continues. In the second place, surprise being a key to success in air and missile warfare, the initial rounds of conflict are little more than a contest to operate faster than the opponent. Surprise attack will be successful if the attacker moves faster than the defender. It will fail if the defender's "reaction time" deprives him of targets and disrupts the attack schedule.

Intelligence must come to closer grips with the time dimension. We are dealing not with one uniform period but with a whole set of different time categories. There is the time problem of maturing manpower, scientific discovery, and technological invention — measured in generations. There is the duration of research and development programs, decisionmaking, production, and incorporation of weapons into battle orders — a period of years to decades. There is the complex problem of warning — ranging all the way from advanced strategic warning measured in weeks, months, or even years, to tactical warning, measured in minutes. There is the problem of reaction time and interception, measured in seconds and microseconds.

Pre-emptive, retaliation, deterrence, counterforce, retardation, and disruption attacks all, in one way or another, are tied to a specific time requirement. The more mobile warfare becomes, the more moving targets are assuming significance, the less it is a question of mere "capability" than of "capability in time." An airplane carrying a high yield weapon can knock out an air base; the problem is to destroy it at a time when the target will be most lucrative — for example, just before the moment when an attack is to be launched from that target. Need I add that only intelligence can provide this all-important "timing capability"?

Perhaps an additional illustration will clarify this thesis further: "Reaction time in guided missiles." It is important to count missiles in terms of numbers, warhead yields, and the like. But the foremost problem is that of reaction time or response.

If it takes a strategic missile force four hours to launch, whereas the opponent can launch within minutes, the obvious advantage belongs to the side with the shorter reaction time — provided it has adequate warning. The 4-hour reacting force will never leave the ground; its threat will be pre-empted. If this is correct, it appears to be a mistake for intelligence to count the degree of deterrent power primarily in numbers of missiles or warhead yields. It will be necessary to assess, above all, relative times of reaction.

Earlier we discussed the new parameters of altitude. It is appropriate, I believe, that we reflect on the purpose of operating at such altitudes. The use of outer space will permit almost continuous observation of any point on the earth, a situation which, although not entirely without precedent, marks a new departure in modern strategic warfare. Space platforms are becoming indispensable elements of effective warning systems against future means of weapons delivery. Unless we conquer space, a great deal of the scientific knowledge which we require to remain in the technological race will not be available.

Furthermore, orbiting vehicles eventually will be used as weapon carriers and thus will develop into crucial components of offensive and defensive missile warfare.

All this poses the spectre of outer space military conflict which will involve three phases: first, the competition to get

vehicles into space in sufficient quantities to occupy desirable orbits and to make profitable scientific use of orbital flights; second, the development of military techniques for operating from our own orbits and for countering the enemy's militarily significant orbital activities; and third, the ability to neutralize or destroy terrestrial and aerial components of orbital systems.

This new sphere of warfare raises some perplexing problems in world relations. In addition to traditional surface boundaries, there will arise sovereignties over vacuous orbits and the areas beneath them—a system of interlaced surface and spatial boundaries thousands of miles in depth and tens of thousands of miles in length.

A new pattern of international relations must be developed in which orbits are occupied peacefully or conquered and in which orbits must be delineated. During peacetime the nations must respect each other's scientific and security operations in the orbits, and in wartime, of course, the purpose will be to eliminate all of the opponent's space vehicles. In turn, there must be capabilities for protecting the satellites. It is clear that this involves entirely new types of "aerial" operations, as it is also clear that the diplomats and international lawyers will have to do some hard thinking to settle peacefully the problems of orbit allocation and orbit sovereignty.

The introduction of the orbital dimension into warfare signifies that factors such as Iron Curtains, the dispersal of air bases and missile sites, and the ability of navies to "hide," so to speak, in the vastness of the oceans will tend to lose significance. The nature of the new implements is definitive enough to suggest that the use of truly underground and of undersea facilities may dominate the terrestrial scene. As a result, the roles and techniques of surprise will undergo very profound changes, the exact nature of which we cannot predict.

For a nation to exist and survive under these conditions, its intelligence system must become a predominant security technique. Such a system must meet three criteria: global coverage, instantaneous discovery, and absolute accuracy. The system must be fully operational both in war *and* peace. Intelligence must be run not only for the benefit of, but *by* those who are responsible for decisions of life or death.

I believe I have reached the point where it is necessary to examine this strategic framework with its epochal implications

in the practical light of where we are today and to consider the future directions we must take.

The problems of strategic and technological surprise are becoming increasingly serious. The danger of tactical surprise is not lessened when the enemy, in addition to a high altitude and rapid strike capability, also has a capability for low altitude air attack and may be developing mixed high and low altitude offensive forces.

Taking an even broader view, we can say that the nuclear explosive and the supersonic delivery vehicle have appeared at a moment when society is quite defenseless against such weapons. During the last few centuries, war has taken place at the margins of society. Society supported the war from its production surpluses and remained intact as a going concern despite losses and devastations.

You recall that during ancient times, the situation was different. During the Middle Ages, every town had to be self-sufficient for defense, with walls, moats, shelters, food, and water reserves. Practically every citizen had to bear arms. The American frontier town serves as a more recent example of this dangerous way of life.

I believe that society eventually will adjust itself to the modern technology of destruction. Perhaps we may have to become troglodytes; our ancestors were. Architects may develop new types of resistant houses and "safe" urban settlements. Perhaps we shall develop anti-radiation protection. The principle of "hardening" can be applied to many human needs.

I am predicting only that the human mind will not stop inventing. After it realizes the grim threat of modern weapons, society gradually but inevitably will take measures to assure its survival. I am basing this prediction on my faith that modern man, morally and intellectually, is not inferior to previous generations of 700 and 2500 years ago.

Whether this process of social adjustment is going to last 20 or perhaps 50 years I am unable to say. But during this interim phase, humanity well may be passing through the greatest peril of its existence. A war five years from now probably will be immeasurably more destructive than a war around 2000 A. D. Our security, therefore, must be tailored to get us and the Free World safely through this immediate period of extreme hazard.

It is this interim character of the present military situation which confronts us with many perplexing problems. Defense planning, which includes intelligence, is faced with numerous paradoxes.

In this age of maximum offensive strength, there may be a great deal of reluctance to use up-to-date weapons, simply because no one wants to unleash a nuclear war. Yet we must prepare ourselves for a contest which requires us to put the bulk of our resources into nuclear armaments. As a result, we may have only limited capabilities to wage war in which nuclear weapons do not provide the basic fire power.

Yet some people have gone so far as to advocate the retention of full-fledged non-nuclear forces in addition to atomic forces. It is generally agreed that we should prepare ourselves to fight with nuclear weapons. Yet some contend that we also should retain a capability to fight in the style of World War II — high explosives on the ground, at sea, and even from the air.

We probably could agree that the availability of non-nuclear forces would be very advantageous. Several types of non-nuclear explosives will remain with us, even in the nuclear age. Under certain tactical conditions, those may be even more effective than nuclear materials, which is the main reason why they should be retained.

Unfortunately, the question is not one of advantage or disadvantage, or even of choice. The question is one of capability in all aspects — manpower, military organization, research, funds, training, equipment, tactics, and so on.

Suppose that we maintain both a nuclear and a non-nuclear defense establishment. There is the high probability or near-certainty that the investment in non-nuclear arms would be invalidated as soon as the first atomic weapons are used. This will happen, almost inevitably, at the first serious military setback of either belligerent.

But the question of non-nuclear armaments is not just a matter of duplication. The cost of matching atomic systems with non-nuclear weapons in terms of relative military effectiveness would be exorbitant. More significant, such a second force could not be established on any reasonable scale unless we acquire two sets of our national resources, two sets of our qualified manpower, and two sets of our country.

I am not raising the issue of limited versus general war. The requirements of any local war situation can be met from available and programmed forces and resources.

Rather, I am addressing myself to the problem of attempting to build a non-nuclear force at the expense of our atomic strike and defense units, which must be maintained at an increasing degree of readiness because of the overwhelming priority of the Soviet nuclear threat to the US and the Free World. We cannot turn back. There may be a collapse of nuclear courage, but no longer can there be any doubt that we have crossed the nuclear Rubicon.

A similar paradox confronts us in disarmament. If the danger of attack could be eliminated by reductions of force levels and by the outlawing of particular types of weapons, the security of all nations unquestionably would be enhanced. The trouble is that with the power of modern weapons, even minor infractions to disarmament agreements may prove fatal.

After 1919, the Western Powers tried to control German armaments. But practically every week a German arms violation of the Versailles Treaty was reported. Many work shops repeatedly were discovered in which, it was said, machine guns were being produced under the guise of baby carriages.

Nevertheless, the security of the Western Powers did not seem vitally threatened, despite the fact that the Germans maintained secret arsenals and continued surreptitiously to produce weapons which they were not supposed to have. These weapons did not seem powerful enough to pose a real threat to Western security. Neither were the camouflaged divisions which the Germans maintained secretly.

But in our time a nation which produces perhaps as few as 50, or as many as several hundred high-yield weapons could become a real threat to the peace, even with makeshift delivery vehicles, especially if other nations faithfully adhere to their disarmament agreements. You are well aware of ominous infractions to such agreements in North Korea.

The point is that we cannot go back in history and undo the discoveries of nuclear fission, electronics, and aviation. We have to live in the modern world. Technological progress will tend to "break through" even the most elaborate and sophisticated disarmament "controls." Each breakthrough will neces-

sitate renegotiation of agreements. There will be little, if any, stability and durability, let alone guarantee of assured international safety in such arrangements.

I confess that this is a very dismal picture. It will not be changed by expectations that the human race will become peaceful and angelic in the next 20 years. There are two brutal facts which we have to remember. The first is that the Soviet regime still is around. Although it sometimes seems to be showing signs of middle or even old age, there is no new evidence that proves that Kipling was wrong when he wrote: "Make ye no peace with Adanizod, the Bear who walks like a man."

The Soviets have not changed their basic objectives. Their policies have remained constant in areas that count, including their fantastic military preparedness effort. It is clear that the Soviets do not expect that the millennium of peace has dawned. While they prepare for war we cannot turn our backs. When they talk conflict, we cannot risk to ignore the peril. When they arm themselves with the most modern weapons, we cannot reduce the magnitude of the threat by wishful thinking about their supposed inability to do that which manifestly they are doing.

We can philosophize that the Soviet Union will enter into an evolution which, after some time, will transform the present Bolsheviks into Jeffersonian Democrats or Puritan pacifists. I do not believe that anyone who has studied Russian and other revolutionary history seriously expects such a mutation will take place.

Naturally, I do not postulate eternity for the Soviet system: their time will come. The question is, when? So far, reports about their demise usually proved quite "exaggerated." Their resilience has been extraordinary. Distinguishing our hopes from realistic planning assumptions, we would be foolhardy not to give them an additional life expectancy of one or two decades. We *must* assume that they will remain in power during the entire period when the technological challenge to the US will be at a maximum.

It is not certain, of course, that the Soviets deliberately will launch an attack on the US. But at the same time we cannot be sure they will not. In the same vein, there is no doubt but that the social system of Russia is changing in many ways.

But is this necessarily a favorable development? One danger surely is that if the Soviet dictatorship were liquidated by force or otherwise, this event — which only optimists expect at this time — could precipitate a major internal crisis. Such a crisis would be uncontrollable. This means that it could lead very easily to a world conflagration. There just is no way by which we could conjure away the ominous dangers in our future.

This leads me to the second point of pessimism about peace in the foreseeable future. It is a mistake to consider the Bolsheviks as the only cause of conflict. Wherever we look at the continents today, there is plenty of politically combustionable material. Old political structures are breaking down. New nations are emerging. Most of them have their own imperialistic ambitions, and some of the older nations show frightening signs of decay. Economic difficulties, cultural transformations, intellectual crises, and ideological passions acerbate many of these political changes, not to mention inflammatory propaganda campaigns, political warfare, and the like.

Unfortunately many of the political minds still function as though we were living in the time of gun powder and sea power. Few have grasped the significance of the modern technology. There is a dangerous timelag between political thinking and technological reality. As industrial technology advances, psychological stability weakens. We must admit the possibility that world society will grow sicker and ever more unstable, even as the descendants of Icarus reach out for the moon.

It is unjustified, therefore, to expect that all nations will observe restraint in order to avoid nuclear conflict. Perhaps most nations will, but the odds are that there will be a few who will act irresponsibly. Hitler was not the last specimen of his type.

Recent sociological research asserts that a large percentage of political rulers and regimes have been, historically speaking, criminal in motivation and action. There is no doubt that many rulers, especially those who acquired unlimited powers, may have been, at least partly, insane. In fact, a German historian coined the term "Caesarian insanity" in order to describe the actions of many Roman emperors.

Although we have made some political progress, the world nevertheless has had more than its share of insane, criminal,

and power-hungry rulers during the 20th century. Crime and insanity rates tend to rise as industrial civilization advances. It may be very convincing to us to say that because of the existence of hydrogen weapons the power-seekers should mend their ways. This type of argument remains unconvincing to the evil doer who is willing to accept the risk, regardless of the consequences.

There is only one way to reduce the probability of criminal aggressiveness. That is, to remain militarily overpowering and mentally more vigilant than the would-be aggressor — to outsmart and outarm him at every turn and to apply persuasive techniques to protect him — and us — from making a miscalculation. It is not enough to possess what could be called a "statistical posture of deterrence." The aggressor also must be convinced that it is inadvisable for him to break the peace. But do we master the techniques by which we could have such an impact on the opponent's mind?

We are in the midst of a lasting crisis which Mao Tse-tung has described as "protracted conflict." Political and psychological weapons are being used every day to advance the Communist cause. In modern conflict, even though actual shooting may not be taking place, air power and the threat of almost instantaneous massive destruction have become the key elements of the psychological as well as the physical struggle.

The extent to which we can deter the opponent from attacking us determines our freedom of action on many of the world's battlefields. If the level of our ready deterrent strength is too low to provide the assurance that the enemy will not react with an all-out attack, we could be inhibited in executing proper defense actions in subsidiary theaters.

Deterrence is a necessary condition for the maintenance of peace — and the waging of limited war — but it cannot be a static condition if it is to keep that peace. If any nation acquires a more effective weapons system, the best posture of deterrence existing before the technological mutation is subject to rapid nullification. We live in a world where the threats to tomorrow's peace are developing today in the laboratories and on the drawing boards.

It is true that so long as the two main competitors run neck to neck, even a major advantage in one or more technological fields may not necessarily upset the balance. A state of mu-

tual deterrence may be reached which essentially would mean that a world conflagration could occur against the deliberate planning of both the US and the Soviet Union. Hence I do not believe that the Soviets merely are trying to catch up in the technological race. On the contrary, they seem to have organized themselves to win the technological race on a broad front, not only in many significant scientific areas but also in combat operational strengths as distinguished from mockups and prototypes. In other words, they may be trying to surpass us simultaneously by at least one whole and perhaps two weapons generations.

The technological race is the very essence of protracted conflict. It is the main event which we cannot afford to lose. The essence of this conflict is not, as many of our contemporaries believe, a series of limited wars in the jungle and in the desert. Any American intervention into limited war depends crucially upon our relative technological posture. If we lose the technological race we cannot fight on local and regional fronts. Nor will an increase in our capability to fight in Bali or Timbuctu improve our over-all deterrence. It certainly is not likely that, should the US fall behind in technological capability, the Russians will press their advantage merely to get a few fringe benefits. The struggle between Rome and Carthage is more meaningful to our times than the formalized and restrained war-tournaments of some epochs in the history of Christian Europe.

Technological superiority in means of delivery is the essence of success in nuclear war. The idea that nuclear war will take the form of an exchange of mutual blows perhaps forecasts correctly what is going to happen. However, this is not necessarily a concept on which the military planner should work. The purpose of planning for nuclear war is to achieve such a predominance of strength that a nuclear blow can be delivered, without the undue risk that a deadly retaliatory blow will be returned. Even the Soviet military leaders who, during the Stalinist period, belittled the importance of military surprise now appear to recognize that surprise could be the condition of nuclear success.

The acquisition and maintenance of a dynamic capability to deliver a rapid and devastating blow — plus a proportionately dynamic defense — are prerequisites to survival. The nation

which insures that its retaliatory force is, in fact, effective at all times, is obtaining maximum protection against preventive and pre-emptive attacks. The success of preventive war and pre-emptive nuclear launchings depends upon the achievement of triple or quadruple surprise — technological, tactical, timing, and conceivably strategic. The US can keep its retaliatory guard up only if it is able to render those surprises too costly, too impractical, and too uncertain. Thus surprise attack will be too risky for enemy resort only if the US keeps ahead in technology and intelligence, as well as in its force levels and, above all, in reaction times.

Should we lose tempo and should one or more of these four pillars of our security crumble, the enemy's superiority may become such that he need not use nuclear weapons except as a threat. The so-called ultimate threat of large hydrogen weapons could become "demilitarized" — by manipulated fear. Suppose the aggressor says: "I grant that you can retaliate, but you will be completely devastated through my first blows. We leave it to you whether or not you want to elect your own death. If you retaliate, you will die, at best with the comforting thought that you have killed some of us. Or you may survive under our whip. That is your alternative." It is known that the Soviets are doing considerable research on conditioned reflexes and brain-washing techniques. Manipulated fear and the conditioning of the opponents' mental and psychological reactions are strategic concomitants to nuclear weapons. The Soviets don't overlook a bet.

Previous wars have lasted for years. Ever since the emergence of a modern industrial society with its long mobilization requirements, war could not be short. A future war may be decided within a matter of a few hours. I think it is wrong, however, to place all attention on the destructive phase of this type of conflict.

In previous times, the length of the war allowed us to remedy the shortcomings and omissions of peace. Today and tomorrow, once the climax of the conflict has come, we shall be the prisoners of our previous decisions. In that critical phase we shall not be able to increase our force levels, acquire a new set of technological weapons, adjust our tactics to outdo those of the enemy, or even reassure the fearful and give orders to the panicky.

The protracted conflict may last longer than any previous war. Although the climactic or decision phase of this conflict may be short, still, the conflict could endure for many decades. We are in the battle now. As a consequence, the main battles are being fought by military forces in continued readiness, by warning and intelligence services, by the research and development community, by national and industrial planners, and by budget makers, as well as by moral and intellectual attitudes.

Militarily speaking, the decisive phase could be won or lost by the staff and operational officers who 5 to 10 years before the shooting select or reject certain weapons systems, succeed or fail in shortening lead times, organize offensive and defensive forces, determine the balance between force elements, and plan deployment and reaction times. It also may be won or lost by the executive and congressional branches which decide, with a timelag of 2 to 3 years, the force levels to be maintained in any technological phase; by the weapons requirement, procurement, and logistics planners within the military; and by industry, all of whom, together, have the task of developing and producing superior weapons faster and in larger quantity than the enemy; finally, by intelligence officers who must try to forecast the relative strengths and weaknesses of the strategic equation 5 to 10 years ahead. The latter will succeed — or fail — depending on whether or not they convince the powers-that-be that their best estimates are valid.

In protracted conflict, the climactic phase may be war in its most extreme form. If the climax is a matter merely of threat and surrender, it will be the most "peaceful" of all wars. To intelligence its most significant aspect should be that protracted conflict is a war during peace.

It is easy to enumerate the need to win the technological race, the requirements for adequate numbers of weapons and forces, the advantage of hardened and dispersed base locations, the necessity for fast reaction times, and so forth. But the basic reason these requirements are difficult to satisfy is that no nation has the economic capability to live up to the exigencies of protracted conflict in the early period of the nuclear age.

I am not talking about budgets which can be increased and reduced. I do not mean various degrees of economic mobilization and readiness. Rather, I refer to more fundamental limitations.

To win the technological race a nation needs numerical and qualitative superiority in technicians and inventive geniuses. Unless the most revolutionary educational changes are made, it is unlikely that sufficient scientists and technicians will be produced to satisfy the growing needs of increasingly complex military programs. Even a program which marshaled all educational resources into scientific and technical curricula probably would be inadequate for acquiring that degree of technical superiority and material effort which makes the launching of a nuclear attack or the psychological threat of such an attack a relatively riskless affair.

The cost of weapons systems is rising geometrically, while the increase in productive capabilities proceeds much slower. There is the problem of protecting and rebuilding our cities and facilities to survive in a nuclear environment. This is a problem — so far largely untouched — which clearly accentuates the severe limitations on our economic capabilities to meet the challenge of the nuclear age. In this time of economic plenty, scarcity still is the supreme fact of civilian and, above all, military economics.

Material resources are not the only limiting factor. Time, which is a major resource, also is in short supply. For example, the time needed to transform a blueprint into a modern weapons system has become such that a military force never possesses an active arsenal without at least some obsolescence. I mean obsolescent in the sense that certain tasks simply cannot be accomplished against opposition or must be undertaken at excessive risks and costs.

There is one inescapable conclusion from this discrepancy between requirement and capability. It is this: the future strategist has the potential choice of an entire technological spectrum of weapons. At least several weapons systems will be able to do the same task.

Because of the technological potential available to both sides, he will have to decide whether to select a faster or slower weapon, an explosive with greater or lower yield, a weapon of endurance or of stealth. Should he guard against high or low level attack? Should he dispense with manned bombers in favor of missiles? Should he select an earth satellite "anchored" approximately 21,000 miles above its target to de-

liver nuclear firepower — or should he use a submarine from which to launch a missile?

In practical terms the strategist can select only a limited number of systems from this entire technical spectrum, which will grow as we progress further into the scientific era. Strategists on the other side have to make similar eliminations. The chances are that the choices may not be identical because of different strategic objectives, production capabilities, operational doctrines, concepts of defensive warfare, and so forth. In turn, because the choices probably will be different on both sides, the possibility of surprise and other major military initiatives will increase.

Therefore, intelligence must forecast, in ample time and correctly, the enemy selection so that proper defenses can be designed. Of course, the choice of the enemy may impose the need for counterweapons, which may have a feedback against our original weapons choice.

It is necessary to insure that the relationship between what we actually have and what we require to counter the enemy's principal threats is such that we are not accepting undue risks. If we made a poor or overly narrow selection from the spectrum, if intelligence fails to guide the research and development community concerning the enemy's probable selections, we might invite attack, provide inadequate defense, and jeopardize life and liberty. But if our intelligence is keen and our armament effort generous we might ensure peace for the period of the technological cycle.

We are in a conflict which has and undoubtedly will endure for decades but which at present is changing complexion. General J. F. C. Fuller coined the term "machine warfare" to describe World Wars I and II. This expression no longer fully applies to future "technological warfare."

I am afraid that the Communists have shown a rather sophisticated understanding of the strategic problems involved in this new form of technological struggle. They seem to understand interrelations between social conflicts and technical and economic competition. More than that, they are organizing themselves to achieve an overwhelming strategic posture in the technological realm. They are girding to win the technological race against the US. Whatever the disadvantages of a dictatorial system, their regime responds to rapid decisionmaking.

In this area, we do not seem to have matched their strategic comprehension. We are said to have made the decision never to strike the first blow. At the same time we have neglected to introduce sufficiently into our thinking the fact that if the opponent is allowed opportunity to achieve a broad tactical success through an initial blow, the retaliatory strategy must be more costly and complicated in order to compensate for the risk and loss which could occur at the outset and weaken the retaliatory force before it goes into battle.

Under the postulate that the enemy strikes first, defense must be more expensive than under the postulate that we shall not surrender the initiative. It follows that we must not be reluctant to pay the price of our security against an opponent to whom we present the gift of the deliberate surprise attack.

The technological race has engulfed us exactly as a fast flowing river occasionally catches the unsuspecting oarsman. Such a situation cannot be met and overcome by preaching to the river, by throwing away the oars, or by using only one of two hands. In such a situation, all skills and all strengths are needed to ride out the rapids and not get smashed against the rocks.

The fundamental conclusion I want to leave is that the technological race, because of various economic limitations and political climates, may not be won by any super power engaging in the competition, even with all its strengths. But this race very well may be lost by a country which fails to put its continued best efforts into the challenge.

It is to a large extent the duty of the national intelligence community to explain to our nation's leadership the true nature of this strategic problem. I pray that we will not fail in this task which is indispensable not only to our survival but to the survival of civilization.

Intelligence has been getting the facts about the Soviet Bloc, or at least enough of them to enable many right decisions to be made. But we have not been able, often enough, to get our information and evaluations accepted and acted upon. The somber fact is that as professional intelligence people we have not entirely grasped the meaning of protracted conflict in the nuclear missile age.

I believe it not unfair to state also that as professional intelligence people we have been disappointingly slow in under-

standing the nature of the pressing problems which are confronting us. Only too often our categories of analysis and estimates still reflect the strategic realities of a passing age. We know all about the deposits of even the least important raw materials, but we may miss major scientific discoveries. Our battle orders of the infantry are considerably better than those of earth satellites. We are adept in measuring floorspace, but we are rarely engaged in comparing lead times. We are able to refine our calculations of weapons yields to the first decimal, but the analysts worrying about Soviet neuropsychology have yet to break through to the national estimates. We produce mountains of "data," but our progress in data handling paraphrases Lenin's title, "one step forward, two steps backward." We are considerably better in post mortems than in warning. Our understanding of man's greatest resource, time, has remained fuzzy in most areas.

All in all, although we often express our conviction as to how important intelligence is to national security, we ourselves have not quite realized the crucial position we are occupying in the present power struggle. It is really the effectiveness of intelligence which, together with the effectiveness of our scientists, is the basis of technology. Beyond the development phase, intelligence is either a multiplier or a divisor of military strength-in-being. It is the one "weapons system" which by necessity is in constant touch with the enemy, regardless of whether there is war or peace. And in war, of course, intelligence remains a key condition of success.

But we must elevate our sights beyond the old saw of intelligence being the "first line of defense." Intelligence is the factor which should make defense economically practical, technologically superior, and strategically victorious. In the missile age, intelligence literally will merge with the decisive weapons system, lest the missiles be entirely ineffective.

But intelligence will not be able to do this job unless it comes of age as a technological system in its own right. We must get the equipment our ubiquitous, instantaneous, and encyclopedic mission requires. We must have the forces to operate these tools. We must develop utilization techniques which are at par with or better than those equipments. And we must be able rapidly to feed our information to all users.

One feature will remain unchanged: the ability to think. Electric computers and space telescopes are no substitutes for common sense and judgment. Reasoning by false analogy, preoccupation with minor problems to the detriment of major issues, emphasis on decimals and disregard for the large magnitude, wrong philosophies about the rules of evidence, delusionary procedures such as the piling of estimates upon estimates — not to mention normal human failings such as prejudices, wishful thinking, parochial interest arguments, and subversion — all those will remain possible in the era of technological warfare. The machines, even the electrons, are no better than the brains they are designed to serve. It is gratifying to think that when the machine proves to be inadequate — for example, because it may take three months to "program" it — common sense and "conventional thinking" still will be called upon to take its place.

The plain fact is that the machine, however good, will not replace the analyst. The machine will make the human brain a more powerful tool — this is the main reason we need it in intelligence. Intelligence technology is indispensable for the rapid handling of thousands of data and for the reduction of innumerable variables to manageable factors. This technology is the key to speed, coverage, and accuracy; to computation; and to experimentation with, and testing of, our conclusions and estimates (for example, through "gaining" techniques).

But intuition and insight are necessary to make the machines work. In turn, intelligence technology will make its greatest contribution if it allows deeper insights and ever more creative intuitions. Man has remained the key factor in technological warfare, as he was the key to victory when rocks and clubs were the most powerful weapons. Military, or in a broader sense, conflict intelligence will be at its best when it is based on brain intelligence: IQ's plus wisdom.

Pending the dawn of the technological age in intelligence, we should face up more courageously to the facts of life, however bitter.

As a nation and as the core of the Free World alliance, we have been underrating the danger for more than twelve years. Why was intelligence not more reliable? Why did we fail to see the obvious? Our own thought patterns and our intel-

lectual isolationism have proved to be far more dangerous enemies to our security than the Iron Curtain and the ominous developments behind it.