

Early in 1939, Leo Szilard performed, jointly with Enrico Fermi and Herbert Anderson, experiments which indicated the possibility of nuclear chain reaction. In the Spring of 1939, he proposed that American scientists abstain from publishing articles on uranium fission, because of their military implications. In July 1939, he initiated and drafted Einstein's famous letter to President Roosevelt, which started the large-scale development of the atom bomb in the United States.

In June 1945, Szilard drafted a petition to President Truman, signed by about sixty Manhattan Project scientists, asking that the bomb not be used against Japanese cities. He contributed substantially also to the Franck Report, submitted to the Secretary of War on June 11, 1945, which dealt with the same problem and forecast the nuclear arms race with the Soviet Union.

In the fall of 1945, Szilard sparked the successful campaign of scientists against the May-Johnson bill, which would have vested the peacetime administration of atomic energy in the military.

Szilard has thus clearly established his capacity to think years ahead of his contemporaries in a rapidly changing world, and this entitles him to attentive consideration, however bizarre some of the ideas expressed in the following article may appear at first sight.

The editor of the Bulletin believes that this article, too, contains pioneer insights into the future, such as the recognition that hydrogen bombs might be used to threaten a measured destruction of property instead of mass murder of populations.

Szilard envisages a "stabilized" state of unchallenged American and Soviet capacity for mutual destruction, provided by invulnerable long-range rockets with hydrogen warheads, rather than an unlimited arms race, or nuclear disarmament. This approach he shares with such others as Wiesner and Leghorn who have written in the Bulletin on the problem of world security.

From the possible use of hydrogen bombs for threatening limited destruction instead of unlimited murder, Szilard proceeds to derive the possibility of a stable atomic stalemate. This security system is likely to leave many readers bewildered. In the editor's mind, too, many questions arise as to the operational stability of such a system, not to speak of its psychological feasibility. Yet, a system of this type may be the only alternative to permanent instability, likely to end in a nuclear catastrophe, unless one considers as possible an end to international power conflicts. Opinion will vary as to which solution is less improbable: termination of power policies (on which the Editor is inclined to place his hopes) or adoption of a security system such as proposed by Szilard.

Many of the ideas expressed in this article have been discussed by Szilard in recent years at several Pugwash conferences and elsewhere. Their presentation in a Bulletin article has been delayed in part by the length of Szilard's article, and in part by the editor's desire to see some of his objections discussed. To avoid further delay, however, the article is now published in full as submitted by Dr. Szilard.—E.R.

How to Live with the Bomb and Survive—

The Possibility of a Pax Russo-Americana in the Long-Range Rocket Stage of the So-Called Atomic Stalemate

LEO SZILARD

The Problem Posed by the Bomb

In the years that followed the dropping of the bomb on Hiroshima, men of good will have from time to time thought that the problem posed by the bomb could be solved by getting rid of it in the foreseeable future. At this point, I am not at all certain that this is, or that it ever really was, a promising approach to the problem.

There is at present a strong sentiment all over the world, including in America and Russia, for getting rid of the bomb, yet no substantial progress is being made toward this goal. It is quite possible that America, the Soviet Union, and some of the other great powers might reach an agreement to stop bomb tests. It is even conceivable that they might agree to more substantial arms limitation involving rather stringent measures of inspection. But if disarmament were the solution to the problem, nothing short of eliminating the large stockpiles of bombs which Russia and America have accumulated could be regarded as an adequate measure.

There is no assurance that this will come to pass in the predictable future. America and Russia might well be forced to retain for an indefinite period of time—for one, or more than one generation—substantial stockpiles of large hydrogen bombs, of the dirty or the clean variety, as well as the means suitable for their delivery.

I believe the time has come to face up to this situation and to ask in all seriousness whether the world could learn to live for a while with the bomb. The purpose of this paper is to examine what it would take to accomplish this.

In the present transitional phase of the so-called atomic stalemate the situation is changing rapidly. If Russia were to stage a sudden attack against Amer-

ica's bases at some point in this transitional phase, she might seriously cripple America's capability for striking a major counterblow. The fear that this could happen induces America to build submarines which are capable of launching intermediate-range rockets that may carry hydrogen bombs. For the same reason America is prepared to keep—in an acute crisis—an appreciable fraction of her strategic bombers in flight.

This transitional phase might well be inherently unstable, and while it lasts, one of the major, or even minor, international disturbances that will occur might trigger an all-out atomic war, which neither Russia nor America wants. I am going to assume that somehow we shall go through this phase without the occurrence of such a catastrophe. This assumption is based on hope, rather than on any reasoned prediction, and the hope is mainly derived from the knowledge that this transitional phase may not last very long.

The next stage of the "stalemate" toward which we are now moving will be rather different from the present transitional phase. Within the next ten years and quite possibly within the next five, the main strategic striking force of America may consist of solid-fuel rockets which could be launched from bases on the North American continent to reach the cities of Russia. Such long-range solid-fuel rockets should be available in adequate numbers and may be capable of carrying hydrogen bombs sufficiently large to destroy a good-sized city. They might be mounted on carriages movable on the railway tracks, and presumably their position could be constantly shifted around the continent.

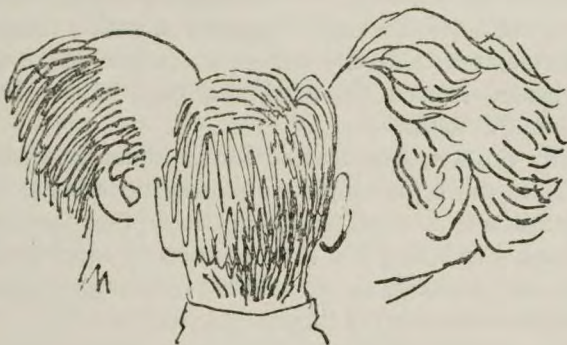
We may assume that much the same development will take place in Russia.

When this long-range rocket stage is reached, then

neither America nor Russia will have to fear that a sudden atomic attack against her bases might substantially diminish her power to strike back. One way or another, their rocket-launching sites will have been rendered invulnerable to a surprise attack. Such a development will then eliminate the danger that, in case of a serious conflict between America and Russia, one of these two nations might be led to stage a surprise attack against the bases of the other, for fear that it would be unable to strike back were the other to strike first. One factor which could render the transitional phase of the "stale-mate" inherently instable would thus be eliminated.

The long-range rocket stage will present a much simpler and clearer picture than the present transitional phase. In that stage the bomb will manifestly pose a wholly novel problem to the world, and it will be obvious that the statesmen do not have at present an answer to this problem. The problem may be phrased as follows:

The threat of force has hitherto always played a role in the dealings of the great powers with each other. At present there is no substitute in sight, and therefore it may be assumed that in the long-range rocket stage the threat of force will continue to play, at least for a while, its traditional role.



In the past, the great powers have always regarded war as the ultimate resort, and "war" meant a contest of strength, to be resolved by the exhaustion or total collapse of one of the two parties to the conflict. Accordingly, a great power had to safeguard itself against being maneuvered into a position where it could be vanquished in such a contest. As far as Russia and America are concerned, this will not hold true any longer in the long-range rocket stage. In that stage America and Russia could no longer engage in a contest of this sort with each other without both being destroyed. Between them "war," in this sense of the term, will no longer be practicable, and thus one of the basic premises of their traditional foreign policy will cease to be valid. What is going to take its place?

The possession of bombs, large ones and small, will continue to present an implied threat. Perhaps Russia

and America might be able to retain the use of the "threat of force" and yet avoid an all-out atomic catastrophe, but only if there is a major change in the character of the "threat." Thus we are led to ask what kind of "threats" may remain permissible" in the long-range rocket stage, if that stage is to be "metastable." By "metastable" we mean a state in which an international disturbance may lead to a change, but would not trigger a chain of events leading to greater and greater destruction.

If America and Russia were the only two nations in the world, the problem could be relatively simple; in the long-range rocket stage there might be no controversial issue left to divide them, and no disturbances need to occur which could trigger an all-out war. It would then not matter quite so much just what they may threaten to do with their bombs in case of war, because there need not be any resort to force. The bombs might well remain frozen in their stockpiles, and after a while one might even decide to get rid of them.

Russia and America are not alone in the world, however. Sooner or later other nations, which are not under the full control of either, might take up arms against each other, and Russia and America might then be led to intervene on the opposite sides.

In the long-range rocket stage, Russia and America will find themselves in a common predicament, due to the continued risk of an all-out war which neither of them wants. Moreover, at that time the controversial issues of the early post-war years will cease to be relevant from the point of view of their security. This might make it then both necessary and possible for them to act in concert in enforcing peace, lest other nations go to war with each other and drag Russia and America into the conflict.

Such discussions as are held these days between the American and the Russian governments are invariably focused on the issues of the present transitional phase. I believe that, as long as they remain so focused, no real progress will be made, because few if any of these issues will become negotiable until we get into the long-range rocket stage. What is needed at present is not for Russia and America to reach agreements on concrete issues, but rather to reach a meeting of the minds on what it would take to render the long-range rocket stage a "metastable" situation, so that an initial disturbance may not trigger an all-out atomic war.

Since no one really knows what it would take to accomplish this, it would seem imperative that Americans and Russians begin to discuss this problem in earnest at this time, perhaps on a private level at first and later on a governmental level also. I believe that, if the discussions between America and Russia were focused on the problem of the long-range rocket stage and a meeting of the minds were reached on this paramount problem, then the controversial issues of the present transitional phase would appear in a new light also and

could thus be seen in their true proportions. Some of these issues could then become negotiable, as we come closer and closer to the long-range rocket stage, when they will cease to be relevant from the point of view of America's and Russia's security.

The Problem of Stability in the Long-Range Rocket Stage

The problem of the stability of the long-range rocket stage has two aspects which may be discussed separately, even though they are interrelated.

The stockpiles of bombs which America and Russia will retain in the long-range rocket stage will represent an implied threat, and in the absence of a clear philosophy of just what Russia and America may threaten to do with these bombs, in any of the hypothetical contingencies that might conceivably arise, even a minor disturbance may trigger an all-out atomic war. By adopting an adequate philosophy as to what constitutes a "permissible" threat, America and Russia might be able to eliminate the danger that a *minor* disturbance would trigger an all-out atomic war. To this end they would have to exercise certain far-reaching restraints, and they may have to proclaim in advance that they are going to exercise such restraints.

This is not enough, however. The greater a disturbance, the greater would be the danger that America or Russia might transgress the restraints which they may have recognized as necessary and which they may have proclaimed prior to the onset of hostilities; in case of a very serious disturbance all restraints might break down.

Major Disturbances: Can They Be Avoided in the Long-Range Rocket Stage?

What kind of an international disturbance is most likely to lead America and Russia into an all-out war in the long-range rocket stage? A conflict between two nations which America and Russia are committed to protect but which they do not fully control might lead to a major disturbance, because it might induce America and Russia to intervene militarily on opposite sides. A political settlement between America and Russia which is specifically aimed at eliminating the possibility that they may intervene on the opposite sides in any of the presently discernible potential conflicts would therefore go a long way toward averting the worst kind of disturbances. When I speak in the following of a "political settlement" between Russia and America, I shall use these words in this narrow sense of the term only.

What are the chances that Russia and America may be able to reach a political settlement of this type in the foreseeable future?

In the first few years that followed the Second World War, there have arisen a number of conflicts between America and Russia, and it has been impossible to settle any of them. Does this mean that the chances of a po-

litical settlement must continue to remain remote in the long-range rocket stage also? In order to answer this question, we must first try to understand why the controversies that have arisen between America and Russia in the early post-war years have not been hitherto negotiable.

In the first few years following the Second World War America and Russia found themselves locked in a power conflict. Conflicts of this kind have repeatedly arisen in the course of history. The conflict between Athens and Sparta which preceded the Peloponnesian War and led to the destruction of Greece was a conflict of this kind. Once two nations locked in such a power conflict come to regard war as a serious possibility, then the issue of winning the war, if it comes, becomes the overriding consideration for both of them. Controversial issues which arise between them may not be settled in such a situation, if they are of strategic importance; were such an issue settled one way, it would increase the chances of one of them to win the war, and were it settled the other way, it would increase the chances of the other to win the war. Clearly, the issue of who is to win the war can not be resolved by a compromise. In such a situation, most of the controversial issues which arise remain unsettled; new issues arise from time to time, and as the unsettled issues pile up, they increase the probability of war. Thus a "vicious circle" operates in such a classical power conflict, and once a stage is reached where war is regarded as almost inevitable, it may, in fact, have become inevitable.

After the war, America and Russia found themselves locked in much the same kind of power conflict as did once Sparta and Athens. Just as in Greece, the opponents attempted to strengthen their position by forming alliances, and gradually more and more nations were drawn into one or the other of the two camps.

This was the setting in which the "cold war" arose. In this particular setting America and Russia may both hold, with some justification, that "What is good for them is bad for us—what is bad for them is good for us," and as long as this thesis is valid, clearly there is nothing much that can be negotiated.

A few years ago, with the increasing accumulation of bombs in the stockpiles of Russia as well as America, and with the progressive development of the means of delivery, a new factor became operative, and there began an at first almost imperceptible wavering in the seemingly inexorable course of events. It is my contention that, as the world moves into the next stage, the vicious circle of the classical power conflict will cease to operate between America and Russia.

During the early post-war years Russia and America looked upon other nations as potential allies, and upon every ally as a potential asset. In the long-range rocket stage they will increasingly look upon allies as potential liabilities. The controversial issues that have arisen be-

tween America and Russia in the early post-war years will not retain any substantial strategic significance, and therefore, they may become negotiable. It will no longer matter, at least not from the point of view of the security of Russia and America, whether such an issue is settled one way or the other; what will matter is only that it be settled, one way or another, lest it lead to a resort to arms and America and Russia be drawn into the conflict.

America and Russia resemble each other in two important respects. In contrast to almost any other nation, imports and exports amount to only a small fraction of their total national outputs. Thus, America and Russia are in no danger of becoming bitter rivals in trade in the predictable future. Also, they are both exceptionally rich in raw materials; and thus they are not competing for any raw materials which might be regarded, by any stretch of the imagination, as vital to their economy.

In the long-range rocket stage, when they no longer need to threaten each other's security, there may remain no major conflict between America and Russia. Moreover, in that stage, they will have one interest in common which may override all of their other interests: to be able to live with the bomb without having to fear an all-out war that neither of them wants. In these circumstances, America and Russia ought to be able to reach a political settlement, specifically aimed at the danger that they may be forced to intervene militarily on opposite sides in any one of the presently foreseeable conflicts.

It is conceivable that America and Russia may be able to go one step further, that they may be able to agree on a revision of the map, and that they may subsequently act in concert with each other, should other nations attempt to change the map by force or the threat of force. Could such a *pax Russo-Americana* conceivably evolve during the next stage?

Before we can discuss this question in a meaningful way, we must examine the role that the bomb may be assumed to play in the long-range rocket stage of the "stalemate." Even if America and Russia were to act in concert with each other in trying to prevent armed clashes between nations which they are committed to defend, there would still be no assurance that some disturbances of this sort would not in fact occur. In the absence of an adequate philosophy of what America and Russia might be permitted to threaten to do to each other, or to some other nation, in any of the hypothetical contingencies that might conceivably arise, the bombs stockpiled in America and Russia might well create an instable situation in which even a minor disturbance could trigger all-out atomic destruction.

Indeed, I contend that in the long-range rocket stage the fate of the world may be largely determined by the philosophy which the great powers may adopt concerning just what constitutes a "permissible" threat with regard to the bomb. The ideas of our statesmen and military strategists on just what the bomb is "good for"

have already undergone one major change since Hiroshima, and in the unprecedented situation that will confront the world in the next stage, these ideas will have to undergo a further major change.

The Threat of the Bomb in the 1950's

A few years after Hiroshima, when America was in possession of the bomb and Russia was not, America adopted a policy of threatening massive retaliation against the cities of Russia, were Russia to intervene militarily in Western Europe. Winston Churchill was the first statesman who proclaimed the belief that, were it not for the possession of the bomb by America, freedom in Western Europe and perhaps in the whole world would perish. Subsequently many people in America came to believe that this was true. In the absence of a control experiment, there is no way of knowing what would have happened in the post-war years if the bomb had not existed, and the belief proclaimed by Churchill will forever remain a tenet of faith, or of the lack of it.

The threat of massive retaliation, upon which American policy was based during some of the post-war years, may well be an effective threat as long as the nation thus threatened is unable to strike back. No objection can be raised, therefore, against such a policy on grounds of expediency. A policy which calls for the dropping of bombs on Russian cities and the killing of millions of Russian men, women, and children in retaliation to a Russian military intervention in Western Europe is, of course, difficult to justify from a moral point of view, particularly if one holds that the Russian government is not responsive to the wishes of the Russian people. This just goes to show that—contrary to what many Americans would like to believe—the American government, much like the governments of all the other great powers, is guided on all really vital issues by considerations of expediency rather than by moral considerations.

These days it is customary to speak of governments as if they were human beings, and to attribute to them the virtues and vices of human beings. But a governmental decision is a group decision, which is quite different from a decision made by an individual. Man's conscience may play a major role in shaping historical events, and it may play a part in shaping what may be called the national goals also. This does not mean, however, that moral considerations can effectively counteract the reasoned arguments of expediency on which governmental decisions are frequently based. On the other hand, emotions, which frequently lead to a shortcut between the passions and the actions of an individual, do not affect governmental decisions to anywhere near the same degree. It will be important to keep these differences in mind in appraising how the governments of the great powers may be expected to act in the next stage.

The Threat of the Bomb in the Present Transitional Phase

The prevailing school of thought in America holds that Russia has a propensity for expanding her rule and that she would bring about changes in the map if she were able to do so at comparatively little cost to herself. But for an effective "deterrent" in operation, so these people believe, Russia would have kept on expanding in the post-war years.

Adopting for the moment such views, for the sake of argument, we may accept the thesis that the threat of massive retaliation may have functioned as an expedient—even though morally unacceptable—"deterrent," as long as Russia herself was in no position to strike back. In the next stage, however, when Russia may be capable of destroying America to any desired degree, just as America may be capable of destroying Russia to any desired degree, the threat of massive retaliation on the part of America would be tantamount to a threat of "murder and suicide." Such a threat made on the part of a government of a great power, whose national interests may be involved but whose national existence is not at stake, is not likely to be taken seriously and will therefore be ineffective.

"A general"—Fermi once said—"is a man who takes chances; usually he takes a 50:50 chance. If he happens to be successful three times in succession, he is considered to be a great general." Statesmen too are disposed to take "calculated risks," and if they get away with it they may subsequently boast of having gone to the brink of war. Therefore, if either Russia or America continues to operate with the threat of murder and suicide in the long-range rocket stage, then sooner or later the "bluff" will be called, and if it should turn out not to have been a "bluff," it will lead to uncontrolled destruction. Thus, the long-range rocket stage could be rendered unstable by threats of murder and suicide.

Among those who believe that Russia needs to be "deterred," there is one group which believes that a confused American policy with respect to the bomb will create "uncertainty" as to what America might do in any given contingency, and that Russia would be "deterred" by such uncertainty.

Another, presumably more important group, believes, however, that a policy of "Keep them guessing!" will not work, and that Russia must be left in no uncertainty concerning the price that may be exacted from her, should she make an aggressive move. These men say that America must resist a possible Russian invasion of any area which she is committed to protect, by being prepared to fight a local war in the contested area. They also believe that America may use small atomic bombs against troops in combat in such a "limited" war.

During the early post-war years there have been numerous discussions, both in private and in public, on what the bomb was going to mean to the world. Curi-

ously enough, the issue of using atomic bombs against troops in combat has never been raised in any of these discussions. It is not clear just what was responsible for this "blind spot." The scientists who were instrumental in creating the bomb were eager to undo what had been done, and this perhaps may account for their failure to see that it might be "practicable" to use atomic bombs against troops in combat. They foresaw that, in time, Russia would have the bomb also, and believing that the bomb could not be put to any other use than to produce Hiroshimas, they concluded that the bombs would become virtually "useless" when both Russia and America possessed stockpiles of them.

Now when it is clear that it may be "practicable" to use atomic bombs against troops in combat—at least from a narrowly conceived military point of view—one



blind spot is gone, but another blind spot seems to have taken its place. Apparently many of these very same people now believe that conflicts between the great powers will be henceforth resolved by using small atomic bombs, locally in the contested area, that the large bombs which America and Russia have accumulated will remain in the stockpiles, and that their existence will in no way affect the outcome of the "limited" war.

The most persuasive argument in favor of this view may perhaps be phrased as follows: "America and Russia may be in possession of substantial stockpiles of large bombs in the next stage, but neither America nor Russia could possibly use any such bombs against the territory proper of the other nation, without precipitating an all-out war which both nations would want to avoid. America, in order to live up to her commitments to other nations, may therefore choose to put up a fight in the contested area and may use small atomic bombs there against troops in combat.

"A limited war need not deteriorate into an all-out war if America and Russia realize that the objective of such a war cannot be anything approaching 'victory,' not even victory in the contested area, to which the fighting may

be limited. The objective of such a limited war would rather be to exact a price, and thereby to make it costly for the enemy to extend its rule. America and Russia would need to impose upon themselves certain far-reaching restraints, proclaimed well in advance. They could do this, for instance, by both declaring unilaterally at the outset that they would use atomic bombs only against troops in combat and only within their own side of the pre-war boundary."

I myself believe that restraints of this sort would have an appreciable chance to be kept only if they were to fulfill two conditions:

1. The restraints to be proclaimed must not be arbitrary, which means that it must be possible to derive them by a closely reasoned argument from the need to avoid the triggering of an all-out war. Otherwise, one could not expect that both belligerents would adopt and proclaim the same restraints, and in case of a resort to arms, a belligerent would be tempted to "retaliate" if the restraints it has proclaimed are transgressed by the other belligerent.
2. It must not be possible for either party to obtain a decisive advantage, in an actual conflict, by transgressing the restraints which have been voluntarily assumed and publicly proclaimed. Otherwise, more likely than not, the restraints initially proclaimed would be whittled down, step by step perhaps, by one or the other of the belligerents.

In my opinion, only if both of these conditions were fulfilled could a limited war be fought without serious danger of an all-out atomic catastrophe. I believe further that, as far as Russia and America are concerned, a war between them would be fought in the contested area, only if it were to the advantage of both Russia and America to do just that, rather than to do something else. This is spelled out below in considerable detail.

The Threat of the Bomb in the Long-Range Rocket Stage

We may assume that Russia and America will continue to operate with the threat of force throughout the predictable future. This does not mean, however, that they will continue to threaten each other with war.

At some point, either Russia or America could decide to respond to the threat of a "limited" war, not by a counterthreat of the same kind, but by the threat of demolishing—if need be—a specified number of cities, which have received adequate warning to permit their orderly evacuation. This would then represent a novel method for "exacting a price" which might be quite appropriate—if a price has to be exacted at all.

In what circumstances would a threat of this type be believable and effective? Would it be possible actually to demolish evacuated cities without triggering a chain of events in which more and more cities would be

destroyed, until in the end no major city of either nation might remain standing?

I am assuming here that America and Russia are going to possess rockets capable of carrying a hydrogen bomb of the clean variety, which is large enough so that if the bombs were exploded at such a height that the fireball would not touch the earth, it would still destroy a good-sized city. Accordingly, no lives need be endangered by radioactive dust, if such a bomb were exploded over a city that has been evacuated.

I shall now try to show that the threat to demolish one or more evacuated cities need not trigger a chain of destructive events, provided the nation making the threat is willing to pay just as high a "price" as it proposes to exact. This means that the nation making a threat of this type would have to be willing to tolerate—without threatening reprisals—as much destruction of cities in its territory as it proposes to cause in the territory of the "enemy."

Russia and America could thus continue to operate with the threat of force and yet forego war, provided only that they impose upon themselves certain specific restraints, spelled out below.

From the moral point of view it would be no minor advance were the threat to destroy property to take the place of the threat of killing soldiers or civilians. Further, either Russia or America might well prefer the threat of demolishing evacuated cities to the threat of fighting a limited atomic war, if the other nation would have a substantial advantage in a limited war fought in the contested area. Moreover, both Russia and America might prefer the threat of demolishing evacuated cities to the threat of a limited war, if the war would involve a "sensitive" area where it would be difficult to fight an atomic war without triggering an all-out atomic catastrophe.

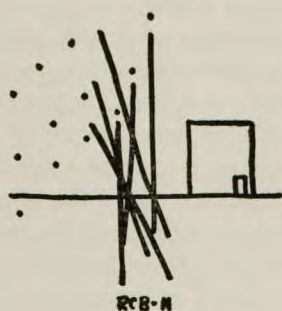
The restraints which Russia and America must impose upon themselves if they want to operate with the threat of demolishing evacuated cities can be derived from self-evident premises by closely reasoned arguments, which I shall now attempt to describe.

Clearly, if America and Russia were to threaten each other with the destruction of all of the cities of the "enemy," as a reprisal against the loss of one of their cities, such a threat would not be believable because it could not be carried out, except at the cost of wholesale destruction of the cities of both nations.

Could America (or Russia) threaten to retaliate for each injury by inflicting double the injury suffered? Could she threaten that, for every city demolished in her territory, she would demolish one or more cities totalling in inhabitants twice the city she has lost? Clearly if both nations adopted this principle there would in the end be total destruction on both sides—coming more slowly perhaps, but just as surely as in the case of massive reprisal.

It is my contention that, if Russia and America want to maintain a "metastable" state in the long-range rocket stage, so that an initial disturbance may not lead to a chain of events progressing to greater and greater destruction, then they must accept the principle of "one-for-one." This principle must not be interpreted to mean that if Russia demolishes a city in America she must tolerate America's demolishing any one of her cities. Rather if Russia demolishes one or more evacuated cities in America, she must tolerate the destruction of cities with the same aggregate population.

For this principle to be operative, it is not necessary for Russia and America to conclude an agreement with each other; either Russia or America could establish this principle by unilateral declaration. It might, however, be necessary to have a catalogue, giving the number of inhabitants for all Russian as well as American cities, which is acknowledged as valid by both nations. Otherwise, a dangerous dispute could arise in an acute crisis as to how the principle of "one-for-one" applies to the particular case.



The world would be in a more stable state than it is today, if Russia and America did not ever threaten to use bombs for anything worse than the demolishing of cities which have been evacuated. Moreover, if Russia and America were to go one step further and decide to forego war—whether fought with small atomic bombs used against troops in combat or with conventional weapons—this would represent an unprecedented advance from the moral point of view.

Such a development will hardly come about, however, merely because it would be desirable from the moral point of view; it may come about because it would offer either Russia or America a substantial advantage. If one of these two nations chose to abolish the threat of war and to substitute the threat of demolishing evacuated cities, the other nation would have practically no choice but to follow suit.

I shall attempt in the following to illustrate how this kind of development may be brought about by one or another of the international disturbances that we might expect to occur in the long-range rocket stage.

Such disturbances would almost certainly occur in the

absence of a political settlement between America and Russia. They might occur even if there is such a settlement, and no clear-cut case of aggression need be involved.

The last clear-cut case of aggression was the British-French attack against Egypt. This was something like a ghost from the past, and nothing like it might ever occur again.

A better model for the kind of disturbances that we may expect in the future might be provided by the British troop landings in Jordan and the simultaneous American troop landings in Lebanon, which followed the revolution in Iraq. These landings were in part an unpremeditated response, evoked by the shock of the news from Iraq, for which apparently America as well as Britain was wholly unprepared, and in part they were undertaken for a purpose. The landings brought America and Britain into a position to move troops into Iraq, and they would have moved troops into Iraq had it turned out that the revolution was only partially successful. Any thought of intervening in Iraq was given up after a few days, when the dust had settled and it became clear that no vestige of the power of the old regime remained.

Had it been otherwise and had America and Britain intervened in Iraq, would this have been an act of aggression? Russia would have undoubtedly condemned it as such, while most Americans and Englishmen would have regarded it as a legitimate defense of the *status quo*.

Let us now assume, for the sake of argument, that in the long-range rocket stage there may occur some major disturbance affecting the Arabian Peninsula which threatens to cut off Western Europe from its Middle Eastern oil supply. Let us further assume that America is on the verge of sending troops into Iraq and Saudi Arabia, that Turkish troops are poised to move into Syria, and that Russia is concentrating troops on her Turkish border for the purpose of restraining Turkey. Let us suppose further that at this point America may declare that she is prepared to send troops into Turkey and to use small atomic bombs against Russian troops in combat on Turkish territory and perhaps, in hot pursuit, also beyond the pre-war Turkish-Russian boundary.

Russia would then have to decide whether she wants to fight an atomic war on her southern border and take the risk that such a war might not remain limited. Assuming that Russia has a substantial stake in the Middle East at that time, she might then decide to proclaim that she would not resist an American intervention locally in the Middle East, but would, if need be, exact a price from America, not in human life, but in property. She might proceed to name some twenty American cities and make it clear that in case of American troop landings in the Middle East she would single out one of these cities, give it four weeks' warning to permit its orderly evacuation and to enable the American govern-

ment to make provisions for the feeding and housing of the refugees, and then demolish that city with one single long-range rocket.

In order to make this threat believable, Russia would have to make it clear that she would abide by the principle of "one-for-one" and that she would tolerate—without threatening any reprisals—America's demolishing Russian cities having the same aggregate population. She could make it clear that she expects these cities to be given advance warning also, and that for any additional city which America may choose to demolish in Russia, Russia would demolish one and just one city of a similar size in America.

Were Russia to fail to make these qualifications, her threat to demolish American cities would not be effective, because people would not believe that Russia would trigger a chain of events leading to the destruction of practically all Russian as well as American cities. Accordingly, Russia's bluff might then be called, and if her threat were not a bluff, it would spell disaster for her as well as for America.

What would be the American response to a Russian threat of this sort, provided the threat were properly qualified and therefore believable? Presumably, the twenty cities named would be lobbying in Washington against the projected armed intervention in the Middle East and perhaps force a re-examination of the whole Mid-Eastern issue. People might well ask:

"In view of the fact that there is no other market for Mid-Eastern oil, is Western Europe really in danger of losing the supply of oil from the Middle East? Could not the oil from the Sahara replace, if need be, the oil from the Middle East, and if this were so, just how high could the Mid-Eastern countries raise the price of oil?"

As the result of such a re-examination, America might perhaps decide against an intervention in the Middle East. Contrariwise, if America, being willing to lose one of her major cities, were to decide in favor of intervention, then both Russia and America would lose the same amount in "property destroyed," and America would be free to occupy Iraq and Saudi Arabia without having to fear any further Russian reprisals.

Someone might say, of course, that if this were to happen, America would have a net gain because America's and Russia's losses neutralize each other and America gets Iraq and Saudi Arabia to boot. There might have been a point to this argument during the period of the cold war, when in a sense it was true that "What is good for them is bad for us and what is bad for them is good for us." In the long-range rocket stage, however, what is bad for Russia need not be good for America, and faced with the decision of whether or not to send troops into Iraq and Saudi Arabia, America would have to balance the loss in cities which she herself would

suffer against the advantages which she would gain through the control of the Middle East. The loss which Russia would suffer in cities would not enter in any way into the balance.

Let us suppose now that Russia, having made a threat of the kind described, were able to prevent an American intervention in the Middle East. Russia might then conclude that America cannot force her to fight a war against her will, and that she is in a position to free herself, if she wants to, from the burden of most of her arms expenditure. She could abolish her tactical air force and her entire navy, including her fleet of submarines. She could also greatly reduce her army, retaining only a small number of highly mobile units equipped with machine guns and light tanks. Even if she were to do all this, she would still remain free from the danger that she might be vanquished, as long as she maintains an adequate number of long-range rockets. Rockets of this type are comparatively inexpensive, and maintaining an adequate number of them would cost Russia only a small fraction of her present arms expenditure.

What would hold in this respect for Russia would hold for America also, except that in the case of America, getting rid of her arms expenditure might not be regarded by all as an unmitigated blessing, because the arms expenditure, just as any other non-productive expenditure, has a stabilizing effect on the American market economy. It is of course possible to stabilize the economy by other means, but no one can tell for certain whether these means would be applied or whether they would be applied on an adequate scale, were the country faced with a major recession resulting from a sudden major reduction in arms expenditure. This uncertainty might well dampen the enthusiasm for a rapid and far-reaching reduction of the arms expenditure. Still, no one could really doubt that in the long run America would benefit from being rid of this economic burden, and were Russia to decide to get rid of her arms expenditure and to lean on her long-range rockets as the sole "deterrent," America could be expected to follow suit, sooner or later.

An adequate number of long-range rockets is sufficient equipment for a nation to resist changes which another nation may want to bring about by force; it may not be sufficient equipment for a nation who may herself want to bring about changes by force. For even though it might be possible to force a contested area into submission by threatening to demolish the cities and production facilities of the area, this is hardly the method that a nation which is bent on extending its rule would want to choose. Such a nation would want to maintain an armed force which could overcome the resistance of the local armed forces. Accordingly, in the long-range rocket stage, the size of the army and navy of a great power might become a measure of its desire to extend its rule by force.

It is clear that, if America were to base her security

on long-range rockets alone, any commitment which America might make to other nations would, of necessity, be a limited commitment. In the long-range rocket stage this would be true, however, in any case, no matter what armed forces and weapons systems America might choose to retain. The only question which remains is whether America's commitments would be explicitly admitted to be limited commitments or whether they would just turn out to be limited commitments—in an acute crisis—when the chips are down.

America might well enter the long-range rocket stage considerably overcommitted on paper to other nations, and she might subsequently attempt to decrease her commitments, presumably with the consent of the nations involved. Such consent may be obtainable, because the nations involved may know that they would be better protected by a limited commitment which is believable, even though it be a rather minor one, than by an unlimited commitment which is not believable.

Even today, hardly anyone in governmental circles in France or Western Germany, for instance, really believes that America could be counted upon to sacrifice a substantial number of her cities in order to live up to a commitment made by her at the time when she needed military bases in Europe, and was able to extend protection to nations in Western Europe without risking the loss of her own cities. Sooner or later, doubts of this sort will inevitably lead nations like France and Germany to want to possess their own bombs, if they choose to put their faith in bombs at all.

I shall examine further below to what extent the possession of bombs by such nations would complicate the situation. For the moment, however, I propose to continue this analysis on the basis of the assumption that America and Russia are the only two atomic powers which need to be taken into consideration.

If America should decide to base her "defense" exclusively on her large bombs, she could issue a price list and set a price for each area that she is committed to protect. There could be a minimum price as well as a maximum price for each such area, expressed in terms of the aggregate number of inhabitants of the Russian cities which America would demolish, after giving four weeks' notice. America would not need to decide on the actual price until the area listed has been actually invaded by Russian troops. The actual price must not exceed the maximum price listed, nor could it be set at less than the minimum price listed, without seriously weakening America's ability to extend protection to other nations.

America must not set the prices too high, for she might have to pay as high a price herself as she proposes to exact. The prices set would have to be based on America's appraisal of what prices Russia would be willing to pay for gaining control over the contested areas

which America desires to protect, and America's own willingness to take a corresponding loss.

If Russian troops were to invade an area which is on the American list, this might show that America has underestimated Russia's willingness to pay a high price for gaining control over certain contested areas. In such a case America might then decide to revise the old price list and issue a new list with the prices generally revised upward. The new prices would apply, of course, only for the future, and no useful purpose would be served by making them retroactive.



One might now ask, suppose that both America and Russia were to issue such price lists, is it likely that they would ever be invoked? If one is permitted to extrapolate from the situation which exists today, then one would say that neither Russia nor America, knowing in advance the price that they would be required to pay, would be likely to send troops into an area which is under the protection of the other. It is indeed difficult to think of a plausible situation in which either America or Russia would be willing to sacrifice even one of their major cities for the sake of gaining control over an area that may be coveted by her in the long-range rocket stage. I believe, therefore, that as far as Russia and America are concerned, changes would hardly be brought about "forcibly" under such a "bilateral security system" in the predictable future.

This is by no means certain, however. No one can foresee what disturbances might occur in the early years of the long-range rocket stage. It may not appear likely, but it is still conceivable that American troops may occupy the Arabian Peninsula and that, in accordance with Russia's price list, both America and Russia would each lose cities housing perhaps two million people. It is further conceivable that, subsequent to an American

invasion of the Arabian peninsula, Russia would move troops into Iran and that—in accordance with the American price list—both America and Russia would each lose on that occasion additional cities housing perhaps one million people.

After a while, Russia would perhaps agree to withdraw her troops from Iran, in consideration for the withdrawal of American troops from the Arabian Peninsula. If that were to happen, then there would have been restored the initial status, except that both Russia and America would have suffered an equal loss in cities. Someone somewhere would then presumably recall the story of the two toads:

“Joe and Tom were walking down the road”—so the story goes—“when a toad came hopping along; and Joe said to Tom, ‘I will give you twenty dollars if you swallow that toad!’ Twenty dollars being a lot of money, Tom picked up the toad and stuffed it into his mouth. It was quite horrible, and even after he had swallowed it the toad jumped around in his stomach, which made him feel very bad. Joe, as soon as he had forked over the twenty dollars, began to regret the bet, for twenty dollars is a lot of money to lose. Thus, when another toad came along and Tom offered to give him twenty dollars if he swallowed it, Joe accepted the challenge, grabbed the toad, and stuffed it into his mouth. He got back his twenty dollars, but long after he had swallowed the toad, it kept jumping around in his stomach and made him feel bad. For a while Joe and Tom walked on in silence. ‘Say,’ said Joe to Tom all of a sudden, ‘what for did we swallow those toads?’”

If something like this were to happen in the first few years of the long-range rocket stage, then the price lists would be invoked once and perhaps never thereafter. Have we really any right to expect that the world may be able to get by with less trouble than this much?

Whether a mechanical system is metastable is determined by the virtual motions which are consistent with the constraints to which the system is subjected. In our particular case, the price lists represent the constraints. From the point of view of the stability of the system, it is irrelevant whether the price lists are invoked or not, for whether the system is metastable or not does not depend on the disturbances which occur, but only on the constraints to which the system is subjected. But whether the initial state of the system is preserved, or whether there are changes which take place, does depend on the disturbances.

One may ask with some justification what would be likely to happen if the price lists were *actually* invoked and if some Russian cities as well as some American cities were *actually* demolished. Would in such a case Russia and America be able to abide by the restraints embodied in the principle of “one-for-one?”

On general principles, I am rather inclined to agree

with those who say that it would be a miracle if Man were to survive the advent of the atomic age. But a miracle, as defined by Fermi, is an event which has a probability of occurrence of less than 10 per cent; people are inclined to underestimate the probability of improbable events. No matter what the probability of Man’s survival may appear to be at this point, there is a margin of hope, and all we can do at present is to concentrate on this margin, be it large or small.

Accordingly, I am not going to contemplate what would happen if America and Russia were to issue price lists, and subsequently, when a disturbance occurs and the price lists are invoked, either America or Russia were to transgress the restraints which they have assumed and publicly proclaimed. Rather I am going to discuss the problem of world security on the premise that there would arise no major conflict between America and Russia, or if such a conflict did arise and price lists were invoked, then Russia and America would both abide by the restraints proclaimed. Historians might then say in retrospect that the advent of the bomb has saved mankind from a succession of world wars which, in the absence of the bomb, could have devastated large regions of the earth during the second half of the 20th century and the first half of the 21st.

America has fought two world wars in the first half of this century. In both cases she fought against Germany, not in order to make the world safe for democracy, nor in order to establish the Four Freedoms in the world, as some may have believed at the time, but mainly for the purpose of preventing a German victory in Europe. The United States was more or less forced to enter the war to this end, because a German victory would have produced a major shift in the power balance which would have threatened America’s security. Had Germany won either the First or the Second World War, she might have become militarily so strong as to be able to vanquish (in the absence of the bomb) America in a subsequent world war.

Similarly Russia was led to go to war with Finland just prior to the onset of the Second World War, in order to improve her strategic position in the next war, which she fought against Germany. Both America and Russia have resorted to war in order to avoid being maneuvered into a position where they might be vanquished in a subsequent war. In doing so they based their actions on reasoned arguments, derived from premises that have been hitherto valid.

Had the bomb not come into existence, it is almost certain that, as major changes in the power distribution took place in the world, America would have again become involved in a world war. The long-range rockets may eliminate the necessity for America to fight another world war, and the same holds true for Russia. If America and Russia adopt an adequate philosophy on what constitutes a “permissible” threat of force, never again

would they have to fight a war in order to remain secure, even though the distribution of power in the world may undergo radical changes.

China might become a great industrial power. Germany may become economically far stronger than England, or any other nation on the continent of Europe with the exception of Russia. Japan might become a great industrial nation dominating the world trade with China. No such changes need any longer concern either America or Russia from the point of view of their security.

In the long-range rocket stage even the most spectacular increase in the so-called war potential of the various nations (resulting from their industrialization and manifesting itself in a conspicuous rise in their production of steel, coal, or oil) would remain irrelevant from the point of view of the security of Russia and America, as well as such other nations which in time may acquire a position similar to theirs.

The Problem of the Security of Europe

So far we have postulated that only America and Russia count as atomic powers. From here on we shall have to consider the possibility that certain other nations, including perhaps Poland and Germany, may also possess bombs and long-range rockets suitable for their delivery.

It is conceivable that Russia and America may act in concert, in order to make sure that, if a city in Russia or America is hit by an atomic bomb, the identity of the nation responsible for the attack may not remain secret. This would require the setting up, throughout the world, of a number of observation posts, which would detect by means of radar the firing of a long-range rocket during the ascent of the rocket.

As long as rockets are fired only from launching-sites on solid ground, locating the rocket's point of origin would automatically identify the nation responsible for the attack. If, however, a number of nations have the capability of launching rockets from submarines, surface ships, or airplanes, a nation might launch a rocket carrying a hydrogen bomb and its identity remain secret,

even though the observation posts determine the point on the surface of the sea or in the air from which the rocket was fired.

We shall discuss further below what kind of an attitude Russia and America could adopt in order to dissuade nations from wanting to possess the capability of staging such an anonymous attack. For the sake of argument, we shall assume for the moment that the possibility of an anonymous attack may be left out of consideration, and we shall discuss the security problem of Europe at first on this somewhat oversimplified basis.

Until the long-range rocket stage is reached, both Russia and America may continue to have a vital and opposite interest in the distribution of military power on the continent of Europe. This makes it rather difficult, for the present, to bring about any changes in Europe with the consent and approval of both America and Russia. At the same time the nations in Europe derive perhaps some measure of security from the very fact that Russia and America have vital and opposite interests.

In the long-range rocket stage America and Russia are going to become increasingly indifferent to changes that might take place on the continent of Europe. In that stage there will be no important reason why the United States should wish to maintain any military bases on foreign soil, and a military alliance with the nations of Western Europe would no longer add anything much to the security of America. Even if America should continue to maintain an alliance with the nations of Western Europe, she would be bound to regard these allies more and more as expendable. For much the same reasons Russia may become increasingly indifferent to what may happen in Europe. What would be likely to happen in Europe in such circumstances?

Right now the nations of Europe are all tired of war, and clearly the people of Western Germany are at present more interested in increasing their prosperity than in the problem of unifying Germany. Yet the time might come when unifying Germany may become the overriding political issue on which all Germans may unite. And similarly, once Germany has been united, the issue of recovering for Germany some or all of the territories lost to Poland might become the overriding issue on which all Germans may unite.

Let us then, for the sake of dealing with a clean-cut concrete example, assume here that Germany has been united, and limit the discussion to the German-Polish problem which might emerge subsequent to the unification of Germany.

a. If it were possible to arrive at a political settlement satisfactory to the nations of Europe and satisfactory also to America and Russia, and if nations like Germany and Poland were willing to forego the possession of atomic bombs and rockets, then Russia and America might be willing to guarantee, jointly or sepa-



rately, the agreed-upon status of Europe against changes brought about forcibly by either Poland or Germany. They could do this effectively and without any risk or appreciable cost to themselves by relying on the threat of demolishing, if need be, a few cities either in Germany or Poland, after giving each city several weeks of warning to permit its orderly evacuation.

b. If there is a political settlement in Europe, but Germany and Poland possess atomic bombs and rockets suitable for their delivery, then both Russia and America might be unable effectively to guarantee the agreed-upon status. Nothing that may happen on the continent of Europe would have an appreciable bearing on Russia's and America's security in the long-range rocket stage, and it is difficult to see why either Russia or America should take the risk of having any of their cities demolished by German or Polish bombs, in case of a German-Polish conflict. If Germany and Poland possess bombs, they themselves could render the situation "metastable" by issuing their own price lists, and if they reach a political settlement, these price lists need not ever be invoked.

c. If there is no settlement in Europe which is satisfactory to Poland as well as Germany when the long-range rocket stage is reached, there will probably still exist some American commitments to Germany and some Russian commitments to Poland, both limited *de facto* if not *de jure*. It is quite possible that, rather than maintain such commitments indefinitely, America would prefer to buy her freedom from such commitments by providing Germany with a certain number of bombs and rockets suitable for their delivery. For the very same reason Russia might provide Poland with a number of bombs and rockets. Both Poland and Germany could then subsequently set up their own price lists. If the attitudes prevailing at present in Western Germany still hold at that time, then these price lists would be likely to freeze the *status quo*. But were Germany willing to pay a higher price for an eastward shift of her present eastern boundary than Poland would be willing pay for preventing such a shift, then Germany could force a change without triggering uncontrolled destruction of German and Polish cities.

At this point it may be necessary to say that the loss of an evacuated city could mean a good deal more than just a "loss of property" and this would hold true in Europe perhaps even more than anywhere else in the world. People have a strong emotional attachment to the city in which they live, and certain cities are in fact irreplaceable. The destruction of a city would cause dislocation of population and may destroy much of the social fabric; thus the damage cannot be expressed in purely monetary terms. In Europe, perhaps even more than anywhere else, people might rebel at the thought that their city might be sacrificed on the altar of more or less irrational national goals.

The Problem of Security Outside of Europe

There are a few areas, moderate in size, which America and Russia may recognize as lying in each other's sphere of influence, in the sense that either America or Russia may be willing alone to assume the responsibility for preserving the peace within those areas and thereby to protect adjacent countries from any attack coming from within those areas.

In some other areas, also few in number and moderate in size, it might be possible to freeze the *status quo* by setting up a regional intergovernmental armed force, with the approval of Russia and America, as well as the consent of the other major nations involved. The sole function of such regional armed forces would be to prevent any nation from violating the territorial integrity of another nation. It could not be their function to prevent governmental changes brought about by internal revolution in a country, as long as no military forces cross the frontier of that country.

The regional intergovernmental armed forces need not and should not be equipped with atomic weapons, but they could be highly mobile and could be equipped with high firepower. Thus they could be militarily stronger than any one nation within the area, if the arms level of the nations within the area is kept low.

In those few areas where the *status quo* can be frozen in this manner, the nations of the area may thus be given the security which they need, so that it would not be necessary for them to divert a substantial fraction of their economic resources into military expenditures.

Would it be possible to set up such regional armed forces under the sponsorship of the United Nations?

At the end of the last war, it was generally believed that—as long as the great powers act in concert with each other—the United Nations may be able to guarantee the security of the smaller nations and may make it unnecessary, as well as impossible, for them to go to war with each other. Attempts made in the post-war years to use the United Nations for purposes other than those for which it was designed have weakened this organization, and it remains to be seen whether they have damaged it beyond repair. Only if it were possible to restore the United Nations to its original function would it be able to serve as an agency to which the organization of regional intergovernmental armed forces could be entrusted.

There are other extended areas in the world, of which Southeast Asia might be an example, where maintaining such international armed forces would not be practicable. If the conflict between India and Pakistan, for instance, were ever to reach a point where these two nations may be ready to go to war with each other, it would be hardly practicable to restrain them from doing so by means of an international armed force. The nations of the world would hardly be willing to incur the

major expenditure involved in maintaining an adequate armed force in Southeast Asia for the sake of preventing India and Pakistan from going to war with each other.

It is conceivable that the problem of maintaining peace in the regions of this type could nevertheless be solved provided that Russia and America were to act in concert in rendering economic assistance to underdeveloped nations for this purpose. Nations which receive economic aid over a number of years come to depend on it. The fear of losing such aid might well keep such a nation from going to war with its neighbor if Russia and America were manifestly opposed to such an unwanted disturbance.

The aid which America and Russia may give may be equal in amount, but different in kind. Clearly, America may find it easier to supply goods than to supply services, whereas Russia may find it easier to supply services than to supply goods. America has no surplus of engineers and technicians, and it is difficult to see in what manner she could induce technically highly trained men to live for an extended period abroad, rather than at home. Russia would be in a very good position to do just this. Thus the nations of Southeast Asia might be given most effective assistance in their development if they were to receive American capital combined with Russian technical assistance.

The Problem of the Unidentified Attacker

We have left out of account so far the possibility that a number of nations may possess the capability of launching rockets from submarines, surface ships, or aircraft. Such rockets can carry large hydrogen bombs, so that a single rocket could destroy a good-sized city.

America is at present building submarines for this specific purpose, and other nations might follow suit. The considerations which impel America to build such submarines at present will no longer be valid in the long-range rocket stage. Therefore, when the time comes Russia and America may act in concert and attempt to induce all nations to forego the possession of such submarines, as well as all other means which could be used for launching an anonymous attack. It is by no means sure, however, that America and Russia would succeed in such an endeavor; the very same compelling reasons which induce America to build such submarines today, may induce Japan, Germany, France or Poland to build such submarines ten or fifteen years hence.

The mere fact that a nation in possession of such submarines could destroy an American or a Russian city and could remain unidentified does not, of course, mean that such an anonymous attack would be likely to occur. Nations do not do things just because they are bad, but they may do bad things if there is a substantial advantage to be gained by doing them.

Thus during the Second World War, a few days after Germany went to war against Russia, there was an at-

tack against the city of Kaschau from the air. The Hungarian government examined the bomb fragments and found that the bombs were of Russian manufacture. As we know today, the bombs were dropped by the German airforce for the purpose of giving the impression that Russia was the attacker and thus inducing the Hungarian government to declare war on Russia. This ruse was successful, and Hungary declared war on Russia.

In certain circumstances one or another nation might conceivably be tempted to destroy an American city if it could remain unidentified, and if there were a reasonable chance that America would counterattack Russia.

The danger of such an occurrence could be virtually eliminated, however, if America and Russia adopt the appropriate attitude with respect to it. What would this be?

Let me assume for the sake of argument that ten different nations possess submarines capable of firing long-range rockets which can carry hydrogen bombs. America could then proclaim that, if a bomb were dropped on an American city and the attacker were not identified, America would destroy one, and just one, city of comparable size in every country which, in her opinion, could conceivably be responsible for the attack. *America would give each such city sufficient warning to permit an orderly evacuation of the city.*

Should an American city be attacked while the political situation is in any way comparable to the situation we have at present, America would presumably conclude that neither England nor France, for instance, could possibly have been the attackers, and she would presumably want to spare these two nations.

It can be shown that it is possible to extend along these lines, on the basis of the principle "one-for-one," the bilateral security system, discussed earlier, to the many-nation problem, even if the identity of the attacker remains unknown. In the case of an unidentified attack, however, the principle of one-for-one would put to a very severe test the ability of the government involved to act rationally, in the face of great provocation.

1. Let us, for instance, assume that an American city is subjected to a surprise attack by a nation which remains unidentified, and America responds by demolishing evacuated cities of comparable sizes in Japan, Russia, and Poland. Let us further assume that she would want to spare France, England, and Germany, even though these nations also possess the capability of staging an anonymous attack. Poland might then respond—without violating the principle of one-for-one—by demolishing an evacuated city of comparable size in Germany, because in contrast to America, she may believe that it was Germany who staged the anonymous attack.

2. An anonymous attack against an American city would, of course, have to be a surprise attack which would not only demolish the city, but also kill the people who live in it. Yet it would not be permissible for America to retaliate by staging a similar surprise attack

even against the country which America may suspect most. Such "retaliation" on the part of America would not be consistent with the principle of "one-for-one," which must operate on the basis of the destruction of property rather than killing people. If America were to "retaliate in kind" against the nation she suspects most, that nation, if it was innocent, might then—in righteous indignation—retaliate in kind, not against America perhaps, but rather against the nation it may blame for the initial anonymous attack. Thus, unless all nations adhere rigidly—even in the face of the provocation of an anonymous surprise attack—to the principle of "one-for-one" in its most restraining form, there could ensue a rapid and total collapse of the whole "multilateral security system" here discussed.

In such circumstances, Russia and America would have good reason to discourage all nations from possessing the capability for staging an anonymous attack. They could go a long way toward accomplishing this by proclaiming that they would adopt the principle of "one-for-one" in the generalized form that I have sketched above. Rather than risk that one of their cities may be demolished because some other nation stages an anonymous attack on either Russia or America, many nations might prefer to forego the possession of submarines which are capable of launching rockets, and they might be eager to convince America and Russia that they possess no means which are suitable for staging an anonymous attack.

The Problem of "Inspection"

To make sure that a nation has no such capabilities would require rather stringent measures of inspection, particularly since such an attack could be staged from surface ships and certain types of aircraft also. It is difficult, and perhaps impossible, to spell out in detail, in advance, all the measures that might be needed in order to rule out all of the numerous possibilities for evasion. I personally have little doubt, however, that any nation which is eager to convince America and Russia that it is not in a position to launch a rocket from a submarine, a surface ship, or an airplane, could find a way of doing so.

I have been trying to show that America and Russia could go a long way toward rendering the "stalemate" metastable without having to enter into an agreement with each other that would require stringent measures of inspection. America and Russia might get by for one or two generations without providing for substantial arms limitations by agreement. But in the absence of an agreement providing for arms limitation, Russia and America may sooner or later get entangled in a new kind of arms race.

Occasionally there are hints in speeches of officials, who should know better, that there is work in progress on a defense system aimed at destroying long-range rockets in flight. Such a defense system is not in fact in

sight. What may be in sight is a novel type of futile arms race. One nation, say, America, may acquire means which would permit her to destroy in flight a small fraction of the incoming long-range rockets and the fraction of rockets which she could thus destroy may gradually increase over the years. Russia may then respond by correspondingly increasing the number of rockets ready to be launched. Only a small fraction of these rockets would need to carry a hydrogen bomb; the rest could carry dummies.

Such an arms race would be futile, with the capability of the offense always keeping ahead of the capability of the defense, and yet it could become a major economic burden. In these and other similar circumstances, an agreement on arms limitations might at some point become necessary, and when that happens, the question of how Russia and America can safeguard themselves against substantial secret evasions will become acute.

In my opinion, the difficulties of instituting safeguards against secret evasions are overestimated at present. These difficulties may appear to be almost insurmountable if one thinks in terms of drafting an agreement aimed at arms limitations to which America and Russia would be irrevocably committed, and which spells out in detail the measures of inspection to which they must submit. Conceivable evasions are almost innumerable and, as time goes on, there might arise new ways of evading which were not previously apparent.

A more fruitful approach to the real problem which is involved might be the following: It lies in the very nature of an arms limitation agreement that it can operate only as long as both Russia and America want to keep it in force. It therefore would be logical to say that in such an agreement Russia and America ought to retain the right to abrogate legally the agreement at any time—without cause. Assuming that America and Russia enter into an agreement which they may want to keep in force indefinitely, there would be no need to spell out in the agreement any specific measures of inspection. Instead, it would be understood that unless Russia is able to convince America that there are no major secret evasions on her territory, America would be forced to abrogate the agreement. The same holds, of course, in the reverse, for Russia.

With the problem posed in these terms there may be little doubt that, as long as Russia would want to keep the agreement in force, she would find ways to convince America that there are no major secret evasions. Russia might accomplish this in a variety of ways. The measures of inspection which have been discussed so far in international negotiations all have one thing in common: they try to solve a novel problem by the most pedestrian methods. There would be no need for Russia to limit herself to such pedestrian solutions.

Similarly, America should have no difficulty in convincing Russia that there are no major secret evasions

occurring on American territory. She might in fact have to do no more than to make it somewhat easier to pursue the traditional forms of spying activities on American soil.

Coexistence Is Not Enough

As long as we limit our discussions to the relationships of the national governments to each other, we cannot go much beyond coexistence. There is no such thing as "friendship" between governments. Yet it is clear that in some sense the nations will have to go beyond coexistence, in the long run.

If America and Russia should succeed in rendering the so-called atomic stalemate metastable, we shall have gained time. But unless we make good use of the respite won, not much will have been gained. It would be necessary to utilize the time won in order to make rapid progress toward establishing a world community of nations, in which the nations would be more interested in continued cooperation than in bringing about changes in the map by the threat of force.

A development in this direction might progress only to the extent that it may be accompanied by shifts in the loyalty pattern of the individuals who make up the populations of the nation states.

The loyalty of an American to his country, as a whole, does not arise merely from what he is taught at home and in school. An American who is born, say, in New York State, thinks of, say, California as a place where he might go to college, and where he might subsequently settle and live out his life. When men born in one country will look upon another country not as a potential enemy but as a potential place of residence, then there

will be a shift in their pattern of loyalties, and there may also be, in time, a corresponding change in the behavior pattern of the national governments. There would have to be a simultaneous evolution in the loyalty pattern of the individual and in the pattern of international institutions. New institutions would have to come into existence which would permit the growth and the exercise of loyalties which transcend that to one's own nation.

There can exist no friendship between national governments, but there can exist friendship between individuals who are nationals of different countries, and also there can be a feeling of friendship, on the part of individuals of one country, for another country as a whole. How could this come about?

In America, working hours might go down in the predictable future to four days a week. The time might come when Americans may prefer to consolidate their free time, with the exception of Sundays, into one extended paid vacation of perhaps three months a year. A substantial fraction of Americans may then choose to spend their vacation abroad. In time, a large number of young Americans might come to prefer to spend their college years abroad, and more and more of them might perhaps settle abroad.

A similar development might take place in Russia also, and perhaps sooner than anyone would venture to predict.

Such developments, and others as yet unforeseeable, would, of course, come about faster if there were a clear recognition that they are needed and if they were promoted by institutions created to further them. This, however, is a topic which falls outside of the scope of the present paper.

