The Theoretical Foundations of Strategic Nuclear Deterrence

ROBERT POWELL

In the continuing debate about strategic issues, the vocabulary and theoretical concepts of strategic nuclear deterrence theory are now widely used to support inconsistent conclusions. Will deploying the MX missile enhance strategic nuclear deterrence or make it more difficult? Does the existence of mutually invulnerable strategic forces reduce the likelihood of major war, or does the strategic stalemate make conventional or limited nuclear war more likely? To the extent that contradictory conclusions are claimed to follow from a theory of strategic nuclear deterrence, these inconsistencies suggest a fundamental weakness in the theory or that those using the theory do not fully appreciate it and its limits. In either case, a reconsideration of the theoretical foundations of strategic nuclear deterrence may help to elucidate this debate.

I shall examine these foundations by asking the most basic questions of nuclear deterrence theory. What, precisely, is being threatened in a nuclear threat? Are there different types of nuclear threats? If so, do they rest on different sets of assumptions or do they work in different ways? Nuclear threats seem closely related to escalation, but are there different types of escalatory processes? If so, in what ways do they differ? These are fundamental questions about the foundations of strategic nuclear deterrence theory.

This analysis will attempt to answer these questions by describing two types of strategic nuclear threats. In the first type, a state raises the risk of an uncontrolled, explosive escalation to general nuclear war by engaging in what Thomas

ROBERT POWELL is a doctoral candidate at the University of California, Berkeley, where he is studying economics and international politics.
Schelling has called threats that leave something to chance. That is, a state threatens to act in such a way that neither the threatening state nor the threatened state can control the outcome. In this type of threat, escalation to general nuclear war results from both sides losing collective control of events. Crises become a competition in demonstrating resolve which is defined as a willingness to run grave risks of an explosive escalation to general nuclear war. In the second type of nuclear threat, the states do not lose collective control. Rather, a state threatens to attack another state in a limited way in an attempt to communicate to the other state the value that the threatening state places on what is at stake in the crisis. Escalation results when a state, while fully in control of its actions, decides that what is at stake is sufficiently important to outweigh the danger that an adversary will not submit after suffering a limited attack but will, while fully in control of its own actions, reply in kind. Crises associated with the second type of threat also are a competition in demonstrating resolve, but the resolve a state is trying to convey is a willingness to inflict and endure future destruction.

The first section of this article identifies two general theories of strategic nuclear deterrence by describing the different sets of assumptions on which these theories rest. Because of the different underlying sets of assumptions, the nature of the nuclear threats inherent in each of these theories differs. The first section also attempts to characterize the nature of each of these threats. Implicit in these two types of threats are different escalatory processes that are examined and related to the two theories of nuclear deterrence in the second section. The elaboration of these two theories and of the escalatory processes implicit in them provides a basis for the third part. Conclusions about the likelihood of war are often claimed to follow from these theories. Such claims thus transform these theories into theories of the causes of war. This analysis suggests these theories of the causes of war are severely limited, for hidden in them is a fundamental assumption about international politics.

THE NATURE OF NUCLEAR THREATS

Since the end of World War II, two general theories of strategic nuclear deterrence have been developed. They rest on distinctly different sets of assumptions that give very different answers to the question of precisely what is being threatened in a nuclear threat. Notwithstanding this important difference, the distinctions between these two theories are rarely noted. Indeed, these two theories are often mixed together under the rubric of strategic nuclear deterrence theory.

During the late 1950s and early 1960s the United States became increasingly vulnerable to a Soviet massive retaliation. A question arose that would echo throughout future debates about nuclear strategy. Could the threat of a massive retaliation ever be credible when carrying it out would result in a devastating

counterretaliation? Could, in short, a threat of mutual suicide ever be credible? The particular policy problem was the credibility of the American nuclear guarantee to Western Europe embodied in the North Atlantic Treaty Organization (NATO). The policy debate focused on questions of the control of nuclear weapons and the meaning and application of the doctrine of flexible response.\(^2\) The theoretical problem was to find a way to threaten to do the incredible credibly.

One of the two theories of strategic nuclear deterrence attempted to describe how the threat of a massive unrestricted nuclear attack might be made credible. This theory rested on three assumptions. First, a general nuclear war would devastate both sides. But, second, the theory took “for granted the importance of pre-emption, of being the one to initiate general war if general war occurs.”\(^3\) These two assumptions seem to imply that, although devastating to both sides, something of social value might escape destruction. For example, by striking first, one side might be able to preserve an important part of its population and industrial base. If there were no significant prospect of protecting something of value by being the first to launch an attack, then it is difficult to attach any meaning to the importance and advantage of being first. The incredibility of threatening mutual suicide was in part resolved by assuming that for one side it might not be suicide. Nevertheless, the cost of prevailing still seemed so great as to leave the threat of launching a general nuclear war less than credible. A third assumption would be needed to solve the problem of making the threat of an unrestricted nuclear attack credible. It was “assumed that each side is not only pre-occupied with the possibility of a pre-emptive attack but is aware of the other’s pre-occupation with it.”\(^4\) The latter two assumptions created a strong incentive to initiate a massive first strike. Since being the first to attack carried some meaningful advantage and since each state feared the other would attempt to capture this advantage, each state seemed likely to try to be first. With the mobilization crisis preceding World War I adopted as the appropriate analogy, escalation to general nuclear war was expected to be very rapid as one or both sides succumbed to the pressure to launch a massive pre-emptive nuclear attack.

Thomas Schelling recognized that this fear of an explosive escalation to general nuclear war provided a means of resolving the problem of credibility. Deterrence could be based on the fear of such an explosive escalation, on the fear of “things getting out of hand.”\(^5\) It was unnecessary to rely on an apparently incredible explicit threat to initiate a general nuclear war deliberately. Rather, a


state could threaten to take steps that would increase the likelihood of such a war. A state could make threats that left something to chance. The solution to the problem of credibility, then, was to create an array of limited options each of which could serve to raise the risk of an explosive escalation to general nuclear war. No single option would of itself mean such a war, only a somewhat greater danger of it. The threat to exercise these options would be much more credible than the threat to launch a massive retaliation intentionally.

A response that carries some risk of war can be plausible, even reasonable at a time when a final, ultimate decision to have a general war would be implausible or unreasonable.6

This emphasis on the risk of a very rapid, explosive escalation tends to obscure the more general nature of a threat of a massive unrestricted nuclear attack that leaves something to chance. The plausibility of an explosive escalation is only a particular example of a more general condition that is essential to a threat of such an attack that leaves something to chance—the existence of a situation in which the prospect of a state launching such an attack is credible. What is left to chance is the possibility of a state finding itself in a situation in which the prospect of its launching an unrestricted nuclear attack is credible. If there were no situation in which such an attack was credible then, by definition, there is no chance of a state finding itself in such a situation. Accordingly, the threat of an attack arising from a threat that leaves something to chance would be incredible, because there would be nothing to be left to chance.

The three assumptions of this theory combine to create a particular situation in which the prospect of a massive nuclear attack is credible. They make possible a condition in which each state fears that the other is about to launch an attack and so is likely to initiate its own in an attempt to pre-empt the other. Given the existence of such a situation, the exercise of a limited option increases the risk that a state will find itself in that situation. Although nuclear deterrence still rests in particular on the fear of an explosive escalation, strategic nuclear deterrence in this theory rests more generally on the assumption of the existence of a situation in which the prospect of a state initiating a massive unrestricted attack is credible.

In this theory, limited options exercised before general war begins are used to manipulate the risk of escalation to general war. Accordingly, these options are not to be judged primarily by their effects on the battlefield of a limited war, but by their effects on the risk of general war. The array of limited options, each of which carries a different risk of escalation, constitutes a spectrum of risk. During a crisis, each side can attempt to demonstrate the strength of its resolve by accepting the greater risk of general war that escalating another step generates. In this way, crises become a competition in risk-taking.7

---


As strategic forces became less and less vulnerable to attack, a new assumption and the theoretical consequences of making it became increasingly important: at least two states simultaneously have invulnerable strategic forces capable of destroying a potential adversary’s society. The assumption of mutually invulnerable strategic forces undercuts the logic of the theory of nuclear deterrence based on a spectrum of risk by invalidating the second assumption of this theory and thereby casting doubt on any implications derived from it. With these forces, it is, by definition, no longer important to be the state to strike first, and if this is the case, there is no obvious reason why both sides would be preoccupied with pre-emption. It is no longer necessary to launch a massive nuclear attack because one might be on the way. Mutually invulnerable strategic forces meant that a state could be the second to strike and not suffer any meaningful disadvantage. A state could wait until it was very confident that it had actually suffered such an attack before retaliating with its own. Assuming the existence of these forces seemed to deny the existence of a situation in which the prospect of a state deliberately initiating a massive nuclear first strike was credible. It also reduced the likelihood of an escalation to general nuclear war. Schelling, although still emphasizing a rapid, explosive escalation, described the issue clearly.

If strategic forces were not very vulnerable or dependent on warning or quick response for their own protection, were capable of controlled reaction, and had the means of communication and the doctrine that would make this possible, and if the other side were aware that this was the situation on the other side, the urge to pre-empt would be greatly reduced. The possibility of war by accident, by false alarm, by some unauthorized action or communication failure would be much reduced. Most of the possibilities of inadvertent or unpremeditated war are functions of haste. Slow down the responses; reduce each side’s expectation that the other would be motivated to attack; design better and more flexible control over forces; and reduce the dependence on fallible warning systems—and the likelihood of general war is reduced, and so is the expectation of it. The tendency of local war, even local nuclear war, would be reduced . . .

---

8 The condition that “at least two states simultaneously have invulnerable strategic forces capable of destroying a potential adversary’s society” will be abbreviated as “the existence of mutually invulnerable strategic forces.” The word “mutually” is used to emphasize that at least two invulnerable strategic forces exist simultaneously. The abbreviation also implicitly assumes that these forces can destroy an opponent. Describing this condition as “mutually assured destruction” would be more natural. This phrase, however, has come to connote more than merely a technological state of affairs. It now represents a particular doctrine about the type of targets to be attacked and how to attack them.

9 Although the strategic forces of each side may be invulnerable, their command, control, and communication systems are not. See Desmond Ball, “Can Nuclear War Be Controlled?” Adelphi Papers, no. 169 (London: International Institute for Strategic Studies, 1981). If these systems are so vulnerable that a state could protect a significant part of its society by destroying the command and control systems of an adversary in a first strike, then it would be important to be the first to strike, and deterrence would tend to rest on a spectrum of risk.

10 Schelling, “Nuclear Strategy in Europe,” 428; see Brodie, Escalation and the Nuclear Option, 63–4.
Indeed, even limited strategic exchanges might not trigger a massive unrestricted nuclear attack.\footnote{Klaus Knorr, “Limited Strategic War,” in Klaus Knorr and Thornton Read, eds., \textit{Limited Strategic War} (New York: Praeger Publishers, 1962), 11-14.}

In summary, the assumption of mutually invulnerable strategic forces implied that being the first to launch an unrestricted nuclear attack no longer offered the possibility of physically protecting one's own society. Implicit in this assumption, moreover, was the notion that a state could ride out any attack and then assess what sort of attack had been suffered. This seemed to render it very unlikely that a state could incorrectly conclude that it had suffered an unrestricted nuclear attack.\footnote{At the heart of the concern in the United States about the vulnerability of its Minuteman missiles is the assumption that the president could distinguish between an unrestricted attack and one limited to these missiles.} Thus, this assumption eliminated the one situation in which it might be said to be rational to launch a massive society-destroying attack. The threat of such an attack that leaves something to chance could no longer appeal to the possibility of a state finding itself in a situation in which the prospect of it rationally deciding to launch such an attack was credible. What now had to be left to chance in these threats was the possibility of a state launching such an attack accidentally or irrationally. The threat of an attack that leaves something to chance would be credible to the extent that the prospect of an accident or an irrational act was credible. Somewhat paradoxically, nuclear deterrence, which had often been criticized for assuming rationality, actually presupposed irrationality.\footnote{Patrick Morgan, \textit{Deterrence: A Conceptual Analysis}, (Beverly Hills, Calif: Sage Publications, 1977), 77-124, also notices this seeming paradox and tries to escape it by fashioning a theory of “sensible” deterrence. He assumes that officials and governments are “sometimes and in some ways conscious and rational, yet take into account the fact certain forces work to make their behavior unconscious and irrational” (p. 102). His escape is a failure: he too presupposes irrationality. For an early warning that this paradox was inescapable, see Glenn Snyder, \textit{Deterrence and Defense}, 25.}

The possibility of an accident or of a lapse of rationality in an era of mutually invulnerable strategic forces provided an unsatisfactory foundation for nuclear deterrence. The challenge was to construct a theory of strategic nuclear deterrence in which mutually invulnerable strategic forces were assumed to exist and that did not ultimately rely on a threat of a massive unrestricted nuclear attack. To achieve this, the new theory would begin by assuming away the possibility of such an attack.\footnote{Historically, these two forms of strategic nuclear deterrence theory developed contemporaneously and were not tied closely to the technical capabilities postulated. These theories, moreover, are buried in policy debates about doctrines of limited strategic war.}

The solution was to be found in defining a new role for limited options. In the first theory of strategic nuclear deterrence, limited options could be used to raise the risk of general nuclear war, creating a spectrum of risk. But if the risk of such an attack were assumed away, the spectrum of risk also disappeared. One could not manipulate the risk of an attack through the exercise of limited op-
tions because the risk of such an attack arising from each and every one of these options was assumed to be zero. Of course, the limited options themselves continued to exist and could be used to inflict varying degrees of destruction on an enemy.

The set of limited options now constituted a spectrum of violence that offered the means through which each side could bring varying degrees of coercive pressure to bear on the other side. But exerting coercive pressure through a spectrum of violence was to prove a much more subtle theoretical problem than exerting coercive pressure through a spectrum of risk. In the theory based on a spectrum of risk, the exercise of a limited option of itself increased the risk of general nuclear war and thus directly demonstrated one's willingness to accept greater risks. Moreover, by actually increasing the danger of escalation to general nuclear war, the exercise of a limited option also increased the coercive pressure on an adversary directly. An increase in risk can be undone by its reduction. Because an adversary dislikes this risk, its reduction is a direct reward for resolving the dispute. In this way a greater risk of general nuclear war is a greater incentive to come to terms. Increasing the risk increases the incentive to come to terms and thereby directly increases the coercive pressure. With the risk of an unrestricted nuclear attack assumed away, the exercise of limited option can only increase the coercive pressure on an adversary indirectly, for coercive pressure does not arise directly from the destruction wrought by the exercised options. This cannot be undone by coming to terms. The destruction itself provides no incentive. Whatever coercive pressure the spectrum of violence creates arises only through an increase in the credibility of the threat of future destruction. “The hurting does no good directly; it can only work indirectly. Coercion depends more on the threat of what is yet to come than on the damage already done.”

By exercising an option in a spectrum of violence, each side attempts to demonstrate the strength of its resolve or, in other words, its willingness to endure more future destruction to achieve its goals than its opponent is willing to endure.

Using a spectrum of violence coercively could be more difficult than using a spectrum of risk coercively for another reason. If the danger of an explosive escalation to general nuclear war is great, then limited options, although not in themselves very destructive, might significantly increase the risk of such a war and thereby provide an adequate deterrent. But it seems unlikely that limited options that are not very destructive would significantly increase the credibility of a threat to exercise very destructive options. Increasing this credibility may necessitate exercising some rather destructive options. Although this destruction in-

---

15 Even mutually invulnerable strategic forces capable of destroying only cities and soft military targets could constitute a spectrum of violence; if necessary, cities could be destroyed one at a time. Snyder, Deterrence and Defense, 47, also uses the phrase “spectrum of violence” but in a different context and without distinguishing between a spectrum of risk and of violence.

16 Schelling, Arms and Influence, 172. Snyder, Deterrence and Defense, 71, offers a similar comment.
directly increases the coercive pressure on an adversary, it directly increases the cost of coming to terms. The investment in prevailing in the crisis is greater, because it now includes the destruction already suffered. These two factors oppose each other: the greater coercive pressure encourages an opponent to come to terms and the greater cost of doing so discourages it. Which factor will dominate is uncertain. "A war of endurance might bleed both sides to death." More certain is that to the extent that the limited options in a spectrum of violence may be significantly more destructive than in a spectrum of risk, then dissuasion in a theory based on a spectrum of violence is likely to be more difficult than in a theory based on a spectrum of risk.

In a theory of nuclear deterrence based on a spectrum of violence, the problem of the inherent incredibility of a threat of an unrestricted nuclear attack is solved or rather avoided by never resorting to such a threat. A threat of mutual suicide is never made. Instead, the threat is to extract from an adversary a toll in destruction sufficient to outweigh any potential gains and, implicitly, a willingness to endure the destruction caused by an opponent's retaliation. This threat, if made in the context of the theory based on a spectrum of risk, reduces to a threat that leaves something to chance, because any attempt to extract such a toll is expected to provoke a massive nuclear attack and general war. But in the context of the theory in which the risk of such an attack is assumed away, the spectrum of violence makes it possible to attempt to collect this toll. Moreover, should this threat initially prove insufficiently credible, then the spectrum of violence could provide the means of making the willingness to extract this toll increasingly credible by collecting it a little at a time.

The most important difference between these two theories is that one of them assumes mutually invulnerable strategic forces. Without this assumption the array of limited options constitutes a spectrum of risk in which each option carries a different risk of escalation to general war. With this assumption, the array of limited options constitutes a spectrum of violence.

Two important implications follow from this difference. The first is that if mutually invulnerable strategic forces are assumed to exist, then dissuading an enemy from attacking must depend on deterrence. This reliance, moreover, is not a matter of doctrinal choice. Even if a state develops an extensive array of limited options that can deny an enemy its battlefield goal, this state still cannot escape an ultimate dependence on deterrence. In the presence of mutually invulnerable strategic forces, it simply is not possible to fight a war in the classical sense in which Karl von Clausewitz understood the word "fight." No state can defend

18 An important element to Clausewitz's understanding of the nature of war is that one side, while being able to defend itself, should be able to render the other defenseless. See Karl von Clausewitz, in Michael Howard and Peter Paret, eds., On War (Princeton, N.J.: Princeton University Press, 1977), 75-123, esp. 77. Mutually invulnerable strategic forces make this impossible and break the causal chain underlying Clausewitz's notion of war.
its society by physically destroying another's strategic forces. During a confrontation, force cannot physically decide the matter. If one side is to lose, it must agree to do so; and it must agree to do so while possessing the ability to destroy the other state. This is deterrence. 19

This implication may seem somewhat surprising. In the theory based on a spectrum of violence, the risk of an unrestricted nuclear attack is assumed away. Limited options do not raise the risk of such an attack; they destroy. They may be used to destroy some of an enemy's forces and deny it its goal. Nevertheless, asserting that it is the physical destruction of some of its forces that denies an enemy its goal is fundamentally to misunderstand the role of limited options in a spectrum of violence.20 In the theory based on this spectrum, states always retain the ability to destroy each other. What they threaten, then, is ultimately to extract from an adversary a toll in destruction sufficient to outweigh any potential gains. Limited options are used in an attempt to make this threat more credible; they are not used just to destroy the other's forces. This is not to say that limited options that destroy an enemy's forces may not help dissuade an enemy from continuing to pursue its goals. If the exercise of limited option helps, it does so primarily by affecting an enemy's judgment of the other's resolve or, in other words, the other's willingness to inflict and endure future destruction. It does not help primarily by destroying some of an enemy's ability to continue to pursue its goal.

The second implication that follows from the different assumptions of these theories is related to their applicability. Even if mutually invulnerable strategic forces are assumed to exist, strategic nuclear deterrence could be based on the threat of an unrestricted nuclear attack and a spectrum of risk. But implicit in this is a reliance on the credibility of this attack resulting from an accident or an irrational act. Policy makers may deem this prospect sufficiently credible to make it the foundation of deterrence. But in deciding what constitutes an adequate foundation, they should be aware of the assumptions often left implicit in these theories.

CONTROL AND UNCERTAINTY

Uncertainty and the struggle to control it are most acute during a crisis, and nuclear deterrence theory has generally addressed these issues in the context of crisis. Schelling states:


The essence of the crisis is its unpredictability. The “crisis” that is confidently believed to involve no danger of things getting out of hand is no crisis . . . It is the essence of crisis that the participants are not fully in control of events . . . 21

That “the participants are not fully in control of events” is fundamental to much of strategic nuclear deterrence theory. This phrase, however, has two very distinct interpretations that are fundamental to nuclear deterrence theory and closely related to the distinction between the spectrum of risk and the spectrum of violence. Nevertheless, the distinction between these two interpretations is rarely made, and these interpretations are often confused.

The first interpretation of the phrase “the participants are not fully in control of events” is what Bernard Brodie seems to have in mind when he attempts to assess the probability of “uncontrolled escalation.”22 It is the interpretation implied by descriptions such as things may “get out of control,” or “getting out of hand,” or “the risks of escalation could be kept limited and controlled.”23 The first interpretation is that control is something which can be lost. Escalation during a crisis results from something beyond the physical or psychological control of any of the participants, from an accident or an irrational act.

A threat of a massive unrestricted nuclear attack that leaves something to chance and this interpretation of events that are not fully under control are closely related. If the existence of mutually invulnerable strategic forces is assumed, then the credibility of a threat that leaves something to chance depends on the likelihood of an accident of an irrational act. The credibility of this threat depends on the likelihood of a loss of control that triggers an explosive escalation to general nuclear war. But this suggests control is something that can be lost. The first interpretation of events not being fully under control thus seems implicit in a threat that leaves something to chance.

To focus attention on the type of accident implicit in this threat, assume momentarily that it is irrational knowingly to be the first state to launch an unrestricted nuclear attack. Also assume that states act rationally. Given these two stipulations, such an attack can arise only through an accident. How could such an attack come about under these stipulations? There are two answers to this question, and they describe the very narrow definition of an accident that is implicit in a threat that leaves something to chance.

The first answer is that such an attack could come about if it could be initiated without those responsible for ordering it actually doing so. Presupposing rational decisions and that it is never rational to be the first to launch an unrestricted nuclear attack, such an attack would never be initiated intentionally. Nevertheless, this attack could still result if those responsible for ordering it do not have to order it for such an attack to be made. If a technical failure or accident can initiate attack, such an attack remains a possibility. To the extent that

21 Schelling, Arms and Influence, 97.
22 Brodie, Escalation and the Nuclear Option, 113–34.
the threat of an attack that leaves something to chance relies on the chance of an accident, and not in part on a subsequent decision, then it must rely on the chance of an accident as defined in this very narrow sense.

In the second answer, a decision to launch an attack is made. Under these stipulations, this can happen only if an accident puts a state in the one situation in which it might be said to be rational to initiate an attack of this type. This is the situation in which a state believes that it has already suffered such an attack and that its society has been destroyed.24 Because of an accident, a state believes not only that a massive nuclear attack has been launched against it, but also that it has ridden out the attack and that, after assessing the damage, its society has been destroyed.

All of this is not to say that accidents more broadly defined would not greatly increase the tension of a crisis and make decisions to escalate more likely. Indeed, more broadly defined accidents may make the irrational decision to launch an unrestricted nuclear attack more likely. But to the extent that the threat of an attack that leaves something to chance relies on the chance of an accident, and not an irrational act, then the credibility of this threat rests on more than the likelihood of the occurrence of some serious accident. The credibility depends on the likelihood of the occurrence of an accident defined in this very narrow sense.

The threat that leaves something to chance also relies on a particular irrational act. As suggested above, the credibility of a threat of an unrestricted nuclear attack that leaves something to chance derives from the existence of a situation in which the prospect of a state initiating such an attack is credible. If for the moment we discount the possibility of an accident as defined above and continue to stipulate the irrationality of launching such an attack, then the credibility of a threat that leaves something to chance depends on the likelihood of an irrational act. But the plausibility of this threat is not to be found in the fact that some irrational act is likely to occur. Rather, the credibility is in the likelihood of a particular irrational act—the launching of an unrestricted nuclear attack. A state may believe that many irrational acts are likely to occur in the fog of war and crisis. But unless this state also believes that the particular irrational act of initiating a massive nuclear strike is likely to occur, then this state will not find the threat of such an attack credible. The implausibility of this particular act implies that there is nothing to be left to chance. Thus, the threat of such an attack that leaves something to chance depends on both a very narrow definition of an accident and on a particular act of irrationality.

From the postulates of the theory based on a spectrum of risk, we have derived

24 Even the rationality, although probably not the credibility, of initiating such an attack in this situation is problematic. See, for example, Robert L. Jervis, "Deterrence Theory Revisited," *World Politics* (January 1979) and Stephen Maxwell's discussion of the rationality of the irrational in "Rationality in Deterrence," *Adelphi Papers*, no. 50 (London: International Institute for Strategic Studies, 1968).
the special definition of an accident and the particularity of the irrational act implicit in a threat of an unrestricted nuclear attack that leaves something to chance. The probability of the occurrence of this type of accident or irrational act is of great importance to the foundations of strategic nuclear deterrence: the smaller the probability, the more deterrence relies on a spectrum of violence and the less it relies on a spectrum of risk. We cannot, however, derive this probability from the postulates discussed above. The magnitude of this probability is beyond the pale of postulate.25

Turning to the second interpretation of the phrase “the participants are not fully in control of events,” recall that the first interpretation was that control is something which can be lost. The participants on both sides of a crisis, when taken as a group, initially control events. What is at risk is the occurrence of something beyond the physical or psychological control of any member of this group. The second interpretation also begins by assuming that states, when taken as a group, control events. But when taken as separate states, no state is fully in control of events, because no state controls the actions and reactions of the other states. No state ever has control and, therefore, cannot lose it. What is at risk under this interpretation is that an adversary will react in a way that deepens the crisis, a reaction over which this adversary has control. This is the risk at the heart of threats based on a spectrum of violence.

The second interpretation and the distinction between the two interpretations seem obvious. But the obvious is often neglected, which leads to confused analyses of the role of uncertainty and escalation in strategic nuclear deterrence theory. Schelling, for example, offers a modified game of chess as an analogy to the role of uncertainty in nuclear deterrence and to the danger that “the thing will blow up for reasons not fully under control.”26 To the three possible results of a standard game of chess—win, lose, or draw—Schelling adds a fourth—disaster. Disaster is analogous to general nuclear war and, in the terms of the modified game, is a penalty imposed on both players that leaves each worse off than if he had simply lost. Disaster may be imposed if a queen and knight of opposite color have crossed the center line. When this happens:

The referee rolls a die. If an ace comes up the game is over and both sides are scored with a disaster, but if any other number appears play goes on. If after the next move the queen and knight are still across the center line the dice are rolled again, and so on.27

Schelling claims too much when he states that this modified game of chess offers a good analogy to the role of uncertainty in nuclear deterrence. This analogy of the role of uncertainty in a threat of an unrestricted nuclear attack leaves something to chance. What is at risk with the roll of the dice is disaster,

26 Schelling, Arms and Influence, 104.
27 Ibid., 102.
the analogy to general nuclear war. This analogy, moreover, relies on the first interpretation of events not being fully under control. For with a queen and knight of opposite color across the center line, the two players lose collective control of events. Their fate passes to the dice.

As an analogy to the threat that leaves something to chance, it has a strength and a weakness. The strength is that it is possible to generate the risk without having to capture a piece. This is quite analogous to the observation that if the danger of an explosive escalation is great, then limited options, although not in themselves very destructive, might significantly increase the risk of general nuclear war. The weakness is in the simplicity of the mechanism that generates the risk. The threat of a massive nuclear attack that leaves something to chance depends on the credibility of the occurrence of a very narrowly defined accident or of a very particular irrational act. The simplicity of the mechanism in the analogy obscures the narrowness and the particularity of the accident and irrational act inherent in the actual threat.

The standard game of chess offers a better analogy to the second interpretation of events not being fully under control. Uncertainty also exists in this game; it is the uncertainty surrounding an opponent's future moves that makes it a game. But this is the uncertainty associated with the second interpretation: it arises from each player's inability to fully control events, in this case an opponent's future moves. In a game of chess, the two players never lose collective control. Yet, neither player as an individual is ever in control of events. This is the essence of the second interpretation.

The second interpretation leads to a description of escalation that differs greatly from the description of an uncontrolled escalation associated with the first interpretation. Superficially, every escalation is uncontrolled under the second interpretation, for no state ever fully controls the reactions of other states. More significantly, until now we have considered a society-destroying nuclear attack coming about only through a massive unrestricted nuclear attack. Given the assumption of mutually invulnerable strategic forces, moreover, such an attack would result from an accident or an irrational act. But a similar amount of damage might be done in another way by carrying out threats based on a spectrum of violence. This way would not require an accident, an irrational act, or even a misjudgment.

Suppose a state is in the midst of a crisis and finds its position deteriorating. If it is to escalate rationally, what decision must it make? The answer to this question will suggest that although accident, irrationality, or misjudgment may be sufficient conditions for escalation to occur, they are not necessary conditions. Escalation may be the result of the interaction of decisions that, given the goals of the states and the conflict of interest underlying the crisis, are completely rational. The answer helps to identify a type of escalation for which rationality is a sufficient condition.

What must a state judge if it is to decide to escalate rationally? It must judge that escalating another step may convince its adversary to submit and that, given
the likelihood of this prospect, this submission is worth the cost in diplomatic or physical damages expected to be paid if this adversary does not submit. This judgment would take into account what is perceived to be at stake and the likelihood that the adversary will react by escalating. This judgment would also consider the chances of further escalation resulting from an accident or an irrational act. But what is important about this judgment is that if the stakes are sufficiently great, then it may be rational to accept the risks of an adversary's escalatory reaction or of the occurrence of an accident or an irrational act. If such a judgment is made, then escalation will have occurred not because of, but in spite of, the possibility of an accident or an irrational act.

Of course, events are not fully under a state's control, and its adversary, considering the new situation, may react by escalating. The crisis may now be much worse. But is it worse because a state misjudged its adversary's reaction? In at least one important sense the answer is no. Suppose that the state believed that the most likely reaction of its adversary would be to escalate. But also suppose that this state believed that the present situation was untenable and that the stakes were sufficient to warrant gambling on the smaller chance that the adversary would not escalate. If after this state escalates, and its adversary also escalates, then the adversary would have done what the state thought most likely. The judgment about the most likely response was correct; nevertheless, the crisis is worse. Escalation would have occurred in a way that did not require misjudgment.

Thus it seems that a state may decide to escalate another step in a way that does not require accident, irrationality, or misjudgment. But suppose the crisis escalated to catastrophic levels of destruction that far exceeded the value of what initially was at stake. Since no state prefers this outcome to submission, would not this outcome constitute evidence of misjudgment somewhere in the process? Again the answer in at least one important sense is no. This outcome would be evidence of misjudgment only if during the crisis a state had to make a single choice between this outcome and submission. But crises confront states with a series of decisions, each of which is a choice between submission and the prospect of suffering future destruction. Each decision to escalate may be rational given the likelihood that an adversary will submit and given what is at stake. Moreover, this likelihood and these stakes must be evaluated at the time each of these decisions is made. If the likelihood or the stakes change during the crisis, then a series of individually rational decisions may lead to an outcome that no state would prefer to submission if this preference could be expressed in a single choice. Even escalation to catastrophic levels of damage that far exceed the value of what initially was at stake does not require misjudgment, accident, or irrationality.28

---

Two examples help to elucidate and emphasize the distinction between the escalatory processes associated with the two interpretations of events that are not fully under control. The first example suggests some of the paradoxes that may arise if the distinction between these two interpretations is maintained. The second example suggests how escalation may result from the interaction of rational decisions if the underlying stakes are sufficiently great.

Of the Sarajevo crisis preceding World War I, the historian F. H. Hinsley writes that if historians had gone as far as the evidence was trying to take them . . . they would have recognised that the dice had been set rolling for all the Powers well before Russia mobilised — and not by any of the Powers but by a Balkan assassination. They would have seen that what makes some governments appear more responsible than others, or some governments more responsible at some stages and other governments more responsible at others, is not the fact that some governments were more instrumental than others in affecting the course of events. It is the fact that the position of the different governments varied with the course of events over which they had lost control. They would have recognised that, although it is theoretically possible to say that war would have been avoided if this or that government had acted otherwise, it was not possible for them to have acted otherwise. All the evidence goes to show that the beginning of the crisis which has been studied so largely with a view to discovering and distributing human responsibility, was one of those moments in history when events passed beyond men's control.29

According to Hinsley, after Sarajevo men lost control of events and this resulted in war. But when considering the causes of World War II, he writes, "A war is always an alternative to some other course and is known to be so."30 Juxtaposed, these comments form a paradox: how is it possible for one not to have control over war or peace and at the same time claim that war is always an alternative to some other course? If an alternative to war is to have any meaning, then it must be possible to decide not to have a war. But if one can decide not to have a war, then one has control over war or peace.

To resolve this paradox note that in his analysis of the Sarajevo crisis Hinsley has failed to distinguish between the two interpretations of events not fully under control. The Balkan assassination setting the dice rolling is an example of the first interpretation: it was an event beyond the control of any Great Power. In this sense the states lost control. But this did not lead directly to the Great War. States reacted to events and made decisions. The war, in Hinsley's account, was the result of the interaction of these reactions and decisions. It resulted from events not being fully under control in the second interpretation: no state could control the reactions of the other states. When Hinsley describes this interaction as "one of those moments in history when events passed beyond men's control," he is confusing these two interpretations.

30 Ibid., 331.
Having distinguished between these two interpretations, the paradox can be resolved. "A war is always an alternative to some other course," because a state retains the option of submission. But in certain circumstances, submission may not seem to be the best decision. Under the second interpretation, rational actors may be said not to have control over war or peace if they are in a situation in which the interaction of their rational decisions leads to war. The path along which an interaction of rational decisions may lead to war is the essence of the escalatory process associated with the second interpretation. It is this process that underlies Hinsley's comment:

... although it is theoretically possible to say that war would have been avoided if this or that government had acted otherwise, it was not practically possible for them to have acted otherwise.

Although any state could have avoided war by submission, each state perceived it to be in its best interest to take the next step down the path to war in the hope that another would submit first.

The second example is yet another reconsideration of the Cuban missile crisis of 1962. When United States intelligence revealed that the Soviet Union was installing ballistic missiles in Cuba, President John F. Kennedy had several alternatives. Among them were doing nothing, blockading Cuba, and launching a military attack against the island to destroy the missiles. Throughout the crisis, the president and his advisers attempted to foresee possible Soviet reactions to various potential American actions. Eventually the president decided to impose a blockade, and by most accounts this seems to have been a rational decision. In terms of the escalatory process associated with the second interpretation, Kennedy judged the stakes too high to do nothing, but not sufficiently great to attack Cuba as the first step. He believed that attacking Cuba as a first step carried with it too great a danger of providing a Soviet military response.

The Soviets did not react militarily to the blockade. But suppose that they had judged their stakes sufficiently high and had responded militarily. Unless rationality is to be an attribute of the consequences of a decision rather than of the decision itself, Kennedy's decision to impose the blockade would still have been just as rational. Because the United States could not control the Soviet reaction, the crisis would have escalated to a military confrontation through the interaction of rational decisions.

One might assert that this escalation would have been the result, if not of an irrational act, then certainly of a miscalculation or misjudgment. But even this assertion is problematic. Kennedy believed that boarding a Soviet vessel would provoke a Soviet military response.

This is why he [President Kennedy] was so reluctant to stop and search a Russian ship; this is why he was so opposed to attacking the missile sites. The Russians, he felt, would have to react militarily to such actions on our part.31

Yet the United States judged the stakes sufficiently high to board a Soviet vessel even if it meant confronting a Soviet submarine first.

It was now a few minutes before 10 o'clock. Secretary McNamara announced that two Russian ships, the Gagarin and Komiles, were within a few miles of our quarantine barrier. . . . Then came the disturbing Navy report that a Russian submarine had moved into position between the two ships.

It had originally been planned to have a cruiser make the first interception, but, because of increased danger, it was decided in the past few hours to send in an aircraft carrier, supported by helicopters, carrying antisubmarine equipment, hovering overhead. The carrier Essex was to signal the submarine by sonar to surface and identity itself. If it refused, said Secretary McNamara, depth charges with a small explosive would be used until the submarine surfaced . . . . We had come to the time of final decision . . . . President Kennedy had initiated the course of events, but he no longer had control over them.32

Fortunately, the Soviet ships stopped before they reached the quarantine line. Nevertheless, these two quotations imply that Kennedy expected the confrontation between American forces and Soviet vessels to provoke a Soviet military response. Yet, he accepted this danger: the Essex was ordered to stop and search the Soviet ships. If the Soviet ships had not stopped of their own accord, and had been searched by American forces, and this, in turn, did provoke a Soviet military reaction, then Kennedy would not have miscalculated or misjudged the Soviet reply. The Soviets would have reacted in the way that he had judged most likely. This suggests that although a Soviet military response was deemed most likely, the stakes appeared sufficiently great to warrant hazardizing the risk of searching a Soviet ship. Had the Soviets reacted militarily, this escalation would not have been the result of misjudgment or miscalculation.

This examination of the escalatory process associated with the second interpretation of events not being fully under control has attempted to show that accident, irrationality, or misjudgment are not necessary conditions for escalation to result. This is not to say that the possibility of accident, irrationality, or misjudgment plays no role in this escalatory process. Escalation occurs in spite of, and not because of, this possibility.

This section has described two different escalatory processes associated with two distinct interpretations of events not being fully under control. In both processes, a state during a crisis is risking the occurrence of events over which it has no control. Thus it might seem appropriate to characterize crises in both interpretations as a competition in risk taking and a contest of resolve. But such a characterization begs important questions. A crisis is a contest of the resolve to do what? And, a crisis is a competition in what types of risk? In the theory based on a spectrum of risk, crises are a competition in demonstrating the resolve to run grave risks of an explosive escalation to general nuclear war. The

32 Ibid., 70–73.
uncertainty of a crisis is primarily about each side’s willingness to accept the risk of suffering an unrestricted nuclear attack. In the theory based on a spectrum of violence, crises are a competition in demonstrating the resolve to suffer future destruction. Here the uncertainty is about the value each side attaches to the possible outcomes of the crisis, that is, each side’s willingness to inflict and endure future destruction. What is at risk is that the stakes may be sufficiently great or through escalation become sufficiently great that both sides, while in control of their own actions, begin to destroy each other. Failing to distinguish between these two types of risk and resolve obscures fundamental differences in the nature and dynamics of strategic nuclear deterrence inherent in each of these theories.

The analysis of the second interpretation underscores the importance of the stakes of a crisis to the escalatory process. Although perhaps less obviously so, these stakes are just as important to the escalatory process associated with the first interpretation, for it is what is perceived to be at stake that motivates a state to accept any risk of an explosive escalation to general nuclear war. The greater a state perceives its stakes in a crisis to be, the more likely it seems that the state will judge escalation to be in its best interest should it find its position deteriorating. In particular, the more a state perceives its initial stakes to be compared to those of its adversary, the more likely it seems that the state will escalate and the further escalation may go before the initial stakes no longer seem to warrant continued escalation. If, however, the escalation has already reached a point where the state now perceives much more to be at stake than was initially, then the escalation may continue. The greater the initial stakes, therefore, the more likely an escalation to the level of nuclear exchanges. How a state comes to perceive the initial stakes seems to be essential to nuclear deterrence. Strategic nuclear deterrence theory, however, has generally failed to address this issue. The theory takes the initial stakes in a crisis as given. This is a significant limitation.

**Strategic Nuclear Deterrence as A Theory of the Causes of War**

Strategic nuclear deterrence theory has become more than a theory about nuclear threats. It has become a theory of the causes of war. This transformation is most evident when deterrence theory is claimed to imply that the existence of mutually invulnerable strategic forces significantly affects the likelihood of major war between the superpowers. This claim generally takes one of two in-

---

33 Maxwell, “Rationality and Deterrence,” recognizes this source of uncertainty in a harsh critique of Schelling’s *Arms and Influence*.

34 In a review of deterrence theory and an analysis of the importance of commitment and interest, Jervis observes that deterrence theory is “begging the question of how it [intrinsic interest in an issue] is established. See also his discussion of the apolitical nature of deterrence theory in “Deterrence Theory Revisited,” 314–7 and 323–4. For similar comments, see Brodie, *War and Politics* (London: Cassell, 1974), 378–81.
consistent forms. The first is that major war is significantly less likely because a state is always vulnerable to an annihilating enemy attack. The second is that large conventional war or even limited nuclear war is more likely because of the strategic nuclear stalemate. The derivation of such conclusions about the likelihood of major war requires some theory about the causes of war. A claim that a change in this or that factor makes war more or less likely requires as a prerequisite the belief that this or that factor is causally related to the occurrence of war. In this way, claiming to derive from deterrence theory conclusions about the likelihood of major war transforms it into a theory of the causes of major war.

Taking the initial stakes of a crisis as given, however, significantly limits the usefulness of strategic nuclear deterrence theory as a theory of the causes of great war. The limitation is that by taking the initial stakes for granted one is also implicitly making a fundamental assumption about international politics. One must assume that the important determinants of the likelihood of a given crisis escalating to a major war are to be found in the states acting in the crisis. At first this assumption may not seem like an assumption at all. If the important determinants of the likelihood of a given crisis escalating to major war are not to be found in the states acting in the crisis, then where else could they be? They may be found in the crisis itself. The likelihood of a crisis escalating to major war may have less to do with the limits of states and more to do with the situations that states face. The primary causes of great war may be found in what Kenneth Waltz has called the third image of international relations.

Considering the logic of the third image in some detail shows how taking the initial stakes for granted implicitly locates the causes of major war in the states acting in the crisis. Waltz expounds this logic through an examination of Jean Rousseau's analysis of the stag hunt. Five hungry men, each of whose hunger can be satisfied by a fifth part of a stag, agree to hunt one of the beasts. During the hunt a hare that would satisfy one hunter's hunger hops within reach of one hunter. If he grabs it, he will be satisfying his own short-run interest. But his action will also permit the stag to escape, thus sacrificing the interests of his fellow hunters. The dilemma confronting the hunter is that even though his long-run self-interest may lie in the continued cooperation of the stag hunt, without some assurance of continued cooperation—something which is lacking in a state of nature—not only his short-run but even his long-run interest may lie in snatching the hare while it is still within reach. Of taking the hare, Rousseau, in Waltz's

35 It would be consistent to claim that the prospect of an unrestricted nuclear attack is less likely and that the prospect of conventional or limited nuclear war is more likely. This is the stability-instability paradox discussed by Snyder, "The Balance of Power and the Balance of Terror," in Paul Seabury, *Balance of Power* (San Francisco: Chandler Publishing, 1965), 196–201, and by Jervis, *The Illogic of American Nuclear Strategy*. But Brodie, for example, claims that "the strategic nuclear forces of each of the superpowers do inhibit the other from any kind of warlike action against it." See Brodie, "The Development of Nuclear Strategy," *International Security* (Spring 1978): 76.

view, "has noticed that the difficulty is not only in the actors but also in the situations they face."

In the search for third image causes, one does not look to the individual or to the state. One does not seek to locate the causes of war in the cognitive limits of individuals or in the organizational and bureaucratic limits of states. Accidents, unintended consequences, and war may result from the interaction of actors limited in these ways. Such causes, however, are in the first and second images. In the search for third image causes, one looks to the conflicts of interest inherent in the situations that states face. This is exemplified by the stag hunt. The dilemma does not arise because the actors do not appreciate their situation. The hunter tempted by the hare understands his two options. He can grab it. Or, he can let it go and risk that a fellow hunter will grab it should the hare jump within reach of him. Nor does the dilemma arise because the hunter doubts his own ability to take the hare. The dilemma is not created by the limited intellectual or physical abilities of the actors to appreciate their situations and act on this appreciation. Given the values of the actors, the source of the dilemma lies in the fundamental conflict of interest underlying the crisis—the opportunity afforded by a hare hopping within reach.

This fundamental conflict of interest motivates states to calculate what acts seem to serve their interests best.

Given imperfect states [i.e. states with different interests] in a condition of anarchy, crises will arise, a fact that in the third image is assumed rather than explained. With this as a starting point, it is possible to describe almost abstractly the kinds of calculations that as a logical minimum each state, under the pressure of its security interests, must make.

The escalatory process associated with the second interpretation of events not being fully under control suggests how such calculations may lead to a decision to escalate. This process requires neither accident nor irrationality. Even the limited rationality of misjudging an adversary's most likely reaction is not required. The sources of escalation in this process are not to be found in the first and second images. The primary danger of escalation in this process does not lie in the limited ability of states to appreciate fully the risks of escalation and act in accordance with this appreciation. The danger is rather that the initial stakes of the crisis are so great for both sides that, even if these states perceive the risks of escalation to major war to be high, they will judge the stakes suffi-

37 Ibid., 167–71.
38 Waltz, Theory of International Politics (Reading, Mass.: Addison-Wesley, 1979), 18.
39 Jervis, "Systems Theories and Diplomatic History," in Paul Lauren, ed., Diplomacy (New York: Free Press, 1979), 212–19, suggests that unintended consequences are a major characteristic of outcomes resulting from third image causes. Although unintended consequences may result from third image causes, they may also be due to first and second image causes.
40 See Waltz, Man, the State and War for a discussion of the first and second images.
41 Ibid., 220.
ciently important to hazard the risks. Escalation in the process associated with the second interpretation of events not being fully under control requires two conditions. The first is a severe conflict of interest underlying the initial stakes of the crisis motivating the states to hazard great risks of major war. The second condition is inherent in the anarchy of international politics: the inability of one state to control the actions and reactions of other states. These two conditions do not describe the states acting in the crisis. They describe the situations the states face.

The preceding discussion of the logic underlying the third image defines the extremes of locating the important determinants of the likelihood of major war in the states acting in the crisis and of locating them in the crisis itself. The question to ask of a theory, however, is not one of extremes but one of emphasis. Does the theory emphasize the states acting in the crisis or the crisis itself as the locus of the determinants of the likelihood of major war? We may now state more carefully the fundamental assumption about international politics that is implicit in the two theories of strategic nuclear deterrence when they are considered as theories of the causes of major war. These theories emphasize the states acting in a crisis.

The emphasis of these theories on the states acting in a crisis will become more apparent by considering how varying causes located in the different images affect the likelihood of major war. When confronted with a crisis, “each state pursues its own interests, however defined, in ways it judges best.” This is an implication of the third image. But whether or not a crisis results in escalation and war depends on both the conflict of interest underlying the crises and the nature of the states acting in the crisis. If one theoretically held the conflict of interest underlying a crisis fixed but varied the nature of the states acting in this crisis, then this may affect the outcome of the crisis. If the states confronting a given crisis are more pacific or more fearful of the devastation war will bring than are other states confronting a hypothetically equivalent crisis in which the underlying conflict of interest is the same, then the outcomes of these hypothetically equivalent crises may differ. Although the underlying conflict of interest—the opportunity to take the hare—is the same, a more trusting hunter may not grab it whereas a less trusting hunter may. The different outcomes would be explained by differences in the actors, whether they are more or less trusting, and not by differences in the situations they face. To the extent that the outcomes of hypothetically equivalent crises differ, these differences are due to causes located in the first and second images. But the outcomes of crises may vary for other reasons. One could also theoretically hold the nature of the actors acting in the crisis fixed but vary the conflict of interest underlying the crisis. The outcomes of these crises may differ. Given the values that the states hold, the stakes may be too small to warrant running the risks of escalation. Or, they may be so high

---

42 Ibid., 238.
43 Ibid., 230–38.
that states with the same values are willing to hazard great risks. The stakes may be so high that the interaction of each state's attempt to pursue "its own interests, however defined, in ways that it judges best" leads to escalation and war. Varying the conflicts of interest underlying crises in which hypothetically equivalent states find themselves may result in different outcomes. If they do, the causes of these differences are to be found in the third image.

The implication of taking the initial stakes for granted is now clear. Deterrence theory takes these stakes for granted by holding the fundamental conflict of interest underlying a crisis fixed. Yet conclusions about significant changes in the likelihood of major war are claimed to follow from this theory. Accordingly, the causes of these changes are not to be found in variations in the underlying conflict of interest, for this was theoretically held constant. The causes of these changes in the likelihood of a crisis escalating to major war are to be found in the states acting in the crisis. In this way, strategic nuclear deterrence theory emphasizes the states acting in the crisis over the crisis itself as the locus of the important determinants of the likelihood of major war.

Thus, nuclear deterrence theory implicitly assumes that a better explanation of the likelihood of major war is to be found by examining the actions of states rather than by examining the situations in which states act. A reductive approach to explaining the outcome of a crisis is assumed to provide a better explanation than a more systemic approach that focuses on how states stand in relation to each other as described by the underlying conflict of interest. 44 This may be so. But regardless of the usefulness of this assumption in accounting for the presence or absence of major war, this is an assumption of a theory of international politics. It is not an assumption of the theories of strategic nuclear deterrence described above. Conclusions that mutually invulnerable strategic forces significantly affect the likelihood of major war do not follow from the assumptions of these theories. Sustaining conclusions of this type requires an additional assumption, an assumption of a much more general theory of international politics. To claim that such conclusions follow from the theory of strategic nuclear deterrence is to claim too much for these theories.*

--44 For a discussion of reductive and systemic approaches to theories of international politics, see Waltz, *Theory of International Politics*, 1-78.

* I should like to thank Albert Fishlow, Robert Jervis, Hew Strachan, and Kenneth Waltz for their comments and criticisms. An earlier draft of this essay was written while I was a Fulbright scholar at the University of Cambridge, and I should like to thank the Fulbright Commission for its support.