

NUCLEAR GAMES

**An Exercise Examining Stability
and Defenses in a Proliferated World**

Report by the NUCLEAR STABILITY WORKING GROUP

**Ballistic Missile Defense Technical Studies Series
Study 4**

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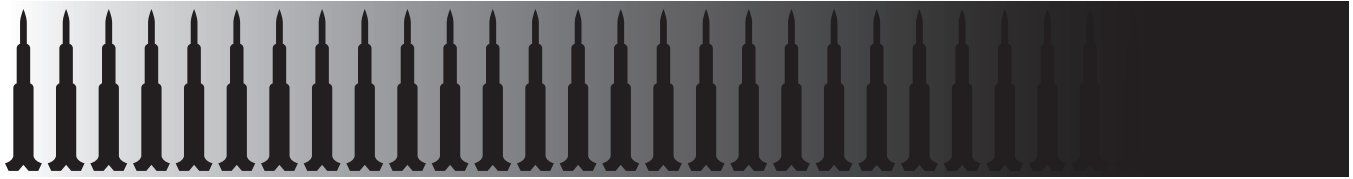
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Printed in the United States of America.

ISBN 0-89195-124-5

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Preface

THIS study is part of a series of technical reports commissioned by The Heritage Foundation to examine programmatic issues related to ballistic missile defense. Since the Bush Administration officially declared in June 2002 that the United States had withdrawn from the 1972 Anti-Ballistic Missile (ABM) Treaty with the former Soviet Union, the focus has turned to the best way to build and operate a missile defense system that lessens the vulnerability of the United States and its friends and allies to attack. First and foremost, this extends to lessening the likelihood of a nuclear-armed attack.

An effective ballistic missile defense will necessarily account for the ongoing proliferation of nuclear weapons and ballistic missile delivery systems. This study, using the game tool, tests the hypothesis that ballistic missile defenses will not contribute to nuclear instability in a setting in which seven “players” possess ballistic missiles armed with nuclear warheads. It suggests not only that defenses will not undermine stability in this setting, but also that they can make a positive contribution to stability.

Beyond the questions of stability and defense, the underlying game design will also allow policymakers to familiarize themselves with the difficult national security problems that they are likely to confront as a result of proliferation. The Heritage Foundation looks forward to using this tool to examine problems related to nuclear security beyond those revealed in the testing of the hypothesis.

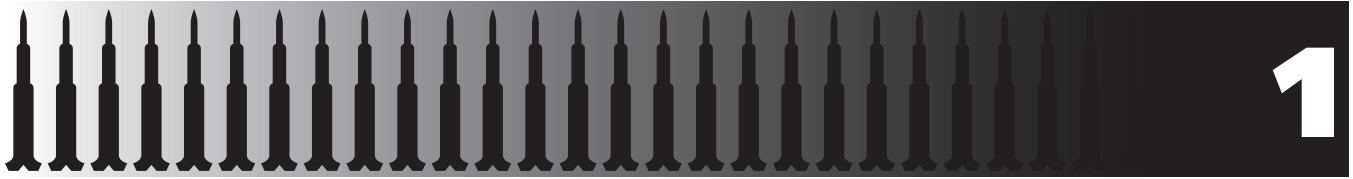
The use of the game tool in the production of this study effectively makes the players of the game also the authors. In addition, many others, some from within The Heritage Foundation and others from outside, contributed to this study in other ways. Given the team required, Heritage formed the Nuclear Stability Working Group to undertake the various tasks involved.

The Heritage Foundation thanks the officers, analysts, and research assistants who spent countless hours of their time in service to the Working Group as players from November 2004 through January 2005. These individuals include (in addition to the undersigned) James Carafano, Ariel Cohen, Dana Dillon, Balbina Hwang, Anthony Kim, Alane Kochems, Will Schirano, Ji Hye Shin, Jack Spencer, John Tkacik, Aerica Veazey, and Larry Wortzel. The Foundation also thanks the Working Group’s Deputy Game Managers Lucia Selvaggi and Kathy Gudgel for lending their extraordinary organizational skills to the production of this study.

Three outside consultants helped to design the underlying game: Dr. David C. McGarvey, Dr. James Scouras, and Dr. Russell Richardson Vane. The Heritage Foundation particularly appreciates the patience and understanding of Dr. Vane, who was required to withdraw from the project before its completion for reasons beyond his control. Baker Spring, The Heritage Foundation’s F. M. Kirby Research Fellow in National Security Policy, served as Game Manager and helped to edit this study.

The Foundation also gratefully acknowledges the contributions made by its editorial and Publishing Services staff to the production of this study: Editors Jon Rodeback, William T. Poole, and Richard Odermatt reviewed the entire manuscript with, as always, great care and attention to detail; Alex Adrianson designed the cover and the interior, and composed the text; and Rick Harrigan produced the visuals that appear in the appendices.

—*Helle C. Dale, Director, Douglas and Sarah Allison Center for Foreign Policy Studies, a division of the Kathryn and Shelby Cullom Davis Institute for International Studies, The Heritage Foundation*



Introduction

LEAST of all human activities may war be called a game. Nevertheless, scholars have used games and game theory as tools to analyze the dynamics of war and peace.¹ During the Cold War, the use of game theory in particular led many scholars to the counterintuitive conclusion that the best means for avoiding nuclear war was to make both sides—in this case the United States and the Soviet Union—as vulnerable as possible to nuclear war’s devastating effects. The conclusion reached by these scholars proved so compelling that it had a significant impact on U.S. nuclear policy, such that the U.S. and the Soviet Union entered into a treaty in 1972, called the Anti-Ballistic Missile (ABM) Treaty, that severely limited missile defense forces.²

Today, the Soviet Union no longer exists, and the United States finds itself in a fundamentally different security environment. The proliferation of nuclear

weapons and the means to deliver them has resulted in the U.S. facing not a single opponent of roughly equivalent strength, but potentially multiple opponents of varying strengths. This is particularly the case in individual regions of interest to the U.S. This new circumstance leads to a fundamental question: Was the conclusion in favor of vulnerability during the Cold War appropriate only in the context of the Cold War, or is the resulting policy universally applicable when nuclear weapons are involved? Specifically, today’s circumstances force the United States to choose whether or not to multilateralize the Cold War policy of vulnerability to nuclear attack.

Skeptics of the Cold War conclusion in favor of vulnerability are intuitively led to answer this compelling question in the negative. Vulnerability to the Soviet Union is one thing, but vulnerability to a long list of potential enemies is something entirely different. While intuition, or common sense, may be adequate to answering this question, it remains appropriate to inquire what games or game theory may say regarding the wisdom of fielding defenses in this new environment.

As it turns out, games and game theory do have something to say. Game practitioners and game theorists, back to the seminal work of John von Neumann and Oskar Morgenstern, have recognized that the characteristics of games with more than two players are different from those of two-player games. Chief among these is the presence of the coalition dynamic.

¹ Brams and Kilgour define a game as “the sum total of the rules of play that describe it.” They define game theory as “a mathematical theory of rational strategy selection used to analyze optimal choices in interdependent decision situations, wherein the outcome depends on the choices of two or more actors or players, and each player has his own preferences over all possible outcomes.” See Steven J. Brams and D. Marc Kilgour, *Game Theory and National Security* (New York: Basil Blackwell, 1988), p. 180.

² For a detailed description of the history behind the development of the concept of mutual assured destruction and its impact on policy, see Henry D. Sokolski, ed., *Getting MAD: Nuclear Mutual Assured Destruction, Its Origins and Practice* (Carlisle, Penn.: Strategic Studies Institute, 2004).

As a result, the Heritage Nuclear Stability Working Group was determined to explore whether games or game theory applications would reveal that defenses do not contribute to nuclear instability in a multi-player setting, despite earlier determinations by some that they were destabilizing in a two-player setting.

The task was undertaken by drawing up a hypothesis asserting that defenses would not be a force for instability in a multi-player environment. This, in turn, led to drawing up a game design that approximates the multi-player nuclear environment that the U.S. may face in the future, particularly in regional settings. A game-theoretic application was not chosen because of the significant complexity involved in quantifying all aspects of an underlying game design that includes more than two players making a series of different decisions on diplomatic relations, force postures, and strike options.

Relying on a game is the preferable choice as a first step. This game design was used to play four iterations of the game, in which each iteration assumes a different defensive force posture. The offensive nuclear force postures remained constant. The defensive force postures ranged from no defensive presence to the possibility of defenses becoming available to all the players. Playing the game allowed the Working Group to draw several important conclusions regarding the hypothesis.

The outcomes suggest that the presence of defenses in a multi-player setting not only does not feed instability, but also may contribute to stability.

First, the outcome of the games generally showed that the more widespread the presence of defenses, the lower was the players' propensity to ready their offensive (nuclear) arms and fire shots with these arms. It also showed a greater propensity among the players to abandon their offensive arms (disarm) as defenses became more widespread.

Second, the more widespread the presence of defenses, the lower the propensity of the players to adopt hostile attitudes toward one another or move to threaten each other.

Third, the more widespread the defenses, the less likely was an aggressive player to conclude there was an exchange ratio imbalance that favors aggressive actions.

However, it is important to point out that these propensities, as a product of a game and not a game

theory application, are not adequate to assign specific probabilities for certain outcomes.

A Hypothesis Regarding How Alternative Force Postures Affect Stability in a Multipolar Environment

The analytical tools derived from game and game theory applications in calculating stability in a nuclear setting need to be modernized. They need to consider the application of games and game theory that involve more than two players.

During the Cold War, game theory in particular was applied by a number of analysts to determine what kind of force postures of would-be enemies could result in greater or lesser levels of strategic stability.³ As might be expected, given the bipolar international political structure of the Cold War, these game theory applications were based largely on the presumption of two players, and strategic stability was calculated on the basis of whether alternative force postures would increase or decrease the likelihood that either side would launch a nuclear strike in a crisis. The use of assumptions that allowed the consolidation of several players into one side or that dismissed the role of other would-be players as insignificant reinforced the historical circumstance pointing to the two-player approach for determining stability.⁴

By contrast, game theory applications for analyzing economic behavior have been more open to multi-player or *n*-player settings.⁵ Given the pressures

³ For examples, see Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, Mass.: Harvard University Press, 1960); Thomas C. Schelling and Morton Halperin, *Strategy and Arms Control* (New York: The Twentieth Century Fund, 1961); and Brams and Kilgour, *Game Theory and National Security*.

⁴ One such assumption is that several players could take a shared position in confronting an opponent and therefore be treated as a single player. Another is to define some would-be players as "dummies," or as those with an interest in the outcome of the game but unable to influence it. For example, see Brams and Kilgour, *Game Theory and National Security*, pp. 3–4.

⁵ This is not to say that there are no explorations of nuclear stability in multi-player settings, even in recent years, just that the literature is significantly less robust in this area. For example, see Paul Bracken, *Fire in the East: The Rise of Asian Military Power and the Second Nuclear Age* (New York: HarperCollins, 1999); Daniel Y. Chiu *et al.*, "Nuclear Multipolarity: Minimum Deterrence Scenarios," DFI International, April 25, 2003; Daniel Y. Chiu *et al.*, "Nuclear Multipolarity: Robust Deterrence Scenarios," DFI International, May 2, 2003; Daniel Y. Chiu *et al.*, "Nuclear Multipolarity: Ambiguous Deterrence Scenarios," DFI International, May 9,

shaping the development of game theory for analyzing national security outcomes, it is therefore not surprising that game theory applications for addressing economic problems involving more than two players outpaced the equivalent applications used to address national security problems.

First, game theory was initially developed in the 20th century to analyze economic problems.⁶

Second, the same original theorists showed a much greater propensity to explore complex multi-player applications in the realm of economics.

Even in more recent analysis that accepts nuclear proliferation as an underlying assumption, the propensity by national security analysts to examine the problem in a two-player format remains strong because they are tempted to define the problem as a contest between the U.S. and a single archetypal rogue state.⁷ The question remains, however, whether the more developed multi-player constructs for addressing economic problems provide important lessons for devising new multi-player game or game-theoretic applications for addressing national security problems. This question is particularly pressing now that the national security environment, particularly in specific regional settings, is moving in the direction of multiple nuclear-armed states.

The majority of the game-theoretic applications devised during the Cold War determined that, in the context of the military confrontation between the United States and the Soviet Union, an offense-dominant strategic force posture by both sides was the least destabilizing option in a nuclear setting. Numerous postures were considered, but the prevailing argument was that the most stabilizing posture was based on the ability to respond to a first strike with a devastating second strike that would undermine any rationale for

the first strike.⁸ As a result, the two-player game-theoretic applications were used to demonstrate that the addition of strategic defenses by either side could be destabilizing under certain circumstances because they could undermine the reliability of the second strike.

However, nuclear proliferation trends since the end of the Cold War indicate that, in regional settings and perhaps even in the strategic setting, a multi-player structure is emerging. This trend means that the two-player game theory analyses that dominated Cold War findings on maintaining nuclear stability are becoming less appropriate. The two-player models used during the Cold War were generally derived from the games of Chicken or Prisoners' Dilemma.⁹ With projections for a multi-player environment, a more appropriate approach is to apply games or game theories that involve more than two players.

Based on the supposition that the two-player game models may not be relevant, an interesting question emerges: Are robust defensive systems as destabilizing in multi-player settings as many analysts during the Cold War considered them to be in two-player settings? One approach to answering this question is to examine a hypothesis regarding alternative force postures in a multi-player setting. The results of such analysis may stimulate the development of new multi-player strategies, as well as more appropriate game and game theory applications to test the hypothesis. This is the purpose of this technical study.

The hypothesis is that a balance of offensive and defensive forces is not a counterproductive force posture for the purpose of maintaining stability because it will not increase strike incentives, particularly with nuclear weapons, in a multi-player setting. Inherent in this hypothesis is the view that a multi-player environment is both so complex and so fluid that the risks associated with a posture of mutual vulnerability

2003; and Chris D. Lay and Tate M. Nurkin, "Nuclear Weapons in Asia: Implications for U.S. Military Planning," Science Applications International Corporation, November 2001.

⁶ John von Neumann and Oskar Morgenstern, *The Theory of Games and Economic Behavior*, 3rd ed. (Princeton, N.J.: Princeton University Press, 1953). For a brief history of the creation of game theory, see Robert J. Leonard, "From Parlor Games to Social Science: von Neumann, Morgenstern, and the Creation of Game Theory, 1928–1944," *Journal of Economic Literature*, Vol. 33 (June 1995), pp. 730–761.

⁷ For example, see Robert Powell, "Nuclear Deterrence Theory, Nuclear Proliferation, and National Missile Defense," *International Security*, Vol. 27, No. 4 (Spring 2003), pp. 86–118.

⁸ This conclusion, however, was far from universal. Some saw defenses as stabilizing for reasons unrelated to game-theoretic applications such as historical analyses on the causes of the breakdown of deterrence. For example, see Keith B. Payne, *The Fallacies of Cold War Deterrence and a New Direction* (Lexington, Ky.: University of Kentucky Press, 2001). Others saw defenses as not destabilizing because of their contributions toward complicating first strike options and thereby enhancing deterrence. For example, see W. Bruce Weinrod, ed., *Arms Control Handbook: A Guide to the History, Arsenal and Issues of U.S.–Soviet Negotiations* (Washington, D.C.: The Heritage Foundation, 1987).

⁹ Brams and Kilgour, *Game Theory and National Security*.

among all the players derived from an offense-dominant posture—for example, in a seven-player setting—are intolerably high. Therefore, this hypothesis rejects the proposition that all multi-player settings can be reduced through carefully chosen assumptions to two-player dynamics and stability outcomes calculated on the basis of the least stable two-player relationship. This is because game-based stability calculations in a multi-player environment must account for managing stability through times of potentially dramatic and unpredictable transitions in coalitions among the players. These calculations cannot be based simply on set coalitions in the context of a discrete confrontation.

As indicated earlier, this hypothesis also assumes that there is a need to create a new game design. This new design differs from those that were used in two-player settings, such as Chicken and Prisoners' Dilemma, for Cold War-era game theory analyses. Given this assumption, the first step is to establish a new game design that meets the need to assess stability outcomes in a multi-player environment.

Assessing Stability in a Multipolar Environment: A New Game Design

This section provides a conceptual description of the experiment that the editor ran using this new game design, which is a seven-player, non-zero sum game. The game design was not chosen on the basis that it would support a particular game theory that would generate a quantifiable outcome, such as a Nash equilibrium. It assumes player rationality but allows different goals for each of the seven players. The game is reasonably complex (with seven to nine allowable actions). The setting is analogous to a situation in which several states join the nuclear club and allows a political scientist or student of national security to evaluate many new issues that arise as a result of nuclear proliferation.

As an insight into the players' values, the design is the second stage of a two-stage strategic game. The first stage is simply to decide whether to play the game by arming or disarming. Once armed with the equivalent of nuclear weapons, the player is in the game. Thus, players have already opted for nuclear weapons. The game assumes at the outset that they believe that playing the game is better than not playing the game. This is therefore a core assumption. The immediate

interest is in those that are playing, although they may decide to quit the game by disarming.

THE PLAYERS. The players correspond to nation-states in a regionally focused geographic setting. (See Map 1.) The game design uses abstract descriptions of these players (states) to allow the individuals playing the game a wider range of options than a strict adherence to the detailed characteristics of these states would allow. Nevertheless, the region corresponds roughly to East Asia, and the players correspond roughly to states within that region and a single global power located outside the region. Individuals at The Heritage Foundation who were used to assume the roles of the players are those who are familiar with East Asia. They were chosen in order to provide valuable insights into the security dynamic in the region and to apply these insights to the abstract construct.¹⁰

The descriptions of both the capabilities and the security policy preferences of the players (beyond the basic goals of avoiding a situation in which they are “wounded” or “killed”) are as follows:

- **Player A** is a lesser power. In the context of the game, he has an offensive capacity equivalent to a 15-shot automatic weapon. Not favoring the *status quo*, Player A is prepared to undertake aggression against Player B if given the opportunity. He also maintains a hostile policy toward Player G because of Player G's alliance relationship with Player B. Further, Player A has a high tolerance for risk and is prepared to consider aggression even if the likelihood of a high payoff is remote or prospects of losing the game (by being “killed”) are significant. In part, this is because continuation of the *status quo* poses a significant risk of regime collapse due to internal economic and political weaknesses. Player A's security goals, starting with the most immediate and ending with the most ambitious, are (1) regime survival; (2) forcing Player G to withdraw from the region, thus

¹⁰ The editor thanks the following Heritage Foundation officers, analysts, and research assistants for making themselves available for the large blocks of time necessary to play four iterations of this game: Peter Brookes, James Carafano, Ariel Cohen, Helle Dale, Dana Dillon, Balbina Hwang, Anthony Kim, Alane Kochems, Will Schirano, Ji Hye Shin, Jack Spencer, John Tkacik, Aerica Veazey, and Larry Wortzel. The editor thanks Lucia Selvaggi, in particular, who helped to organize the sessions and served as Deputy Game Manager.

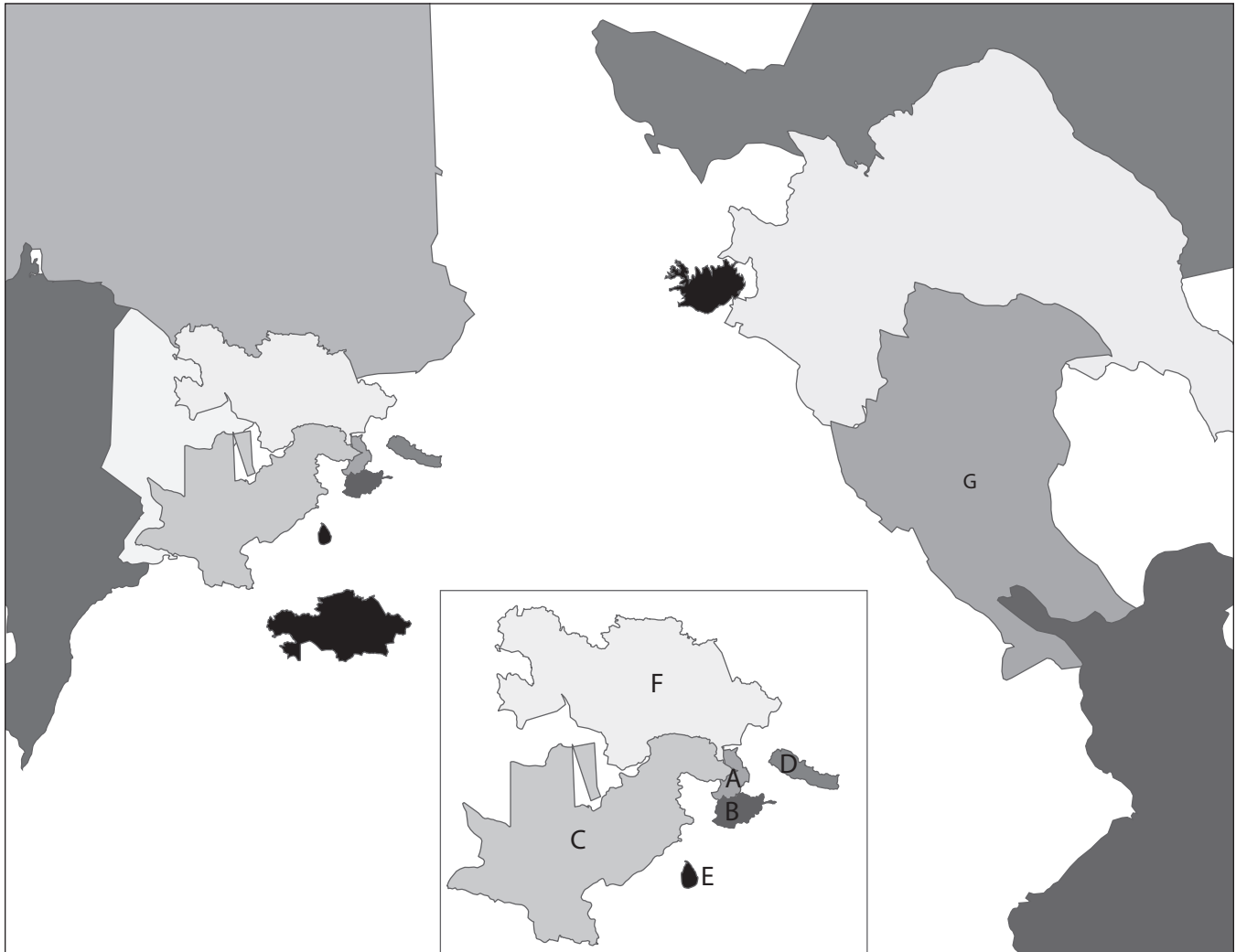
breaking his alliance relationship with Player B; (3) hegemonic power over Player B; and (4) the conquest of Player B. Player A is roughly equivalent to North Korea.

- **Player B** is also a lesser power. As indicated earlier, he is allied with a major power (Player G). However, unlike Player A, he prefers the *status quo* and is not likely to use force unless provoked. Likewise, he is a power with a low tolerance for risk. In fact, he is seeking ways to avoid confrontations with Player A. His security goals, starting with the most immediate, are (1) deterring or, if necessary, defending against an attack by Player A; (2) settlement of the dispute with Player A and the establishment of a stable relationship; and (3) continuation of the alliance with Player G, at least until the dispute with Player A is settled. Player B is roughly equivalent to South Korea.
- **Player C** is the third lesser power in the game. While an independent power, he has a relatively close relationship with Player A and shades his position in favor of Player A in its confrontations with Players B and G. This shading is in part a response to a view that Player G's involvement in Player C's region is a meddlesome presence. Like Player A, Player C is not a *status quo* power and will assert his position. He also has a high tolerance for risk. Player C's security goals, starting with the most immediate, are (1) lessening the likelihood of a military conflict between Player A and Player B, (2) facilitating the withdrawal of Player G from the region, (3) regional hegemony, and (4) the conquest of Player E. Player C is roughly equivalent to the People's Republic of China.
- **Player D** is the fourth lesser power in the game. While now an independent power, Player D formerly had an alliance relationship with Player G and maintains a friendly relationship with Player G. While Player D, at the outset of the game, is neutral regarding any possible confrontation between Player A and Player C on one side and Players B and G on the other, he is likely to side with Players B and G if pressed. Like Player B, Player D is a *status quo* power and has a low tolerance for risk. He is not aggressive and seeks to avoid confrontation. His security goals, starting with the most immediate, are (1) to avoid getting

drawn into a military conflict, particularly as a means for avoiding attacks by either Player A or Player C; (2) a continued presence in the region by Player G; (3) nuclear disarmament by Players A and B; and (4) blocking regional hegemony by Player C. Player D is roughly equivalent to Japan.

- **Player E** is the final lesser power in the game. At the outset of the game, Player E is neutral regarding any confrontation between Player A and Player C on the one hand and Player B and Player G on the other. Nevertheless, he historically has had a tense relationship with Player C. If drawn into the conflict, Player E is likely to side with Players B and G. Player E also is a *status quo* power and has a low tolerance for risk. Player E's security goals, starting with the most immediate, are (1) deterring or, if necessary, defending against an attack by Player C; (2) continuing the presence in the region by Player G; and (3) blocking regional hegemony by Player C. Player E is roughly equivalent to Taiwan.
- **Player F** is the first of two major military powers in the game. In the context of the game, he has an offensive capability that is equivalent to a 200-shot chain gun. However, Player F's gun is not well maintained and has a propensity to malfunction. This limits the probability of a high payoff if he uses his weapon. Regarding any confrontation between Players A and C and Players B and G, Player F is strictly neutral. In part, this is because he sees few vital interests at stake in such a confrontation. This same view leads Player F, at least in this instance, to view the *status quo* with satisfaction and to possess a relatively low tolerance for risk. Player F's primary security goal is to lessen the likelihood of a conflict between Players A and C and Players B and G and to avoid being drawn into such conflict, particularly if being drawn in could lead to a direct confrontation with either Player C or Player G. Player F is roughly equivalent to Russia.
- **Player G** is the final player in the game. He is also the second of two major powers in the game, with an offensive capability equivalent to a 200-shot chain gun. Unlike Player F, however, his weapon is well maintained. In later iterations of the game, in order to test the hypothesis that defenses are not destabilizing in multi-player games, Player G

Map I



will be provided access to a defensive capability in the form of a bulletproof vest. He will have the option to furnish this capability to other players as well as himself. As indicated earlier, he is allied with Player B and, as a result, is subject to threats from Player A. As a major power, Player G prefers the *status quo* and has a low tolerance for risk. He is unlikely to resort to force unless provoked. On the other hand, he will seek a way to come to the defense of his ally Player B, unless the risks of losing (being “killed”) are quite high or the payoff for victory is exceedingly low. Player G’s security goals, starting with the most immediate, are (1) preventing a nuclear attack on his territory; (2) preventing an attack by Player A, particularly in collusion with Player C, on Player B; (3) nuclear disarmament by Players A and B in particular, and perhaps by others; and (4) continuation of his

strong presence in the region. Player G is roughly equivalent to the United States.

The game works in the following way. It is divided into “moves” (decisions made by each player at one point in time) and “rounds” (the compilation of the decisions made by all the players at the same point in time). The game requires each player to make moves within each round by reviewing his options on two levels. These are player attitudes and force postures.

PLAYER ATTITUDES. The first level is the diplomatic level. Here, each player assesses the relationship he would like to have with each of the other players. They are categorized as (1) hostile, (2) unfriendly, (3) neutral, (4) friendly, and (5) allied. In four of the five cases, it is not necessary that the player that is the object of the selected attitude reciprocate. The exception is an alliance relationship. An alliance relationship, which means a

Figure 1

		Initial Attitudes						
		A	B	C	D	E	F	G
Player A attitude toward			Hostile	Friendly	Unfriendly	Unfriendly	Friendly	Hostile
Player B attitude toward		Unfriendly		Unfriendly	Unfriendly	Neutral	Neutral	Ally
Player C attitude toward		Friendly	Unfriendly		Unfriendly	Hostile	Friendly	Unfriendly
Player D attitude toward		Hostile	Neutral	Unfriendly		Neutral	Neutral	Friendly
Player E attitude toward		Unfriendly	Neutral	Hostile	Friendly		Neutral	Friendly
Player F attitude toward		Neutral	Neutral	Friendly	Neutral	Neutral		Neutral
Player G attitude toward		Hostile	Ally	Unfriendly	Friendly	Friendly	Neutral	

Color Key:	Hostile	Unfriendly	Neutral	Friendly	Ally	Would Ally
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mutual defense commitment, must be reciprocated. As a result, a player signals his willingness to enter an alliance by selecting “would ally” from the options menu. If the opposite party also selects “would ally,” the alliance is consummated. In all iterations of the game, the initial relationships are identical. (See FIGURE 1.)

FORCE POSTURES. The second level of options pertains to force postures and is also reviewed in every round. Five of the players, A through E, have a holstered automatic weapon, such as an Uzi (15-shot). The remaining two players (Players F and G) have chain guns (200 shots). These weapons correspond to nuclear-armed ballistic missiles. In other words, this level assumes a proliferated environment in the region. Further, each player’s shots are capable of hitting (reaching the territory of) every other player. The game is designed exclusively as a nuclear weapons exercise. These offensive armament levels are held constant throughout the game in order to test the hypothesis in terms of various levels and configurations of defenses.

Any player can voluntarily disarm (“quit”), but the game is not designed as an arms control exercise. Questions related to verification and enforceability of disarmament decisions are not addressed. Rather, the players

are instructed that a decision to disarm will result immediately in that player’s losing his ability to fire offensive shots for the remainder of the game. Any player can draw his weapon at any time (“ready”), which is necessary for him to shoot. Any player can put his readied weapon back into the holster (“holster”). Any readied weapon can be aimed at another player (“threaten”). Any player can fire a readied weapon at another player (“attack”). Any player can choose to hide his weapon hand with a shroud held by his off-hand (“shroud”), which precludes other players from knowing whether his weapon is ready. A decision either to threaten or to attack another player results in the lifting of the shroud, which may not be restored until after the relevant player holsters his weapon. However, Player F’s chain gun is not as well maintained as Player G’s and may malfunction. The probability of specific malfunctions in Player F’s gun is not quantified and therefore is not known to Player F or any other player. The impact of such malfunctions was left to the discretion of the Game Manager, to be applied only in the context of shots taken by Player F.

Player G can put on a bulletproof vest in two turns, which reduces the number of penetrating shots from the other players. This limited defense takes the form

of “defensive interceptors” and provides a defense against as many as 40 shots, intercepting 80 percent of them. Thus, it is neither a perfect defense nor capable of rebuffing large-scale strikes. Player G therefore cannot field defensive interceptors that leave him or any other player imperious to attack. Furthermore, in certain iterations of the game, Player G may

provide similar defenses, with the same imperfections and limitations, to others in two turns in accordance with parameters set by the Game Manager. Other players must agree to take the interceptors for them to benefit from them. Finally, the number of defensive interceptors fielded by players other than Player G is the lesser of those sought by the other player and those proffered to him by Player G. Once obtained, the player will retain the defensive interceptors for the remainder of the game unless they are used to counter an attack.

TABLE I lists the allowable game moves below each player in order of increasing belligerence.

All players start out holstered, unshrouded, undefended, and functional. (See FIGURE 2.) As a result, the exchange ratios are 0–0 for all players at the outset of the game.

PHYSICS OF THE GAME. Regarding force postures, players play the game by taking actions that change their postures. Results matrices are provided to adjudicate the outcome of select force posture actions, as shown in TABLE 2 and TABLE 3.

ATTACK OUTCOMES. As described in FIGURE 2, the game defines three possible outcomes for a player who is attacked: (1) “functional,” which is the initial status for all players; (2) “wounded”; and (3) “killed.” The requirements to wound or kill are preset for each player and vary from player to player. The rules of the game, however, allow a player to launch “death throes shots,” which are designed allow an uncertain level of retaliatory response by a player that is attacked even with overwhelming force.

COMMUNICATIONS. Private communications and public announcements among the players are used to augment the game structure. These tools increase the pace

Table 1		The Heritage Foundation	
Players and Allowable Actions			
A-E	F	G	
Quit	Quit	Quit	
Request Defenses	Request Defenses	Furnish Defenses (including to self)	
Holster	Holster	Holster	
Shroud	Shroud	Shroud	
Ready	Ready	Ready	
Threaten	Threaten	Threaten	
Attack	Attack	Attack	

of the game and allow greater insight into the decision-making process. Private communications, because they serve as an augmentation, are limited. Each player is allowed to initiate one such communication between any two rounds (although it may be directed at more than one player) and to respond to any private communication directed at him, but only once. The rule is designed to preclude private communications from becoming a replacement for formal moves in the game.¹¹ Private communications and public announcements are issued in writing and preserved in Appendices A–D.

THE GAME MANAGER. Finally, a Game Manager supervises the conduct of the game. The Game Manager is empowered to disallow a player’s move on two grounds. The first ground is that the move is inconsistent with the description of the player that was provided. The second is that the move is disruptive to the testing of the hypothesis. The Game Manager is also responsible for reconciling players’ moves with the rules of the game, as necessary. Finally, the Game Manager is allowed to issue warnings to players under circumstances in which their actions could lead to a decision to disallow a move. The Game Manager’s warnings and decisions are recorded as “Game Manager’s Notes” in the appendices.

Limitations of the Game Design

This game is not designed to test two other related hypotheses. The first is whether defenses in a prolifer-

¹¹ As might be expected, players periodically breached the rule limiting communications in the course of playing the game. In no case, however, did these breaches interfere with the fair testing of the hypothesis, because the players did observe the intent of the rule, which was to prevent them from failing to submit a formal move because they were relying on a private communication.

Figure 2

Initial Forces							
Players	Armaments			Vulnerability		Posture	Visibility
	Offense shots	Defense shots	Defense hit probability	Shots to Wound	Shots to Kill	Holstered?	Shrouded?
Player A	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player B	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player C	15	0	0.8	10	30	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player D	15	0	0.8	5	20	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player E	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player F	200	0	0.8	10	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player G	200	0	0.8	10	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Total additional defense shots available from G:		280		Per player limit on additional defense shots:		40	
						Rounds between defense agreement and deployment	
						2	

ated setting that includes non-state actors, such as terrorists, are stabilizing or destabilizing. There is little debate at this time that defenses are a necessary part of a posture for reducing the likelihood of an attack by nuclear-armed terrorists. As a result, the equivalent of non-state actors are excluded from the mix of players in this game design. Nevertheless, a related game design that examines the behavior of nuclear-armed terrorist groups may be a worthwhile undertaking for testing hypotheses that are not designed to test the impact of defensive measures.

The second related hypothesis is whether a proliferated (multi-player) nuclear setting is inherently more or less stable than a two-player setting. This is a critical question and deserves detailed comparative analysis, but it is not the one explored here. Rather, this game design is based on the need to assess the impact on stability of deploying defenses in a proliferated setting. Nevertheless, playing this game does allow one to draw inferences regarding the changing requirements for stability in a multi-player setting.

On the other hand, relatively modest modifications to this game design would allow the examination of other issues related to national security decision-making in a proliferated setting. These include issues regarding decision-making processes internal to the players; long-term arms control and disarmament options and weapons development options; stability and instability factors based on models derived from other regions, such as South Asia and the Middle East; and stability in a partially proliferated setting

Table 2			The Heritage Foundation
Allowable Actions and Associated State Transitions for Offensive Forces			
Present State	Action	Resulting State	
Holstered	Ready	Ready	
Ready	Holster	Holstered	
Open	Shroud	Hidden	
Hidden	Unshroud	Open	
Ready and Open	Threaten	Threaten	
Threaten	Withdraw Threat	No Longer Threaten	
Ready	Attack	Attack	

Table 3		The Heritage Foundation	
Allowable Actions and Associated State Transition for Defensive Forces of Players A–F			
Previously Agreed to	Number of Defensive Interceptors:		Agreed to for Transfer*
	In a Pending Request to Player G	In a Pending Proffer by Player G	
0	x where $0 \leq x \leq 40$	y where $0 \leq y \leq 40$	lesser of x or y
z where $1 \leq z \leq 39$	x where $x \leq 40 - z$	y where $y \leq 40 - z$	lesser of x or y

*Defensive interceptors agreed to for transfer in a particular round do not become operational until the second round following the agreement.

same as the first iteration in that Player G adopts a policy of not putting on the vest (deploying defensive interceptors) except that he decides to provide the vest (defensive interceptors) to other players on a case-by-case basis. As a result, he remains vulnerable to attacks launched from the region even though

in which most, but not all, players possess nuclear armaments.

Four Game Iterations to Test the Hypothesis That Defenses Will Not Contribute to Instability in a Proliferated Setting

To test the hypothesis on the impact of the presence of defenses on stability in a proliferated setting, four iterations of the game are played. Each corresponds to a different defensive posture, in which offensive forces are held constant through all four iterations.

GAME ITERATION #1: MULTILATERAL MAD. The first iteration of the game has Player G opt not to put on the vest (furnish himself with defensive interceptors), despite the fact that he has the ability to do so. This decision also leads him to decide not to furnish the vest (defensive interceptors) to any other player. This policy is applied in a setting in which there are two obvious sources of confrontation—Player A’s desire for the conquest of Player B and Player C’s desire for the conquest of Player E—and the potential for a variety of less obvious confrontations. All of these sources of confrontation are of interest to Player G because of his deep involvement in the region as a global power.

GAME ITERATION #2: LESSER POWER VULNERABILITY. The second iteration of the game differs from the first in that Player G decides to put on the vest (deploy defensive interceptors). In this case, however, he adopts a policy that precludes him from furnishing the vest (defensive interceptors) to any other player. In this case, Player G will have an imperfect ability to defend himself against an attack resulting from a conflict in the region, but necessarily leaves all other players vulnerable.

GAME ITERATION #3: A THEATER-ONLY OFFENSE-DEFENSE MIX. The third iteration of the game is the

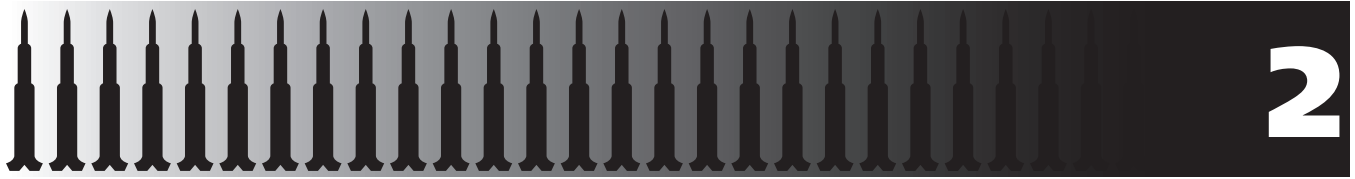
the other players, on a selective basis, may be partially defended against attack.

GAME ITERATION #4: GLOBAL OFFENSE-DEFENSE MIX.

In this case, Player G adopts a posture that is the polar opposite of his posture in Game Iteration #1. He decides to put on the vest (deploy defensive interceptors) and provide it (defensive interceptors) to other players on a selective basis. As a result, Player G and other players may all be capable of partially defending themselves against attack.

What follows are summary descriptions of what happened in the four iterations of the game as they were played at The Heritage Foundation on November 4 and 9, 2004; December 16 and 17, 2004; January 11, 2005; and January 25, 2005. These summary descriptions, provided in Chapters 2–5, include analysis of the outcomes relative to the hypothesis within the confines of each iteration. Chapter 6 provides analysis that assesses the outcome relative to the hypothesis across the four iterations detailed in Chapters 2–5. Observations regarding issues other than those considered by the hypothesis are provided in Chapter 7.

More complete descriptions of what took place in playing the four iterations of the game are provided in the appendices. These appendices include the status sheets recording the positions of the players in terms of their attitudes toward one another at the outset of each round, the status sheets recording the posture of their weapons at the outset of each round, and the recorded private communications and public announcements from between rounds.



Game Iteration #1: Multilateral MAD

THE first iteration of the game was played on November 4 and 9, 2004, at The Heritage Foundation. In this iteration, the Game Manager instructed Player G to adopt a policy that precluded him from deploying defenses for his own protection or providing such defenses to any other players. Inherent in this policy choice is the belief that the Cold War policy of relying exclusively on offensive forces to maintain security is the best approach, even in a proliferated (multi-player) setting. The remainder of this chapter provides a brief description of what took place during this exercise, along with working group observations, analysis, and conclusions. (Appendix A provides a detailed history of what took place in this iteration of the game. The private communications and public announcements by the players documented in this appendix should provide the reader with a deeper insight into the thinking of the players at the time they made their moves.)

Round 1

FORCE POSTURES. Player G's announced policy of eschewing defenses seemed to have driven several of the other players to move to a higher state of readiness for their offensive capabilities. In the course of Round 1, four of the seven players (Players A, D, E, and G) readied their offensive forces. On the other hand, a private communication issued by Player E prior to Round 1 that he intended to ready his weapon demonstrated that the lack of any prospect for defenses was not the only factor. This is because he was not yet aware of

Player G's policy regarding defenses at the time of his private announcement. He made good on his stated intention in his formal moves.

While the four players readied their weapons, three (Players A, D, and E) did so in a manner that is inconsistent with the Cold War policy of deterrence because they also shrouded their forces. Deception turned out to be preferable to deterrence as a tool for some players in this multilateral setting. Only Player G opted for the traditional deterrence posture of openly readying his weapon. The posture of deception leads to the conclusion that by Cold War standards, there are considerable stability risks in this circumstance.

DIPLOMATIC DEVELOPMENTS. On the diplomatic level, the moves in favor of readying forces and adopting deceptive postures were accompanied by overtures to defuse tensions.

Player B upgraded his relationship to Player D to neutral (previously unfriendly).

Player C upgraded his relationships with Players D and G to neutral in both cases (previously unfriendly in both cases).

Player D upgraded his relationship with Player A to unfriendly (previously hostile).

Player G upgraded his relationship with Player A to unfriendly (previously hostile) and offered an alliance to Player D (previously friendly).

The contradiction in these moves to exhibit good intentions was in the position of Player A. While Player A made a public announcement regarding his willing-

ness to disarm, he readied his weapons and shrouded them and maintained his hostile attitudes toward Players B and G. Clearly, Player A's action forced the other players to speculate about whether his disarmament offer was genuine.

EXCHANGE RATIOS. At the outset of the game, the exchange ratios were 0–0 in all instances because all offensive weapons were holstered. These ratios changed as a result of the actions taken in Round 1 to ready offensive weapons. Those changes were most important in instances in which hostile relations existed.

Player A's exchange ratio with Player B went to 15–0 in his favor. However, the exchange ratio with Player G went to 15–200 against him, which also pertained to the combined exchange ratio between Player A on the one side and the alliance of Players B and G on the other. In both instances, Player A was aware of his position because neither Player B nor Player G shrouded his weapon. At this point, Player A knew he could attack and kill Player B in the next round with 10 shots without fear of retaliation by Player B because Player B's weapon remained holstered. As an aggressive and non-*status quo* power, Player A would find this tempting but had to keep in mind that the alliance between Player B and Player G could result in Player G killing him with 10 shots in return. These exchange ratios raised the question of whether Player G would still retaliate and kill Player A despite the fact that Player A would already have killed Player B. The dilemma for Player G is heightened by the fact that Player A would retain five shots after killing Player B and Player G's lack of defenses meant they would hit him if they were fired. This would not have been enough to wound Player G but would still have imposed considerable pain. A lesser option for Player A in the next round would be to exploit the lack of defenses by threatening to wound both Player B (with three shots) and Player G (with 10 shots) unless they agreed to specific terms.

Regarding the mutually hostile relationship between Player C and Player E, the exchange ratios went to 15–0 in favor of Player E. He would have been free to shoot at Player C in the next round without fear of immediate retaliation by Player C because Player C's weapons were holstered. However, Player E could not know this because Player C shrouded his forces. Second, Player E possessed only the capacity to wound Player C, not the capacity to kill him. Therefore, Player C would have survived to later rounds when he would possess

the forces to kill Player E. On the other hand, Player E would not have the capacity to kill Player C unless he could coordinate such an attack with another power. Oddly, Player E did not move to extend formal alliance overtures in Round 1, which could have changed the exchange ratio with Player C to one even more in his favor. This was despite his private announcement of his intention to do so prior to Round 1.

Round 2

FORCE POSTURES. Player F readied his offensive weapons, thus bringing five of the seven players to a posture of readiness. This action raises the level of instability regarding force posture by an additional increment. Player F also shrouded his offensive force, thus establishing the preference for deception over deterrence in this setting.

DIPLOMATIC DEVELOPMENTS. Player A took the seemingly surprising action of extending a "friendly" overture to Player B (previously hostile) despite the fact that he was seeking to subdue and ultimately conquer Player B. This was not surprising in reality because Player A's overture was a deceptive move. (See Game Manager's Note in Appendix A.)

Player B sought to reinforce his position relative to Player A, which he continued to view as an unfriendly one, by upgrading his relationship with Player D to friendly (previously neutral).

Player D accepted a private overture from Player C to improve bilateral relations and upgraded his attitude toward Player C to neutral (previously unfriendly). He also agreed to an alliance with Player G, which clearly bolstered his position in the region.

Player E, partially fulfilling his privately stated intentions, sought an alliance with Player G (previously friendly). This step was consistent with his policy of trying to break out of the diplomatic isolation imposed on him by Player C.

Player F took the unusual action of simultaneously seeking an alliance with Player C (previously friendly) and Player G (previously neutral). The purpose of this move was not clear at this time.

Player G, like Player D, accepted Player C's private overture for improved bilateral relations and upgraded his attitude toward Player C to neutral (previously unfriendly).

It is also interesting to note an action that was *not* taken: Players B and D did not seek to establish an alli-

ance. Player B had an alliance with Player G at the outset of the game. Player D entered into alliance with Player G in this round. Players B, D, and G, through private communications, were designing a coordinated policy regarding Player A. Players B and D could have “closed the loop” on this three-party relationship by establishing an alliance between them but chose not to do so. Player B’s decision merely to upgrade his attitude toward Player D to friendly and Player D’s decision to maintain a neutral stance toward Player B showed that each preferred to coordinate his policy toward Player A through Player G.

EXCHANGE RATIOS. Regarding exchange ratios, the imbalance in favor of Player A over Player B (15–0) appeared to become less worrisome because of Player A’s friendly overture toward Player B. Whatever Player A’s long-term intentions, he did not move to attack and kill Player B. Player B’s alliance with Player G and Player G’s readied posture served to deter Player A, which continued with an alliance-based exchange ratio of 15–200 against Player A. In this regard, Player G’s decision to adopt a deterrence posture (openly readied) contributed to stability. It is interesting to note that a decision by Player B to ready his weapons and the formation of an alliance between Player B and Player D would have produced an alliance-based exchange ratio toward Player A of 15–230. Clearly, both viewed this additional strengthening of the exchange ratio as unnecessary.

The exchange ratio between Player C and Player E resulting from the moves in Round 1 remained the same. Thus, it is fair to conclude, at least at this point in the game, that Player C’s deceptive posture contributed to stability by allowing him to remain holstered. Lifting his shroud would have revealed his current vulnerability to all players, including Player E.

Round 3

FORCE POSTURES. No player changed his force posture in Round 3. All were comfortable with the force postures that they carried over from Round 2.

DIPLOMATIC DEVELOPMENTS. First, Player A sought to bolster his position by seeking an alliance with Player F, which was consistent with his private communication prior to the round that sought support from both Player C and Player F. On the other hand, he chose not to seek an alliance with Player C, having been rebuffed in the private communication. His doing so would

have revealed the weakness of his diplomatic position to all other players.

Player B upgraded his attitude toward Player C to neutral (previously unfriendly), which was consistent with his ongoing effort to split Player C from Player A.

Player B also upgraded his attitude toward Player D to friendly (previously neutral). This move represented a tentative step toward an alliance with Player D, the implications of which were described in the analysis accompanying Round 2. Player D reciprocated.

Player E fulfilled his stated intentions from the outset by seeking alliances with Players B (previously neutral) and D (previously friendly). These offers came in addition to the alliance Player E sought with Player G in Round 2. Player G chose not to respond to Player E’s earlier request for an alliance, effectively rebuffing Player E’s request.

Player F’s private communication with Player C prior to this round revealed that his earlier moves to seek alliances simultaneously with Players C and G involved deception toward Player G. Player F’s strategy could have very negative implications for long-term stability. Specifically, he proposed to Player C that he would support Player C in subduing Player E and wanted Player C to support him in a coordinated strike on Player G at a later point in the game. At this time, however, Player F’s strategy was frustrated by Player C’s decision to rebuff Player F’s overture. Likewise, Player G, without knowledge of Player F’s hostile intentions, refused to respond to Player F’s overture and did not enter into an alliance.

EXCHANGE RATIOS. The moves in Round 3 did not change force postures and did not result in any new alliances or hostile/threatening relations. As a result, no substantive changes in exchange ratios occurred.

However, it is appropriate to note that if Player A had achieved his ambition regarding alliances with Players C and F, the exchange ratio at this point between the alliance consisting of Players A, C, and F on the one hand and Players B and G on the other, with no defenses in place, would be 215–200. At this stage of the game, the existing exchange ratio, which was based on Player A versus the alliance of Players B and G, was 15–200. If Player E realized his ambition of an alliance with Players B, D, and G, the alliance exchange ratio with Player C at this stage of the game would be 230–0. Finally, Player F’s stated long-term goal of an alliance with Player C for the purpose of attacking Player G

would, if all the players readied their weapons, result in a conflict between an alliance of Players C and F and an alliance of Players B, D, and G, with a corresponding exchange ratio of 215–245.

All this reveals that in this proliferated environment, the coalition dynamic can lead to profound changes in the relevant exchange ratios. This explains why the players were more focused on diplomatic maneuvering at this stage of the game than on altering their force postures, even as many diplomatic ambitions are going unrealized.

Round 4

FORCE POSTURES. The only change in force posture made during Round 4 was that Player C lifted his shroud and revealed that his weapon was not readied.

DIPLOMATIC DEVELOPMENTS. During Round 4, Players B and E entered into an alliance. This alliance served to bolster Player B's position against a possible attack by Player A while also bolstering Player E's position against an attack by Player C. However, it was odd that Player B opted for an alliance with Player E and risked a hostile relationship with Player C in lieu of an alliance with Player D, who was already involved in a joint policy for disarming Player A.

Players F and G established a reciprocal friendly relationship. This is consistent with the private exchange between the two players prior to these moves. Given the strategy outlined by Player F to Player C earlier, it is clear that Player F's friendly overture to Player G was disingenuous.

EXCHANGE RATIOS. The new alliance between Player B and Player E changed the exchange ratios in significant ways. Given that Player B had alliances with Players E and G at this point in the game, an attack on him by Player A (with as many as 15 shots) carried the danger of a retaliatory strike by Players E and G with as many as 215 shots. This continued to allow Player B to remain unshrouded and holstered despite the fact that Player A retained the capacity to kill Player B. A contributing factor in Player B's vulnerable posture was the deceptive friendly overture extended to him earlier by Player A. Player E's new alliance with Player B, however, did not change the exchange ratios with Player C in a prospective conflict with him. At this point in the game, Player C could not attack Player E because he had holstered his weapon. Given Player C's decision in this round to unshroud his weapon, Player

E now knew that Player C was incapable of shooting. Player E could have attacked Player C in concert with Player B and killed him without fear of retaliation, although it would have taken all the shots of both (30 combined) to do so, but only if Player B readied his weapon. Thus, the Player B–Player E alliance had an exchange ratio that favored it 15–0 over Player C at this point in the game, which was the same as Player E's solitary posture.

Round 5

FORCE POSTURES. There were no changes in force posture by any player in Round 5. The important point here was that Player C did not move to ready his weapon in the context of the alliance formed between Player B and Player E in Round 4.

DIPLOMATIC DEVELOPMENTS. Not surprisingly, Player C did downgrade his attitude toward Player B to hostile (previously unfriendly) to complement his already hostile attitude toward Player E. The tentative steps toward stability in the process of negotiating Player A's disarmament were being offset by instability in the relationship between Player B and Player E on the one hand and Player C on the other.

EXCHANGE RATIOS. Despite having moved to a hostile attitude toward Player B in the aftermath of his agreement to ally with Player E, Player C did not move to ready his weapon. Given Player C's decision to continue to reveal the status of his weapon, Player E knew that Player C was incapable of shooting. Again, Player E could have attacked Player C but would only have wounded him. The ratio continued to favor Player E over Player C 15–0.

Round 6

FORCE POSTURES. There were no changes in force posture by any player in Round 6.

DIPLOMATIC DEVELOPMENTS. The sole change in diplomatic positions undertaken in Round 6 was that Player B did an about-face regarding his move in Round 4 to enter into an alliance with Player E. He withdrew from the alliance and downgraded his attitude toward Player E to friendly. This move, along with Player D's private communications with Player C prior to this round that he was prepared to remain neutral in the dispute between Player C and Player E, sent the clear message to Player C that his cooperation in pressing for the disarmament of Player A would result in Play-

ers B and D not interfering with his efforts to isolate and ultimately subdue Player E.

EXCHANGE RATIOS. The breaking of the alliance between Player B and Player E did not result in a change in the exchange ratio in a hypothetical conflict between Players B and E and Player C. The ratio during the alliance was 15–0 because both Player B and Player C remained holstered. With the alliance dissolved, the ratio continued to be 15–0 in favor of Player E over Player C. However, Player C was still not certain of this ratio because Player E continued to shroud his weapon.

Round 7

FORCE POSTURES. There were no changes in force posture by any player in Round 7.

DIPLOMATIC DEVELOPMENTS. Player A withdrew his alliance offer to Player F but retained a friendly attitude toward Player F.

Player C, recognizing Player B's move in the prior round to withdraw from his alliance with Player E, upgraded his attitude toward Player B to neutral (previously hostile).

Player E upgraded his attitude toward Player F to friendly (previously neutral).

EXCHANGE RATIOS. The breaking of the alliance between Player B and Player E in Round 6 did not change the exchange ratio in a hypothetical conflict between Player C and Player E. This is because both Players B and Player C remained holstered. The exchange ratio that favored Player E over Player C stayed at 15–0 because of Player C's unready posture. The same consistency pertained to Player C's decision to upgrade his attitude toward Player B to neutral. The lifting of the hostile attitude of Player C toward Player B did not change the exchange ratio because both were holstered. The exchange ratio was 0–0 when Player C held a hostile position, and it remained 0–0 following the upgrade in diplomatic relations.

Round 8

FORCE POSTURES. There were no changes in force posture by any player in Round 8.

DIPLOMATIC DEVELOPMENTS. Player A downgraded his attitude toward Player C and Player F to unfriendly in both cases (previously friendly in both instances). At the same time, he upgraded his attitude toward Player E to neutral (previously unfriendly). Player E reciprocated

Player A's move and upgraded his attitude toward Player A to neutral (previously unfriendly). Player A, responding to both positive and negative incentives from Players B, D, and G, was clearly moving to change his allegiances. Further, what was described as a deceptive move by Player A to improve relations with Player B in Round 2 was now emerging as a genuine relationship. The change in the diplomatic posture by Player A was coming at the expense of the strategic position of Player C. While Player C's goal of lessening the likelihood of a conflict between Player A and Player B was being served by the diplomacy to achieve the disarmament of Player A, it was also giving Player G a stronger position in the region and lessening the ability of Player C to achieve hegemonic power in the region. The disarmament effort was also creating incentives for Players B and D to abandon their existing positions of not coming to Player E's defense if he was attacked by Player C.

EXCHANGE RATIOS. Since no changes in force postures or new alliances or hostile relationships were established in Round 8, no exchange ratios changed. Nevertheless, it is appropriate to review the implied negative incentives that could be applied to Player A if he persisted in the aggressive policies that he adopted at the outset of the game. If Player A continued to pursue an aggressive policy, in a circumstance in which it was clear that neither Player C nor Player F would come to his defense, the exchange ratio he would have faced with Players B and G in hostile positions and with their weapons readied would be 215–15 against him. If Player D joined with Players B and G, the ratio would be 230–15. These implied exchange ratios carried a clear implication regarding the risk to Player A's survival. His offensive force, while still capable of killing Player B or wounding Player G (or wounding both), in a circumstance in which neither has defenses, would do nothing to prevent his destruction at the hands of both if he pursued aggression. Player A's inability to garner greater support from Players C and F was significantly limiting Player A's aggressive options.

Round 9

FORCE POSTURES. Player A disarmed in Round 9. In the culmination of the private diplomacy, Player A chose regime survival over his other interests. Private assurances not to attack notwithstanding, Player G chose to remain readied.

Player C shrouded and readied his weapon. This reflected Player C's dissatisfaction with his deteriorating diplomatic position.

Player D lifted his shroud and holstered his weapon. This was a de-escalatory response to Player A's decision to disarm, reflecting the view that an attack by Player A was his primary security concern and that he was now satisfied with the situation.

Player F lifted his shroud and revealed that his weapon was readied. At this transition point, Player F felt more comfortable with a deterrence posture than with a posture relying on deception.

DIPLOMATIC DEVELOPMENTS. Player A upgraded his attitude toward Player E to friendly (previously neutral) and his attitude toward Player G to neutral (previously hostile). The former action by Player A was consistent with a public announcement admonishing Player C for his lack of support. The latter action was an extension of his decision to disarm.

Player B upgraded his attitude toward Player A to friendly (previously unfriendly). This, too, was an extension of the diplomacy resulting in Player A's disarmament.

Player E upgraded his attitude toward Player A to friendly (previously neutral). This reflected the success of Player E's strategy for breaking out of the isolation Player C was attempting to impose on him by using economic incentives to encourage Player A's disarmament. (See "Private Communications" in Appendix A.)

Player F upgraded his attitude toward Player A to neutral (previously unfriendly) and withdrew his alliance offer to Player C and extended a friendly attitude in its place. Player F was pleased with Player A's disarmament, and it was clear at this point that Player C was not going to accept Player F's alliance offer.

EXCHANGE RATIOS. Player A, having disarmed, lost his capacity to threaten an attack for the remainder of the game. He would depend on security assurances, both positive and negative, to prevent or deter any attacks against him.

Despite the "era of good feeling" following Player A's disarmament, the relationship between Player C and Player E persisted as the sole hostile relationship in the game at this time. Since neither Player C nor Player E maintained any alliances at this time (although Player E had pending alliance offers to Players B, D, and G) and both players had readied their weapons, the exchange ratio was 15–15. However, neither Player C

nor Player E could be certain of the other player's readiness because both were shrouded at this time. Under these circumstances, with no defenses present, Player C had the capacity to kill Player E, but Player E had only the capacity to wound Player C.

Round 10

FORCE POSTURES. Player C threatened Player E and took a single electromagnetic pulse (EMP) shot at him. This limited strike could be described as a warning shot. This move left Player C with 14 shots for future rounds. Player C was clearly uncomfortable with his diminished diplomatic position and with the fact that the direction of the game was such that his strategic goals of isolating and subduing Player E and diminishing Player G's influence in the region were being put further out of reach. This action automatically lifted Player C's shroud.

Player F reshrouded his weapon. Player F reverted to a deception strategy, reversing his decision in Round 9 to lift the shroud. He continued to maintain a readied weapon.

DIPLOMATIC DEVELOPMENTS. Player A upgraded his attitude toward Player G to friendly (previously neutral). This action was consistent with a steadily improving relationship with Player G resulting from Player A's decision to disarm. Particularly in the context of Player A's earlier move to downgrade his relationship with Player C and issue a public rebuke to Player C, this move to improve relations with Player G added to Player C's isolation.

Player D upgraded his attitude toward Player A to neutral (previously unfriendly). This action was consistent with a steadily improving relationship with Player A resulting from Player A's decision to disarm.

Player G reciprocated in Player A's move to upgrade relations by adopting a friendly attitude toward Player A (previously neutral). This action was consistent with a steadily improving relationship with Player G resulting from Player A's decision to disarm. This reciprocal move was also consistent with a pattern of further isolating Player C.

EXCHANGE RATIOS. Player C's limited attack on Player E demonstrated that significant instabilities remained in the game, even in a context in which a successful agreement for the disarmament of Player A was improving stability. The strike occurred under a circumstance in which the exchange ratio with Player E was 15–15, although Player C was unaware of Player E's readiness posture. As a result of the attack, Player

E remained functional. (See relevant Game Manager's Note in Appendix A.) Player C, following the strike, retained 14 shots. Thus, the exchange ratio following the strike favored Player E over Player C by 15–14.

Round 11

FORCE POSTURES. Player D moved simultaneously to shroud and ready his weapon. He determined that his openly vulnerable posture, while acceptable in the context of Player A's decision to disarm, was no longer acceptable in the context of a conflict between Player C and Player E.

Player E threatened and retaliated against Player C in kind. Player E fired a single shot, which he described as an EMP attack. The move to threaten and shoot automatically raised Player E's shroud. Consistent with a public announcement made by the Game Manager regarding EMP attacks, Player E's retaliatory shot resulted in Player C's remaining functional.

Player F unshrouded his weapon and revealed that he was in a ready position. Player F's move was consistent with his stated intention of deterring Player G from intervening in the region.

DIPLOMATIC DEVELOPMENTS. Players C and F, consistent with the privately stated intentions of both, entered into formal alliance. The primary reason for this action was to deter Player G from intervening in the region. Player C regretted his earlier decision to rebuff Player F's overture regarding an alliance. Similarly, Player F regretted his decision in Round 9 to withdraw the alliance offer to Player C.

Player D downgraded his attitude toward Player C to unfriendly (previously neutral) while upgrading his attitude toward Player E to friendly (previously neutral). Player D was moving in the direction of siding with Player E in his conflict with Player C.

Player F, in addition to entering into the alliance with Player C, upgraded his attitudes toward Players B and D to friendly in both cases (previously neutral in both cases) and downgraded his attitude toward Player E to unfriendly (previously neutral). While clearly siding with Player C in his conflict with Player E, Player F was also seeking to bolster his position by currying favor with Players B and D. He hoped that they could be persuaded to convince Player G not to intervene in the conflict between Player C and Player E.

Player G downgraded his attitude toward Player C to hostile (previously neutral). By doing so, Player

G moved to side with Player E in his conflict with Player C.

EXCHANGE RATIOS. Player E's single retaliatory shot would have evened the exchange ratio with Player C at 14 on each side, but Player C's success in consummating an alliance with Player F dramatically shifted the exchange ratio to one of 214–14 in favor of the alliance of Players C and F over Player E. Player E was left in this vulnerable posture because his earlier attempts to form enduring alliances with Players B, D, and G proved unsuccessful. Given that Player E, contrary to an earlier public declaration, fired only a single shot in retaliation against Player C, the question at this point in the game was whether the players could avoid uncontrolled escalation.

Round 12

FORCE POSTURES. Player B shrouded his weapon. He was uncomfortable allowing the other players to know of his vulnerable posture during a shooting war between Player C and Player E.

Player C took two additional EMP shots at Player E. This, along with the earlier single shot, wounded Player E.

DIPLOMATIC DEVELOPMENTS. Player B downgraded his attitude toward Player C to unfriendly (previously neutral). This action signaled Player B's intention to side with Player E following Player C's single EMP strike against Player E.

Player E downgraded his attitude toward Player F to unfriendly (previously friendly). This came in response to Player F's decision to enter into an alliance with Player C.

Player G, despite his private communication that offered security guarantees to Player E that are consistent with an alliance relationship, chose not to enter into a formal alliance. Since Player E had already extended an alliance offer to Player G, Player G needed only to accept in order to consummate an alliance relationship.

EXCHANGE RATIOS. Player C's additional two EMP shots left him with 12 shots. Player E retained 14 shots. Player C's earlier success in consummating an alliance with Player F, however, maintained an exchange ratio of 212–14 in favor of the alliance of Players C and F over Player E. If Player G had entered into an alliance with Player E, the exchange ratio would have been 212–214 in favor of the alliance of Players E and G over Players C and F. The two shots taken by Player C also demonstrate that the pressures for escalation were significant.

On the other hand, Player F, despite his alliance with Player C, chose not to join Player C in his more recent attack on Player E. This is consistent with Player F's declaration that his primary purpose for entering the alliance was to keep Player G from intervening.

Round 13

FORCE POSTURES. Player E fired all 14 of his remaining shots at Player C. These shots were described as direct nuclear attacks and not EMP shots. This action left Player C wounded. It left Player E with no remaining offensive capability.

Player G joined Player E in his attack on Player C by launching a strike consisting of five shots. The additional shots by Player G were not sufficient to kill Player C. They left Player G with 195 offensive shots.

DIPLOMATIC DEVELOPMENTS. Player D threatened Player C. This move automatically downgraded his relationship with Player C to hostile (previously unfriendly). Player D was prepared to respond to Player C's attacks on Player E at this point.

EXCHANGE RATIOS. The Game Manager chose to terminate the game at this point, having determined that the instability factors in a proliferated environment were severe. Player E's 14-shot attack on Player C was suicidal. It is reasonable to expect that Player C would have killed him in the next round. It is also reasonable to expect that Player G, perhaps in concert with Player D, would then have moved to kill Player C. What is less certain is whether Player F, as an ally of Player C, would have joined in the attack to kill Player E and moved to wound or kill Player G in response to his intervention.

General Observations

The playing of the first iteration of the game provides a number of very important lessons regarding the instabilities in a regional setting in which there are seven nuclear-armed players (states). The shooting war that ended the first iteration of the game revealed that, at least in an environment in which no defenses are permitted, the inherent instabilities are quite serious. It is important draw some specific conclusions from the history of the first iteration of the game.

Conclusion #1: Failing to account for multiple axes of possible confrontation and conflict is a serious mistake.

The players in this first iteration of the game focused most of their attention on defusing the possible Player

A–Player B conflict and the diplomacy surrounding Player A's voluntary disarmament. The success of this diplomacy and the significant step toward stability that it represented masked the festering conflict between Player C and Player E that eventually would lead to open conflict. Indeed, the success of the diplomacy to disarm Player A contributed to decreasing stability on the Player C–Player E axis. First, this success caused Player A to turn on his natural friend, Player C, leaving Player C in a more isolated position. Player E used the diplomacy regarding Player A to break out of the isolation imposed on him by Player C. These developments might not have led to a shooting war if Players B, D, and G had not lowered their deterrence postures, either by formal moves or less formal communications, to encourage progress in the diplomacy toward Player A. This sent the unmistakable message to Player C that Players B, D, and G would not come to the defense of Player E if he chose to act. Player C perceived that Players B, D, and G placed a higher priority on resolving the situation with Player A.

Conclusion #2: Distinguishing between players that are aggressive, non–status quo powers and those that are not aggressive and in favor of the status quo is a key to maintaining stability.

Applying the standard of moral equivalence by focusing excessively on maintaining a balance of exchange ratios between players can actually undermine stability. At the end of the game, Players B, D, E, and G could easily have obtained an exchange ratio advantage over Player A of 245–0 and killed Player A without any risk of retaliation by Player A and at a minimal risk of retaliation by either Player C or Player F. Yet they did not attack. On the other hand, Player C chose to attack Player E when the applicable exchange ratio was 15–15. The key regarding exchange ratios in this offense-only environment is to ensure ratios that favor the non-aggressive powers over the aggressive ones. In the real world, this means distinguishing the good guys (the U.S.) from the bad guys (North Korea, at least at the outset, and China) and working to establish exchange ratios that favor the good guys.

Conclusion #3: Crossing the nuclear threshold carries serious incentives for escalation.

In the offense-only environment, it proved impossible to stop the escalation of violence following even the most limited attacks. The first shot fired in the game (by Player C) was a single EMP strike. The response,

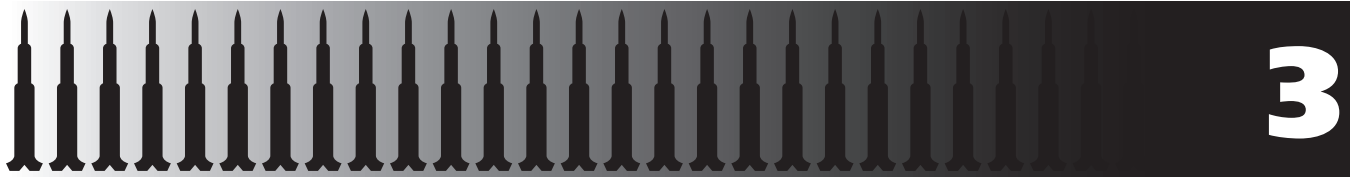
following some rash comments, by Player E was similarly restrained. Nevertheless, attempts to interrupt the escalation of the violence proved fruitless. While the Game Manager stopped the game before the full array of tit-for-tat retaliation could occur, it is reasonable to expect that the outcome would have been Players C and E being killed and Players D and G being wounded. It is possible to imagine an outcome in which Players C, D, E, F, and G are all killed—a paradox because Players A and B represented the players most at risk at the outset of the game.

Conclusion #4: Players can be expected to mix their choices between deterrence and deception, with varying impacts on stability.

Early in the game, players seem more comfortable with deception as a security tool in this multi-player setting. By the philosophy prevalent during the Cold War, choosing deception would be highly destabilizing. In this multilateral setting, the destabilizing impact is less clear. For example, Player C's early move to shroud his weapon also allowed him to keep his weapon holstered. On the other hand, the same decision by Player C later in the game contributed to instability and, ultimately, a shooting war that left him wounded or (if additional rounds had been played) perhaps killed. Player G's classic deterrence posture (unshrouded and ready) throughout the game proved helpful in stabilizing the situation regarding Player A but unhelpful in preventing a conflict between Player C and Player E.

Conclusion #5: The coalition dynamic is both complex and immensely important regarding stability.

All the players demonstrated an intense desire to play the alliance game, despite the fact that they were all independent nuclear powers. The reason is that a single change in alliance relationships can have an enormous impact on the exchange ratios. This possibility can lead to instability because the stakes of winning or losing the alliance game are very high. In this context, it is important to recognize that losing the alliance game can stem from joining a losing alliance that puts a player at risk and from being rebuffed in an attempt to join a winning alliance.



Game Iteration #2: Lesser Power Vulnerability

THE second iteration of the game was played on December 16 and 17, 2004, at The Heritage Foundation. In this iteration, the Game Manager instructed Player G to adopt a policy that had him provide for his own defense but not furnish defenses to any other player. This policy choice was based on the belief that the best option for stability was for Player G to focus on defending himself while ruling out defenses for other players, because the presence of defenses in the region would exacerbate the tensions already present in the region. The remainder of this chapter provides the history of what took place during this exercise, along with observations, analysis, and conclusions. (Appendix B provides a detailed history of what took place in this iteration of the game. The private communications and public announcements by the players documented in this appendix should provide the reader with a deeper insight into the thinking of the players at the time they made their moves.)

Round 1

FORCE POSTURES. In the course of Round 1, three of the seven players (Players A, E, and F) readied their offensive forces. At the same time, four players (Players A, B, D, and E) shrouded their offensive forces. Deception, rather than deterrence, was the preferred option. Only Player F opted for the traditional deterrence posture of openly readying his weapon. The posture of deception leads to the conclusion that, by Cold War

standards, there are considerable stability risks in this circumstance.

DIPLOMATIC DEVELOPMENTS. On the diplomatic level, the moves in Round 1 were very limited. Player F moved to seek an alliance with Player C (previously friendly).

EXCHANGE RATIOS. The exchange ratios resulting from the actions taken in Round 1 to ready offensive weapons were as follows.

Player A was hostile to both Player B and Player G. Player A's decision to ready his weapon under the cover of his shroud was not followed by a similar decision by the alliance of Players B and G. Thus, Player A enjoyed a 15–0 advantage in exchange ratios over Players B and G, although Player A did not know this regarding Player B because of Player B's decision to use his shroud.

Player D's hostile attitude toward Player A did not cause him to ready his weapon. His exchange ratio with Player A was 15–0 in favor of Player A. However, neither side could be certain of this ratio because both were shrouded.

Regarding the mutually hostile relationship between Player C and Player E, the exchange ratios went to 15–0 in favor of Player E. He would have been free to shoot at Player C in the next round without fear of immediate retaliation by Player C because Player C's weapon was holstered. Further, Player E was aware of his advantage because Player C had not shrouded his forces. On the other hand, Player E possessed only the capacity to

wound Player C, not the capacity to kill him. Therefore, Player C would have survived to later rounds in which he would possess the forces to kill Player E. By contrast, Player E would not have the capacity to kill Player C unless he was able to coordinate such an attack with another power. Finally, Player E, as a non-aggressive, *status quo* power, would have been acting outside his described position if he attacked Player C without severe provocation.

Round 2

FORCE POSTURES. Player D, while remaining shrouded, moved to ready his weapon. This move was consistent with his statement of agreement with Player G's view that Player A's weapon posed a threat to stability. However, by maintaining his shroud, Player D revealed his preference for deception over deterrence in this setting.

Player G also readied his weapon but did so openly. This move was consistent with Player G's views of the threat posed by Player A. In so doing, he joined Player F in adopting a traditional deterrence posture.

DIPLOMATIC DEVELOPMENTS. Player F upgraded his relationship with Player A to friendly (previously neutral). This move, combined with Player F's alliance proposal to Player C prior to the round, revealed that Player F was more concerned about Player G's intervening in the region than about Player A's offensive posture.

Player G upgraded his attitude toward Player C to friendly (previously unfriendly) and his attitude toward Player F to friendly (previously neutral). These moves were consistent with a strategy to split Players C and F from Player A and encourage their support for an effort to disarm Player A. However, by upgrading his attitude toward Player F, Player G revealed that he was not yet aware of Player F's suspicions toward him.

EXCHANGE RATIOS. Player D's decision to ready his weapon resulted in an exchange ratio with Player A, with which he had a hostile relationship, of 15–15.

Player G's decision to ready his weapon resulted in a Player B–Player G alliance advantage over Player A of 200–15.

Player E continued with his 15–0 advantage over Player C because Player C kept his weapon holstered. Player E was aware of his advantage because Player C was not resorting to the shroud. However, Player E's employment of the shroud kept Player C from know-

ing whether or not Player E's weapon was in a readied position.

Round 3

FORCE POSTURES. Player A chose to lift his shroud and reveal that his weapon was in a ready position. Thus, Player A joined Players F and G in opting for a traditional, Cold War–style deterrence posture.

Player G's 40 defensive interceptors became operational this round.

DIPLOMATIC DEVELOPMENTS. Player A downgraded his attitude toward Player D to hostile (previously unfriendly). This made the attitudes between Player A and Player D reciprocal. This move was prompted by Player D's explicit rejection (on behalf of himself and Players B and G) of Player A's demands for disarmament prior to this round.

Player B downgraded his attitude toward Player F to unfriendly (previously neutral). This move came in reaction to Player F's positive statement toward Player A prior to this round.

Player C upgraded his attitude toward Player G to friendly (previously unfriendly). This move was consistent with Player C's attempt to encourage Player G to pressure Player E to acquiesce to Player C's demand that he abandon his independence.

Player D moved to seek alliances with Players B (previously neutral) and G (previously friendly). This move was an outgrowth of the joint efforts of Players B, D, and G to disarm Player A.

Player E upgraded his attitude toward Player B to friendly (previously neutral). Player E was included in private communications among Players B, D, and G regarding a coordinated policy toward Player A. This upgrade in Player E's attitude toward Player B supported Player E's desire to keep this line of communication open.

Player F upgraded his attitude toward Player G to friendly (previously neutral). This was a deceptive move on the part of Player F. He wanted to hide the fact that he had deeply held suspicions regarding Player G's involvement in the region.

Player G upgraded his attitude toward Player A to unfriendly (previously hostile). This move signaled Player A that his disarmament had the potential to provide him tangible diplomatic benefits.

EXCHANGE RATIOS. The fact that Player G's 40 defensive interceptors became operational this round caused Player A to see the exchange ratio of 15-200 against

him relative to Player G to fall 3-200 to his disadvantage. Player A faced the same ratio in confronting the alliance of Player B and Player G because Player B's weapon was holstered at this point, but he was not certain of this because Player B's weapon was also shrouded. Assuming the worst, Player A calculated an exchange ratio of 3-215 against him in confronting the alliance of Player B and Player G.

Round 4

FORCE POSTURES. The only change in force posture made during Round 4 was by Player B. Player B readied his weapon under cover of the shroud he had put in place earlier. This reflected Player B's growing concern that Player G would not fulfill his security commitment to Player B despite the continuance of the alliance relationship.

DIPLOMATIC DEVELOPMENTS. Player A did not formally seek alliances with Players C and F. A formal move by Player A to seek the alliances—given that he had been firmly rebuffed by Player C and had received only conditional support from Player F in communications—risked revealing his diplomatic weakness. This was a weakness already detected by Player D when he addressed Player A in a private communication as “Dear ‘I am Lonely.’”

Player B downgraded his attitude toward Player A to hostile (previously unfriendly). At the same time, Player B entered into an alliance with Player D (previously unfriendly) and upgraded his relationship with Player E to friendly (previously neutral). These actions, as well as simultaneously readying his weapon, were prompted by Player B's growing concern that Player G would turn out to be an unreliable security partner and would seek additional security partnerships as an insurance policy.

Player D upgraded his attitude toward Player A to unfriendly (previously hostile). This move mirrored Player G's similar move in Round 3, which signaled to Player A that his disarmament had the potential to provide tangible diplomatic benefits. This move also had the unintended consequence of weakening Player B's rationale for entering into the alliance with Player D in this round.

Player F upgraded his attitude toward Player D to friendly (previously neutral). This also offset Player B's rationale for entering into the alliance with Player D in this round.

Player G accepted Player D's overture for an alliance (previously friendly). This action by Player G created a

Player B, D, and G security bloc.

EXCHANGE RATIOS. The establishment of the security bloc by Players B, D, and G presented all the players with a dilemma regarding how to calculate the exchange ratio relative to Player A. Exchange ratios are directly affected by whether or not the players' weapons are ready. In this case, all four players had their weapons drawn at this point. Thus, calculating the exchange ratio at this level was clear, leaving aside the issue of shrouding. On the other hand, exchange ratios are most relevant where hostile attitudes are present. It is at this level that a dilemma over calculating the exchange ratio emerged.

Players A and B had mutually hostile attitudes toward one another. Player A also viewed Players D and G with hostility. Players D and G, however, had attitudes toward Player A that are merely unfriendly. The question was whether to calculate the exchange ratio between Player A and the combined bloc of Players B, D, and G or to calculate it individually between Player A and Player B alone. This was a judgment call because it was possible to view the mutually hostile attitudes between Player A and Player B as drawing Player B's allies, Players D and G, to his side despite their own less hostile attitudes toward Player A. The difference was quite important because Player B was starting to question the commitment of Player G in particular. If Player A faced the bloc of Players B, D, and G, the exchange ratio was at best 15-230 against him. If he were to fire all 15 shots in the teeth of Player G's defenses, the exchange ratio, based on probability, was 3-230 against him. Compounding the problem for him was that Players B and D had shrouded their weapons. Thus, he did not know at this time whether they had readied their weapons. On the other hand, he could assume that Player B's shrouded weapons were ready and still calculate an exchange ratio of 15-15. If he assumed that Player B's shrouded weapon was holstered and neither Player D nor Player G would retaliate, he could have calculated an exchange ratio with Player B of 15-0 in his favor. Under this circumstance, Player A could attack and kill Player B without fear of a counterstrike.

The exchange ratio between the mutually hostile Players C and E remained at 15-0 in favor of Player E because Player C's weapons were holstered.

Round 5

FORCE POSTURES. There were no changes in force posture by any player in Round 5.

DIPLOMATIC DEVELOPMENTS. Player A, despite the risk of revealing diplomatic weakness if the offer was rebuffed, formally sought an alliance with Player F (previously friendly).

Player B, as revealed in the private communications prior to this round, struck an alliance with Player E (previously friendly). This move carried the inference of extending the bloc alliance of Players B, D, and G to Player E. This move was calculated to drive a wedge between Player C and Player G.

Player C, not aware of the private diplomacy among Players B, D, and E prior to this round to create alliances among themselves, upgraded his attitudes toward Players B and D to neutral (previously unfriendly in both cases).

Player D, as a result of private communications, upgraded his attitude toward Player E to friendly (previously neutral).

Player E moved to offer alliance relationships with Players B, D, and G (previously friendly in all cases). As indicated earlier, Player B accepted the offer. Player D did not accept the offer but did choose to upgrade his attitude toward Player E to friendly. Player G also did not accept the offer, choosing to maintain a friendly attitude toward Player E.

EXCHANGE RATIOS. The most important impact of the change in diplomatic relations during Round 5 was the establishment of the alliance between Player B and Player E. Prior to the establishment of this alliance, Player E enjoyed a 15–0 advantage over Player C because Player C’s weapon was holstered. Player E’s alliance with Player B, if Player C believed Player B would join Player E in an attack on him, presented him with a circumstance in which the alliance of Player B and Player E enjoyed an exchange ratio advantage of 30–0. Further, Player C could infer from this alliance that Player E had become a *de facto* member of the Player B, D, and G bloc. In this case, Player C could see that the security bloc of Players B, D, E, and G had an exchange ratio advantage of as much as 245–0 against him. Further, Player G’s defenses would counter the effectiveness of a move by Player C to ready his weapons. On the other hand, none of the players of a *de facto* Player B, D, E, and G bloc—other than Player E—had a hostile attitude toward Player C, and Player E was rebuffed in alliance offers to both Player D and Player G. In fact, there was no certainty that Player C faced such a powerful bloc. Finally, none of the players in a Player B, D,

E, and G bloc was an aggressive, non-*status quo* power. There was little likelihood that Player C faced a serious prospect of an unprovoked attack by such a bloc.

Round 6

FORCE POSTURES. Player C shrouded his weapons, although they remained holstered. Clearly, this was a response to the alliance formed in Round 5 between Player B and Player E. He wanted to keep both guessing about his future military moves.

DIPLOMATIC DEVELOPMENTS. Player C downgraded his attitude toward Player B to hostile (previously neutral). This was a direct response to Player B’s decision in Round 5 to enter into an alliance with Player E.

Player F downgraded his attitude toward Players B and E to unfriendly (previously neutral in both cases). This signaled Player F’s sympathy toward Player C’s negative reaction to the new alliance between Player B and Player E.

EXCHANGE RATIOS. Neither the force posture nor the diplomatic changes during Round 6 changed the most relevant exchange ratios. The exchange ratio calculus remained complex at this point, as pointed out in the analysis in Round 5.

Round 7

FORCE POSTURES. Player B lifted his shroud and revealed that his weapon was ready. This move was intended to deter aggression by Player A.

Player C readied his weapon, although it remained shrouded. As a result of this move, all the players had their weapons drawn. Player C was preparing for a confrontation with Players B and E, and perhaps with Players D and G, over the alliance formed between Player B and Player E.

DIPLOMATIC DEVELOPMENTS. In accordance with the private diplomacy prior to this round, Players A, C, and F moved toward forming a bloc. Player C formed an alliance with Players A and F (previously friendly in both cases). Player F, however, chose not to form an alliance with Player A at this time.

Anticipating the formation of the bloc of Players A, C, and F, Player B downgraded his attitude toward both Player C and Player F to hostile (previously unfriendly in both cases).

Player E, anticipating the same development, chose to downgrade his attitude toward Player F to unfriendly (previously neutral).

Player F, consistent with a public announcement prior to this round, downgraded his attitude toward Player D to unfriendly (previously friendly).

Player G, facing a troubling dilemma, downgraded his attitude toward Player C to neutral (previously friendly). The dilemma he faced was that he wanted to reassure his friends and allies in the region while not driving Player C into the bloc he was forming with Players A and F. At this juncture, Player G chose to reassure his friends and allies by downgrading his attitude toward Player C and accepting the risks stemming from Player C's actions in moving into alliances with Players A and F.

At this point in the game, it became clear that the players were forming opposing blocs of Players A, C, and F on the one side and Players B, D, E, and G on the other. The unresolved question was Player E's role in the second bloc. This entire diplomatic process was eroding the credibility of Player G. The more Player G sought to assuage the concerns of Player C, the less confident his allies, Players B and D, were becoming that he would honor his alliance commitments. Simultaneously, Player G's efforts to assuage the concerns of Player C encouraged all three members of the opposite bloc (Players A, C, and F) to reach the same conclusion as Players B and D: that they could drive a wedge between Player G and Players B, D, and E. On the other hand, attempts by Player G to reassure his allies, Players B and D, had the effect of driving Player C into the bloc with Players A and F, which Player G did not want. Diplomatically, Player G was losing on all counts, and the other players' confidence in him was rapidly dissipating.

EXCHANGE RATIOS. At this point, it became appropriate to start analyzing the exchange ratios on a bloc-on-bloc basis. All the players had drawn their weapons. As a result, the bloc of Players A, C, and F possessed 230 shots. The bloc of Players B, D, E, and G possessed 245 shots. Player G's 40 defensive shots, however, could reduce the effectiveness of the 230 shots possessed by Players A, C, and F to the extent that shots would be fired at Player G. Based on probability and the assumption that 40 or more shots would be fired at Player G in the context of a conflict between the two blocs, the exchange ratio favored the bloc of Players B, D, E, and G over the bloc of Players A, C, and F by 245–198.

Round 8

FORCE POSTURES. Player D chose to lift his shroud and reveal that his weapon was drawn. This served to

present a deterrence posture by Player D toward the emerging bloc of Players A, C, and F.

DIPLOMATIC DEVELOPMENTS. Player D now made good on his threat to Player C to enter into an alliance with Player E (previously friendly), which he had momentarily withheld. At the same time, Player D reacted to the emerging alliance of Players A, C, and F by downgrading his attitude toward Player F to unfriendly (previously neutral).

Player F fulfilled his private commitment to Player A at this time and entered into an alliance (previously friendly).

Player G responded to the emergence of the bloc of Players A, C, and F by downgrading his attitude toward Player F to neutral (previously friendly).

Collectively, these diplomatic moves all served to accelerate the movement toward the establishment of the two blocs. The establishment of the alliance between Player D and Player E left the question of whether Player G would accept Player E's offer of an alliance relationship as the only important unresolved issue in the formation of the two blocs.

EXCHANGE RATIOS. Given the continued progress toward the establishment of the two blocs in Round 8, the observations regarding the exchange ratios following Round 7 remained pertinent. The bloc-to-bloc exchange ratio, with Player G's defensive interceptors in place, was 245–198 in favor of Players B, D, E, and G over Players A, C, and F. The pressing question at this time for the players of the more aggressive bloc (Players A, C, and F) was how firmly they believed that Player G could be sidelined diplomatically and militarily. In a scenario in which Player G would not act, the bloc-to-bloc exchange ratio between Players A, C, and F on the one side and Players B, D, and E on the other, in which none had defenses, favored Players A, C, and F by 230–45. Under this circumstance, Players A, C, and F could kill Players B, D, and E in a coordinated strike. Further, Player F would clearly survive such a conflict, while Player C would have a good chance of surviving and even Player A could survive. On the other hand, all three ran a significant risk of being wounded under this scenario.

Round 9

FORCE POSTURES. The "Red Alliance" of Players A, C, and F launched a coordinated preemptive strike at Players B, D, and E, but not at Player G. Specifically, Player A threatened Player B and fired 10 shots at him.

Player C threatened Player E and fired 10 shots at him. This move automatically lifted the shroud Player C had over his weapons. Player F threatened Players B, D, and E and fired five shots at Player B, 25 shots at Player D, and five shots at Player E. This calculated preemptive strike achieved tactical surprise. Players B, D, and E were killed. Clearly, the players of the Red Alliance had convinced themselves that the preemptive strike that would kill his friends and allies would paralyze Player G and dissuade him from firing retaliatory shots. This is in a context in which the Red Alliance players opted not to fire any shots at Player G. On the other hand, the preemptive strike by the Red Alliance did not achieve strategic surprise. It would have done so if Players B, D, and E had had their weapons holstered. In this sense, the Red Alliance was operating under the false assumption that there would be no opportunities for Players B, D, and E to fire retaliatory strikes prior to their deaths.

DIPLOMATIC DEVELOPMENTS. The preemptive strike by the Red Alliance automatically resulted in Player F's attitudes toward Players B, D, and E being downgraded to hostile (previously unfriendly in all cases). Player F also chose to downgrade his attitude toward Player G to neutral (previously friendly).

Player C chose to downgrade his attitude toward Player D to hostile (previously neutral).

Player G, a little late in the game, chose to accept Player E's alliance offer (previously friendly) and consolidate the formation of the bloc of Players B, D, E, and G.

EXCHANGE RATIOS. The Red Alliance, having achieved tactical surprise, assumed they had handed Player G a *fait accompli* and undermined the rationale for a retaliatory strike by Player G in accordance with his alliance obligations. From this perspective, the appropriate way to calculate the exchange ratio is the Red Alliance of Players A, C, and F and the bloc of Players B, D, and E, which excludes Player G. Further, the Red Alliance assumed that the surprise attack either would bar retaliatory strikes by Players B, D, and E or, at worst, allow only a non-coordinated or disorganized retaliatory strike. (For a detailed discussion of this issue, see the Game Manager's Note for Round 10 in Appendix B.) From the Red Alliance's viewpoint, the exchange ratio following its preemptive strike was 175–0 in its favor over the bloc of Players B, D, and E. At the other extreme, the exchange ratio favored the bloc of Players B, D, E and G over the Red Alliance by 245–143. This alternative exchange ratio is based on Players B, D, and E having all of their death-

throes shots available and using them and a decision by Player G to retaliate despite the deaths of his allies and the deployment of Player G's defenses.

Round 10

FORCE POSTURES. Players B, D, E, and G, despite the deaths of Players B, D, and E in Round 9, attempted to take large-scale retaliatory strikes at Players A, C, and F. Specifically, Player B threatened Player C and tried to launch all 15 of his shots at Player C. Player D threatened Player F and tried to launch all 15 of his shots at Player F. Player E also threatened Player F and tried to launch all 15 of his shots at Player F. Player G threatened Players A, C, and F and took 25 shots at Player A, 75 shots at Player C, and 100 shots at Player F. The move by Player B to launch at Player C instead of Player A and the moves by Players D and E to launch at Player F instead of Players A and C, respectively, as well as the move by Player G to strike all three, revealed the existence of limited coordination among Players B, D, E, and G regarding this retaliatory strike. There was a need for only limited communication because it was readily apparent that the primary threat to the sole survivor of the alliance of Players B, D, E, and G—Player G—was Player F. Nevertheless, the Game Manager, on the basis of the arguments presented by Player A before the round, took away five shots each from Players B, D, and E. (See Game Manager's Note accompanying analysis provided with this round in Appendix B.) Thus, Player A, having received 25 shots, Player C, having received 85 shots, and Player F, having received 120 shots, were all killed by this retaliatory strike. All the players, save Player G, were dead by this point in the game. There remained, however, the issue of deaththroes shots by Players A, C, and (particularly) F.

DIPLOMATIC DEVELOPMENTS. Player D, having shot at Player F, downgraded his attitude toward Player F to hostile (previously unfriendly).

Player E, having shot at Player F, also downgraded his attitude toward Player F to hostile (previously unfriendly). Player E also downgraded his attitude toward Player A to hostile (previously unfriendly).

Having taken shots at Players A, C, and F, Player G downgraded his attitude toward all three to hostile (previously unfriendly toward Player A and neutral toward Players C and F).

EXCHANGE RATIOS. With Players B, D, and E already dead from hits taken in Round 9 and unable to shoot,

and with Players A, C, and F killed by hits taken during this round, and in view of Player G's decision in this round to fire all of his shots, the sole issue that remained regarding exchange ratios was the number of death-throes shots Players A, C, and F might launch at Player G. This came in a context in which Player G had 40 defensive shots remaining in his arsenal. At this point in the game, Players A, C, and F had as many as 175 death-throes shots remaining between them. With Player G's 40 defensive shots remaining, with a kill probability of 0.8 in one-on-one engagements, the exchange ratio favored Players A, C, and F over Player G by 143–0. This was enough to kill Player G, even with his defenses in place. However, this ratio did not account for the fact that all three players were killed with overwhelming strikes in this round, and the Game Manager would still have to make a judgment regarding how many shots to take away from them based on this circumstance. Further, the description of Player F stated that his arsenal was "not well maintained and has a propensity to malfunction." The Game Manager also had to make a judgment regarding the number of death-throes shots to take away from Player F as a result of this circumstance.

Round 11

FORCE POSTURES. Players B, D, and E, having been killed in Round 9, no longer had any shots. Player A, having five death-throes shots remaining, threatened Player G and attempted to launch all his remaining shots at him. Player C, likewise having five death-throes shots remaining, also threatened Player G and attempted to launch all of his remaining shots at him. Player F had 165 death-throes shots remaining and threatened Player G and launched all of them at him.

DIPLOMATIC DEVELOPMENTS. Because Players B, D, and E had been killed in Round 9, their attitudes reverted to neutral in all instances under the rules of the game.

The death-throes shots taken by Player C at Player G automatically resulted in the downgrading of Player C's attitude toward Player G to hostile (previously a disingenuous friendly).

Player F's death-throes shots at Player G also automatically downgraded Player F's attitude toward Player G to hostile (previously neutral).

EXCHANGE RATIOS. All players exhausted their offensive shots. Likewise, Player G used all of his defensive

shots to defend himself against the death-throes shots launched at him during this round. The only remaining question was whether Player G survived.

Round 12

FORCE POSTURES. All players had exhausted all of their shots, both offensive and defensive.

DIPLOMATIC DEVELOPMENTS. Because Players A, C, and F had been killed in Round 10, their attitudes reverted to neutral in all instances under the rules of the game.

Player G's threats against Players A, C, and F were automatically lifted, both because he had exhausted all of his shots and no longer possessed a means for threatening them and because all three of his enemies were killed by this time and there was no point in maintaining the threat.

EXCHANGE RATIOS. Player G's defensive posture of 40 interceptors was forced to contend with a 75-shot death-throes strike from Player F in Round 11. Of these shots, 35 struck Player G because his defenses had been exhausted. Based on probability, an additional eight penetrated the defense. As a result, Player G received 43 shots from Player F. Since it required 50 shots to kill Player G under the rules of the game, Player G survived. Otherwise, the game was over.

General Observations

As with the first iteration of the game, the second revealed that in this proliferated setting—this time with defenses available only to Player G—the potential for instability is high. In fact, the results of the second iteration of the game confirmed the finding of the first iteration that offensive deterrence is a fragile concept for stability in this proliferated environment. This fragility results from both the complexity of the coalition dynamic and the dramatic impact of this dynamic on the behavior of the players. The differing outcomes of the coalition dynamic were unpredictable and carried extremely high stakes for the players. This combination of low predictability and high stakes increased the risk that players would miscalculate.

The question regarding the hypothesis was whether the shooting war that ended the playing of this second iteration of the game was encouraged by the presence of the defenses in the hands of Player G. The answer is no. The shooting war that resulted in the deaths of every player but Player G and the serious wounding of Player G had two proximate causes. Both causes

were serious miscalculations by Players A, C, and F under the Red Alliance they formed in the course of the game.

The first miscalculation came in the area of assessing the exchange ratio. In Round 9, the three players concluded that the exchange ratio was such that they could launch a coordinated preemptive strike at Players B, D, and E with little or no risk of an effective retaliatory strike from these players. The second, and more serious, miscalculation came at the same time. The Red Alliance players concluded that they had effectively divided Player G from Players B, D, and E, his allies in the region, and that by using the element of surprise to kill his allies in a preemptive strike, they would leave Player G with no incentive to retaliate.

There is no discernible evidence that Player G's defenses prompted the two miscalculations by the players of the Red Alliance. In this regard, it is important to assess the underlying causes of the two miscalculations by Players A, C, and F.

Underlying Cause #1: The Cold War deterrence dynamic did not operate.

Following the first round, only one player (Player F) opted for the traditional Cold War deterrence posture of both lifting his shroud and readying his weapons. By the beginning of Round 9, the round in which the initial preemptive strike took place, five of the seven players had adopted the traditional deterrence posture. According to Cold War calculations, the move in the direction of bolstering deterrence should have served to stabilize the situation. It did not. The players of the Red Alliance chose to launch their preemptive strike at this time, even though they knew that two of the three targeted players had their weapons ready, because they assumed that the tactical surprise they achieved would be sufficient to block an effective retaliatory strike. If Players A, C, and F had caught the three target players with their weapons holstered, their strike, at least at this level, would have been effective. The confusion over strategic versus tactical surprise, not Player G's possession of defenses, led to the miscalculation.

Underlying Cause #2: Players B, D, and E were perceived as vulnerable.

The Red Alliance calculated that it could effectively preempt Players B, D, and E by calculating the exchange ratios that were present both before and after the strike as favoring them. These calculations were based on the certain knowledge that the three targeted players

did not have defenses. With even limited defenses in place, these exchange ratios would clearly have been less favorable to the Red Alliance. In this regard, it is telling that Player G was not subject to the preemptive strike. The Red Alliance did not want to waste its shots by shooting into the teeth of Player G's even limited and imperfect defenses. It was not Player G's defenses that fed the miscalculation by the Red Alliance regarding exchange ratios; it was his policy of refusing to furnish his friends and allies with similar defenses. In fact, this sequence of decisions by the Red Alliance bolsters the argument in favor of defensive deterrence. While one could point to the death-throes shots taken by the players of the Red Alliance at the end of the game as being prompted by Player G's defenses, this would be a mistaken conclusion. The Cold War argument that defenses were destabilizing was based on calculations regarding tangible payoffs resulting from preemptive strikes, not follow-on death-throes shots from which there were no prospects of a payoff.

Underlying Cause #3: Players A, C, and F did not perceive the formation of two opposing blocs.

Prior to the launch of the preemptive strike by the Red Alliance, it was appropriate to see that the players were dividing into two blocs. As a result, it was not unreasonable to assume, prior to the strike, that this outcome would create a *de facto* two-player dynamic with the familiar Cold War calculations in favor of stability derived from offensive deterrence. It did not happen. While the two blocs did in fact emerge, the Red Alliance did not see the conflict as a two-party conflict until after its initial strike. Rather, it saw the conflict as a three-party conflict in which it was pitted against a coalition of Players B, D, and E, with Player G representing a third party who would stand aside. Its players calculated the exchange ratios prior to the initial strike on this basis. The behavior of the Red Alliance players pursuant to their assumption that Player G would stand aside revealed that his defenses had little impact on their calculation to strike Players B, D, and E.

Underlying Cause #4: The proliferated environment itself, not the presence of Player G's defenses, provided incentives to engage in "overkill."

This iteration of the game resulted in calculated engagements in overkill when the Red Alliance purposefully struck Players B, D, and E with more weapons than required to kill them and Players B, D, E, and (particularly) G did likewise in their retaliatory

strikes. Reducing the incentives for escalating the level of violence in this proliferated environment is difficult because the very concept of “reasonable sufficiency” becomes tenuous in a proliferated environment with new, small-scale nuclear powers included in the mix. The operational implication of this tenuousness is that meeting damage limitation goals against projected retaliatory strikes becomes a moving target. Players cannot know ahead of time, at least with reasonable certainty, the precise circumstances of any confrontation. Further, the survivability of any particular player’s retaliatory capacity will differ from the survivability of other players’ capacity. In an environment in which several of the players have small arsenals, the attacker’s assumption in favor of the survivability of the targeted player’s retaliatory forces, and its concomitant deterrent effect on the attacker, is at best questionable. The game, by design, limits the ability of the players to calculate precisely the damage expectations from retaliatory strikes by leaving the scope and effectiveness of such strikes to the discretion of the Game Manager. Thus, the logical default position of the player contemplating a first strike is to attack with everything he has in an attempt to convince the Game Manager to take away enough retaliatory shots by the targeted player to allow the attacker to survive.

This iteration of the game demonstrated that the calculated engagement in overkill had limited payoffs. For example, the Game Manager took away 15 of the 45 retaliatory shots fired by Players B, D, and E in Round 10. He did this in part because of the scope of the preemptive strikes by Players A, C, and F in Round 9. Likewise, the Game Manager took away 90 of the 175 retaliatory shots that Players A, C, and F attempted to take at Player G in Round 11. Again, this decision by the Game Manager was based in part on the overwhelming scope of the strikes on Players A, C, and F in Round 10. Absent the attacks by Player G in Round 10—which should be discounted in this context because no strikes were launched at him in Round 9 and because they were not part of the damage limitation expectations of Players A, C, and F—all three of these players would have survived. In the latter case, the decision by the Game Manager was a contributing factor in the ability of Player G to survive the attempted attacks on him. On the other hand, Player G’s survival also depended on the poor maintenance of Player F’s arsenal and the presence of his defenses. In short, the expectations of

all players regarding the effectiveness of overkill were not met. In the end, six of the seven players were killed and the seventh player was severely wounded. These unrealistic expectations, not the presence of Player G’s defenses, are the primary reasons the players in this iteration of the game moved quickly to escalate the level of violence.

Underlying Cause #5: The players demonstrated a propensity to focus on confronting their most immediate regional foe at the expense of broader considerations.

In this iteration of the game, Player C, for example, spent considerable effort pursuing his goal of isolating Player E while demonstrating a willingness to take enormous risks in the same pursuit. He successfully manipulated Players A and F into serving his purposes in creating the Red Alliance and getting them to share in the risks he was taking. He used diplomacy to raise questions in the minds of Player G’s allies, especially Player B, about Player G’s security commitments. All of this effort and risk came at the expense of destabilizing the overall situation. Given the complexity of the proliferated environment, this cause of instability and others like it are inherent in the situation. In this case in particular, it was not caused by the presence of Player G’s defensive arsenal.

Underlying Cause #6: There was a loss of confidence in Player G as a global power.

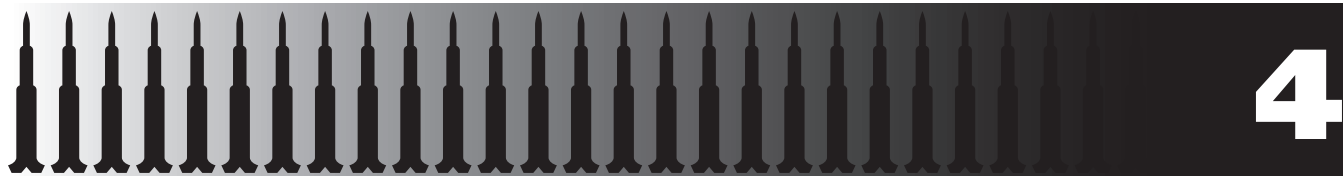
Maintaining deterrence and stability, as demonstrated during the Cold War, is largely a psychological exercise. It depends on the leader’s ability to convince both friends and adversaries not to engage in risky behavior based on their expectations of his future actions. Nowhere is the requirement for confidence greater than for the state that is a global superpower.

In all iterations of this game, Player G assumes the role of the superpower. In this iteration, however, Player G faced credibility problems at the hands of both friends and adversaries. As an ally, Player B openly questioned Player G’s commitment to their alliance in a private communication prior to Round 5. As an adversary, Player C questioned Player G’s ability to control his friends and allies in a private communication prior to Round 7. Players B and D ultimately entered into an alliance with Player E, even though it would provoke Player C, in order to bolster their positions in a future circumstance in which Player G proved unreliable. The Red Alliance took the extraordinary risk of

launching a preemptive strike in Round 9 on the basis of their belief that Player G would not honor his alliance commitments.

Despite all the questions by friends and foes alike regarding Player G's credibility, it is difficult to argue that Player G made egregious diplomatic mistakes in this context. While it is true that he denied defenses to his friends, which was a policy demanded by the testing of the hypothesis in this iteration, and while it could be argued that he was too accommodating regarding Player C's complaints and too willing to provide positive diplomatic incentives to Player A for his disarmament, he reassured his friends and allies at every step and never backed away from his commitments to them in both public and private messages to his adversaries. In the end, he undertook a large-scale retaliatory strike despite the near certainty that he would be wounded in return and the significant risk that he would be killed. Further, he did this at a time when his allies were already killed.

The history of this iteration of the game drives the observer to conclude that it is inherently more difficult for a superpower to maintain the necessary credibility to bolster both deterrence and stability in this proliferated environment. This speaks to the issue of the fragility of deterrence that was raised at the outset of these general observations. A superpower's allies, with their own nuclear arsenals, are more likely to look to their own resources to provide for their security. They are also more likely to look to other outlets—namely, alliances with nuclear powers other than the superpower—to meet their security requirements. Adversaries, in turn, are more likely to see opportunities to divide the superpower from his friends and allies and pursue these divisive policies aggressively. Unfortunately for Player G, his credibility problems may have come with the territory. His defenses did not cause them. In fact, they contributed to his survival.



Game Iteration #3: Theater-Only Defenses

THE third iteration of the game was played on January 11, 2005, at The Heritage Foundation. In this iteration, the Game Manager instructed Player G to adopt a policy of providing defenses to other players on a selective basis but not fielding a defense to protect his own territory. This policy choice is based on the belief that the best option for stability is for Player G to forgo defenses for himself while providing them to his friends and allies on the basis that fielding such defenses for himself would upset the strategic balance with Player F and jeopardize arms control initiatives between the two. The remainder of this chapter provides the history of what took place during this exercise, along with observations, analysis, and conclusions. (Appendix C provides a detailed history of what took place in this iteration of the game. The private communications and public announcements by the players documented in this appendix should provide the reader with a deeper insight into the thinking of the players at the time they made their moves.)

Round 1

FORCE POSTURES. In the course of Round 1, three of the seven players (Players A, E, and G) readied their offensive forces. At the same time, four players (Players A, D, E, and F) shrouded their offensive forces. Again, deception, rather than deterrence, was the preferred option. Only Player G opted for the traditional deterrence posture of openly readying his weapon. The posture of deception leads to the conclusion that, by Cold

War standards, there are considerable stability risks in this circumstance.

On the defensive side, Players B, E, and F requested defenses from Player G. Player B requested 10 defense interceptors. Players E and F requested the maximum of 40 interceptors each. Player G actually proffered 40 interceptors to Player B while not responding to the requests of Players E and F at this time. Both of his decisions (to provide defenses to Player B and withhold them from Players E and F) were consistent with his policy of offering defenses to those players who were committed to disarmament, which he announced at the outset. The former decision was also consistent with a private commitment to Player B. On the basis of the agreement between Player B and Player G in this round, Player B's 10 interceptors would become operational in Round 3.

DIPLOMATIC DEVELOPMENTS. Player B sent a positive diplomatic signal to Player A by upgrading his attitude toward Player A to neutral (previously unfriendly). This was intended to offer Player A the prospect of tangible diplomatic benefits if he acted positively in response to Player G's offer of defenses and a nuclear security guarantee in return for disarmament.

Players D and G entered into an alliance (previously friendly on both sides), bolstering the positions of both players against potential threats from Player A and Player C.

Player E, in an effort to break out of his diplomatic isolation, upgraded his attitude toward Player B to friendly (previously neutral).

Player F, consistent with a private communication prior to Round 1, proposed an alliance with Player D (previously neutral). Player D, consistent with his stated intentions in response, deferred the alliance offer and maintained his neutral attitude toward Player F. Player D saw greater opportunities for him in the alliance that he struck this round with Player G and perceived the offer from Player F as an attempt by Player F to use his strong offensive force to earn some quick money.

EXCHANGE RATIOS. Player A maintained a hostile attitude toward both Player B and Player G. Because both Player A and Player G had readied their weapons in Round 1, Player A faced an exchange ratio of 15–200 against him from the alliance of Players B and G. This ratio resulted from the fact that Player B had not yet obtained the 10 operational interceptors that were agreed to in Round 1 and the second fact that Player B opted to keep his weapon holstered. Further, Player A knew precisely the situation that he faced because neither Player B nor Player G shrouded his weapon. On the other hand, Players B and G were not aware of Player A's readiness, although they could assume the worst.

Further complicating the situation for Player A was Player D's hostile attitude toward him. Player D had entered into an alliance with Player G, but not with Player B. Since Player D continued to holster his weapon, Player A faced the same exchange ratio (15–200) against the alliance of Players D and G as he did against the alliance of Players B and G. However, Player A could not depend on this because Player D shrouded his weapon.

Regarding the mutually hostile relationship between Player C and Player E, Player E enjoyed a 15–0 advantage. This is because Player E chose to ready his weapon while Player C did not. Player E would have been free to shoot at Player C in the next round without fear of immediate retaliation by Player C because Player C's weapon was holstered. Further, Player E was aware of his advantage because Player C had not shrouded his forces. On the other hand, Player E possessed only the capacity to wound Player C, not the capacity to kill him. Therefore, Player C would have survived to later rounds in which he would possess the forces to kill Player E as long as Player E continued not to have access to defenses. By contrast, Player E would obtain the capacity to kill Player C only if he was able to coordinate such an attack with another power. Further, even

a coordinated attack on Player C might fail to kill him in the future if he was able to obtain defenses. In addition, Player E, as a non-aggressive, *status quo* power, would have been acting outside of his described position if he attacked Player C without severe provocation. However, Player C could only assume his disadvantage regarding Player E because Player E chose to employ his shroud.

Round 2

FORCE POSTURES. Player A, consistent with a conditional acceptance of Player G's offer of defenses and a nuclear security guarantee in exchange for disarmament, formally requested 40 interceptors from Player G.

Player C shrouded and readied his offensive weapon. Player C was uneasy because of the possibility that Player G's possible furnishing of defenses to other players in the region, particularly Player E, would leave him at a disadvantage.

Player D requested 40 defensive interceptors. This request signaled to Player G that Player D was willing to consider his offer of defenses in exchange for disarmament.

Player G did not offer any additional defensive interceptors to any other player at this time. This was consistent with his policy of demanding offensive disarmament in return.

DIPLOMATIC DEVELOPMENTS. Player B upgraded his attitude toward Player D to neutral (previously unfriendly). Player B was hoping to obtain Player D's support in his effort to induce Player A to disarm.

Player D upgraded his attitude toward Player F to friendly (previously neutral). This move served as a partial response to Player F's earlier alliance offer.

Player F upgraded his attitudes toward Players B, E, and G to friendly (previously neutral in all cases). This signaled that Player F was moving toward favoring Players B, D, E, and G in the effort to obtain the offensive disarmament of Player A.

Player G upgraded his attitude toward Player A to neutral (previously hostile). This move signaled Player A that there was the possibility of diplomatic advantages, as well as defensive interceptors, if he chose to dismantle his offensive capabilities.

EXCHANGE RATIOS. At this point in the game, Player A maintained hostile attitudes toward Players B and G. Player D maintained a hostile attitude toward Player A. The asymmetries in the relations between Player

A and Players B and G created considerable complexity for Player A in calculating the exchange ratios at this point. If Player A, as he looked ahead, believed that Player G would not come to the defense of Player B, he could have calculated an exchange ratio in his favor of 7–0 over Player B. This is because Player B's offensive weapon remained holstered, but his 10 defensive shots would become operational in Round 3. This meant that Player A would no longer have the capacity to kill Player B and that, because he had no defenses, Player B would retain the capacity to kill him in a retaliatory strike in the subsequent round.

If Player A calculated that Player G would come to the defense of his ally Player B, the exchange ratio was 7–200 to his disadvantage if he fired all of his shots at Player B and up to 15–200 to his disadvantage if he fired all of his shots at Player G. The 15–200 exchange ratio also pertained to a hypothetical one-on-one conflict between Player A and Player G. While Player A was in a weak position relative to both Player B and Player G at this point, it was not implausible for him to conclude that his greatest source of political leverage was to threaten Player G rather than Player B. This stemmed from Player G's lack of defenses.

Player D's hostility toward Player A did not have an impact on the exchange ratios because Player D's weapon was holstered at this time and he had no defenses. On the other hand, Player A did not know the readiness of Player D's weapon because it was shrouded.

Player C's decision to shroud and ready his weapon during this round evened the exchange ratio between the mutually hostile Player C and Player E to 15–15. While neither Player C nor Player E could be sure of the readiness of the other's offensive weapon because both were shrouded, each could assume that the other was ready to fire.

Round 3

FORCE POSTURES. Player B's 10 defensive shots became operational in this round. Further, Player B chose to take up the earlier offer by Player G for the remaining 30 interceptors that he also offered in Round 1. Thus, Player B would have the maximum 40 operational defensive interceptors in Round 5. This reflected Player B's understanding that defensive deterrence was the security tool of choice in the context of his commitment to Player G to abandon offensive capabilities.

Player D chose to ready his offensive weapon under cover of the shroud he constructed in Round 1. Player D was not receiving a positive reaction from Player G in response to his request for 40 defensive interceptors in Round 2. He understood that offensive capabilities would have to be his security tool of choice under these circumstances.

DIPLOMATIC DEVELOPMENTS. Player A upgraded his attitudes toward Players B and G to neutral (previously hostile in both cases). These moves sent a diplomatic signal to both Player B and Player G that he was encouraged by the proposal for Player B to abandon his offensive force.

Player B upgraded his attitude toward Player C to friendly (previously unfriendly) and his attitude toward Player D to friendly (previously neutral). These moves were designed to create a split between Player A and Player C and to win the support of Player D in Player B's confrontation with Player A.

EXCHANGE RATIOS. At this point in the game, the only hostile attitudes were Player D's toward Player A and the mutually hostile attitudes between Player C and Player E. In a one-on-one conflict between Player A and Player D, the exchange ratio was 15–15 because Player D had readied his offensive weapon and neither player possessed defenses. At this time, however, neither player could be certain of this ratio because both weapons were shrouded. In a conflict that pitted Player A against the alliance of Players D and G, however, the exchange ratio was 215–15 to the disadvantage of Player A.

The exchange ratio between Player C and Player E remained as it was in Round 2 (15–15) because there were no force posture or diplomatic changes in Round 3 that changed the ratio.

Round 4

FORCE POSTURES. No player changed his force posture in Round 4.

DIPLOMATIC DEVELOPMENTS. Player B offered alliances to Players D (previously friendly) and F (previously neutral). The former move represented another step by Player B in the direction of winning Player D's support in his confrontation with Player A. The latter move was consistent with an effort to divide Player F from Player A and possibly from Player C.

Player D upgraded his attitude toward Player B to friendly (previously neutral). This demonstrated that

Player B was making progress in his effort to win the support of Player D.

Player E upgraded his attitude toward Player A to neutral (previously unfriendly) and his attitude toward Player F to friendly (previously neutral). The first move was designed to encourage Player A to disarm. The second move was designed to drive a wedge between Player C and Player F.

Player G upgraded his attitude toward Player F to friendly (previously neutral). This signal was designed to encourage Player F to increase his level of support for Player G's general proposal to the other players to provide defenses in exchange for disarmament.

EXCHANGE RATIOS. There were no substantive changes in exchange ratio calculations as a result of the moves by the players in Round 4.

Round 5

FORCE POSTURES. The only change in force postures during Round 5 was that the additional 30 defensive shots Player B accepted in Round 3 became operational. At this point, Player B had the maximum number of operational defensive shots, which was 40.

DIPLOMATIC DEVELOPMENTS. Player A downgraded his attitudes toward Players B and G to hostile (previously neutral in both cases) and threatened both. These moves reflected his view that Players B and G were being duplicitous regarding their stated positions of exchanging defensive interceptors for disarmament as a result of Player B's retention of his offensive arms and the operational status of his 40 defensive shots, which he viewed as coming at his expense.

Players A and C entered into an alliance (previously friendly in both directions). This was consistent with Player C's stated intentions to both Players A and G prior to this round. He saw this move as restoring balance to the region, in light of Player B's possession of both offensive and defensive armaments.

EXCHANGE RATIOS. The most important impact of the change in diplomatic relations during Round 5 was the establishment of the alliance between Player A and Player C. While Player C did not follow his new ally's moves to downgrade relations with Players B and G and threaten them, it was appropriate at this point to view the exchange ratio as one between the alliance of Players A and C and the alliance of Players B and G.

The exchange ratio in this setting depended on how Players A and C, as the aggressive powers, would dis-

tribute their shots if they decided to attack. If they concentrated their shots on Player B, the exchange ratio, based on probability, would have been 6–200 against them. This is based on Player B's possession of 40 defensive interceptors and his decision to remain holstered. This would have resulted in Player B's being wounded and Player G's not being touched at all. At the other extreme, Players A and C could concentrate their shots on Player G. Since Player G did not possess defenses, the exchange ratio under this option would have jumped to 30–200. Under this circumstance, Player G would have been wounded and Player B not touched. A determination to distribute the shots evenly would have resulted in an exchange ratio of 18–200 and wounded both Player B and Player G. In all instances, Players B and G would have survived these hypothetical strikes and, between them, would likely have had sufficient retaliatory power to kill both Player A and Player C. While the Player A–Player C alliance was at a disadvantage no matter how it might distribute its shots, the exchange ratio suggested that the maximum political leverage for them stemmed from concentrating their threats on the undefended Player G.

However, the further complication for Player C, was his goal to suppress and ultimately conquer Player E. The exchange ratio in the Player C–Player E confrontation remained at 15–15 at this point in the game. If Player C wanted to continue to maintain the ability to wound Player E, he would have to withhold at least three of his shots in a conflict with Players B and G. If he wanted to maintain the ability to kill Player E, he would have to withhold at least 10 shots.

Round 6

FORCE POSTURES. Consistent with their public commitments prior to this round, Players C, E, and F lifted their shrouds. Players C and E revealed that their offensive arms were in a ready position. Player F revealed that his offensive weapon was holstered.

Player G acceded to Player D's request for 40 defensive interceptors. Player G's move appears to contradict his policy of not providing defenses to other players who had not committed to disarm because Player D had not yet made such a commitment. These defensive shots would become operational in Round 8.

DIPLOMATIC DEVELOPMENTS. Player G downgraded his attitude toward Player A to hostile (previously neutral) and his attitude toward Player C to hostile (previ-

ously unfriendly) and threatened both. These moves were designed to warn both Player A and Player C against attacking Player B if he disarmed and would provide breathing room to Player B that would allow him to disarm.

EXCHANGE RATIOS. While the lifting of the shrouds by Players C, E, and F allowed all players to become more aware of the specific threats they faced, there were no force posture or diplomatic changes in Round 6 that altered the exchange ratios from what they were in Round 5. On the other hand, Player G's move to downgrade his attitudes toward Players A and C and threaten them confirmed that the best way to view exchange ratios among Players A, B, C, and G at this time was as an alliance of Players A and C against an alliance of Players B and G.

Round 7

FORCE POSTURES. Pursuant to a public announcement prior to this round, Player B disarmed.

Player D lifted his shroud and holstered his weapon. This came in response to the recognition both that regional tensions were diminishing following Player B's disarmament announcement and that the 40 defensive interceptors he obtained in Round 6 were going to become operational in the next round. The latter circumstance made Player D less reliant on his offensive forces for his security.

Player F chose to shroud his forces, reversing his move to lift his shroud in Round 6. He had lifted his shroud earlier as a means of encouraging Player B's disarmament, and that motivation now ceased to pertain.

DIPLOMATIC DEVELOPMENTS. Player A upgraded his attitudes toward Players B and G to neutral (previously hostile) and lifted his threats against both. This came in response to Player B's disarmament announcement.

Player B, on the other hand, chose to downgrade his attitudes toward Players A and C to hostile (previously neutral in both cases). Player B saw this as necessary both in order to communicate what he saw as the continuing threats posed to him by Players A and C and to emphasize to Player G the necessity of deterring Players A and C from attacking him.

Player C offered an alliance to Player F (previously friendly). This offer was designed to give Player C access to offensive capabilities large enough to overwhelm the defenses that were now entering the region.

Player D entered into alliances with Players B and F (previously friendly in both cases), who had made their alliance offers to Player D in earlier rounds. The former move bolstered Player B's position following his disarmament. The latter move served to drive a wedge between Player C and Player F.

EXCHANGE RATIOS. With Player D's move to enter into an alliance with Player B, the earlier exchange ratio calculation based on an alliance of Players A and C against an alliance of Players B and G evolved into one of an alliance of Players A and C against an alliance of Players B, D, and G. While Player A's moves to lift his threats against Players B and G and upgrade his attitude toward both diminished the likelihood of such an exchange, Player B's and Player D's hostile attitudes toward Player A still made it a possibility. The exchange ratio still depended on how Players A and C might distribute their shots. Their most favorable alternative was to concentrate their attack on the defenseless Player G. Here the exchange ratio was 30–215 to the disadvantage of Players A and C. If Players A and C concentrated their attacks on the defended Players B and D, the exchange ratio would fall to 6–215 against them. This is based on Player B's already possessing 40 defensive shots and Player D's 40 defensive shots becoming operational in the next round.

The exchange ratio in the mutually hostile relationship between Player C and Player E remained at 15–15. However, Player C's decision to reserve shots with which to threaten Player E would further undermine the disadvantageous exchange ratio that the alliance of Players A and C faced regarding the alliance of Players B, D, and G.

Round 8

FORCE POSTURES. Player E disarmed pursuant to a public announcement. He saw his disarmament as a requirement for obtaining both the defensive shots that Player G's announced policy was offering him and the nuclear security guarantee. Clearly, he saw the defenses and the security guarantee as more important to him than his offensive shots.

Player D's 40 defensive shots became operational in this round.

Player F, pursuant to a public announcement, lifted his shroud and revealed that his weapon was holstered.

Player G, in accordance with a statement to Player E, provided 40 defensive interceptors to Player E. They would become operational in Round 10.

DIPLOMATIC DEVELOPMENTS. Player B upgraded his attitude toward Player C to friendly (previously hostile). Player B saw this both as a step in the process of de-escalating tensions following his disarmament and as a means to drive a wedge between Player C and Player F.

Player C, despite a rather chilly message to Player G prior to this round, chose to upgrade his attitude toward Player G to neutral (previously unfriendly). He also chose to upgrade his attitude toward Player B to friendly (previously unfriendly). Both moves were consistent with attempts to relieve tensions following Player B's and Player E's disarmament.

Player D upgraded his attitude toward Player A to neutral (previously hostile). This also was a move designed to ease tensions.

Player E opted to seek alliances with Players B, D, and G (previously friendly in all instances). Player E thought the time was ripe to make these alliance overtures because of his earlier decision to disarm. The moves were designed to break out of the diplomatic isolation imposed on Player E by Player C.

Player G upgraded his attitudes toward Players A and C to neutral (previously hostile in both instances) while lifting his threats against both. These moves were also consistent with the ongoing process of easing tensions following Player B's decision to disarm.

EXCHANGE RATIOS. Given the significant easing of tensions in Round 8 following Player B's decision to disarm, there were only two instances of hostile attitudes at this time. Only one of these two instances was significant. Player B continued to have a hostile attitude toward Player A but had disarmed by this time and had no capacity to strike Player A. Player A's attitude toward Player B was neutral at this time. In any event, based on probability, the exchange ratio was 3–0 in favor of Player A. The modest scope of this advantage to Player A resulted from the possession of defenses by Player B, which would allow Player A to wound Player B but not to kill him. Further, a calculated strike by Player A on Player B would depend on Player A concluding that Player G, despite his clear statement of intent, would not retaliate against Player A for such an attack.

The more relevant instance of hostility was the relationship between Player C and Player E. Player E dis-

armed in this round. Thus, the exchange ratio at this time was 15–0 in favor of Player C. Player C could have killed Player E at this time without fear of retaliation by Player E. However, such an attack would depend on Player C concluding that Player G would not retaliate despite his clear statement of intent. In the context of a *de facto* alliance between Player E and Player G, Player C would have to calculate an exchange ratio that is (from his perspective) 15–200 against him. Finally, Player C's window of opportunity would close in Round 10 because the defenses that Players E and G agreed to during this round would become operational. At that point, Player C would lose his capacity to kill Player E. The exchange ratio between Player C and Player E at that time, based on probability, would be 3–0 in favor of Player C.

The better political option for an aggressive Player C, following the deployment of defenses by Player E, would be to exploit Player G's lack of defenses by threatening to wound him if he did not abandon his commitment to Player E's security. Even here, however, Player C would face an exchange ratio with Player G that would be 15–200 to his disadvantage. An actual strike on Player G would be tantamount to suicide because Player G would retain the capacity to kill Player C in retaliation despite his lack of defenses.

The Game Manager, seeing the situation evolving toward stability, chose to terminate the game in this round.

General Observations

The third iteration of the game revealed that in this proliferated setting, with defenses available to select players other than Player G, the potential for instability was significant. However, the results suggest that it was possible for the players to overcome this potential for instability. The potential for instability, as with the earlier iterations of the game, resulted both from the coalition dynamic's complexity and from its dramatic impact on the behavior of the players. The differing outcomes of the coalition dynamic were unpredictable and carried extremely high stakes for the players. This combination of low predictability and high stakes increased the risk that players would miscalculate. What was necessary to overcome these sources of instability was for the players to find buffers that increased the predictability of their behavior and lessened the stakes resulting from swings in coalitions.

The question regarding the hypothesis was whether the presence of defenses in the hands of select players other than Player G contributed to a circumstance in which a conflict became imminent by Round 6 and made it more difficult to achieve the stable outcome that resulted by the time the Game Manager terminated the game prior to Round 9. The answer is no. In fact, the evidence suggests that the defenses served as a source of the buffers needed to avoid an exchange of shots.

At the surface level, the evidence indicates that, in this iteration of the game (unlike the first two iterations), no shots were fired and no players were wounded or killed. While it would be wrong to suggest that the presence of defenses in the hands of select lesser powers was the only factor in generating this outcome, specific observations suggest that the defenses made a significant contribution.

Observation #1: The ability of Player G to offer defenses to his friends and allies provided another means to bolster their confidence in him and limit opportunities by the aggressive powers to split Player G from his friends and allies.

A loss of confidence in Player G's security commitments could generate risky steps by his friends and allies, particularly Players B and D, as they look to alternative means of security. Chief among these alternatives was to form an alliance with Player E, despite the fact that it would provoke Player C. In this iteration of the game, neither Player B nor Player D felt the need to enter into such an alliance.

On the other hand, Player B's apparent reluctance to disarm in accordance with his agreement to do so in exchange for defenses allowed Players A and C to raise tensions by questioning Player G's credibility and, ultimately, led Player A to threaten Players B and G in Round 5. While it was clear that Player A was using the complaint to increase his political leverage because Player B's weapon remained openly holstered throughout the game, Player B came to recognize that maintaining Player G's credibility was more important to his security than retaining offensive shots. He disarmed, which led to an easing of tensions. His possession of defenses made it easier for him to disarm, in part because the defenses were tangible evidence of Player G's security commitments to him.

The relatively high level of confidence in Player G's security commitments to his friends and allies

also limited the options for Players A and C to drive wedges between Player G and his partners. This did not mean that they did not try. This attempt was particularly clear in their response to Player B's perceived duplicity in not disarming immediately after receiving defenses. However, the attempts ultimately fell short. In this case, Player B's confidence in Player G did not slip. The defenses seemed to have contributed to this continued confidence.

Observation #2: The presence of defenses in the hands of the non-aggressive powers lessened their reliance on offensive threats to pursue their security interests.

With defenses in hand, Players B, D, and E were clearly less reliant on their offensive arsenals for their security. In the end, Players B and E disarmed. Player D holstered his weapon and issued a statement of intent at the end of the game revealing that he was considering disarming. These decisions served to ease tensions and to reduce the likelihood of conflict.

In this context, however, it is necessary to understand that Player G's nuclear deterrent was still critical to the overall maintenance of deterrence, peace, and stability. Throughout the game, Player G maintained a readied offensive weapon. On a number of occasions, he issued explicit warnings regarding the possibility of his firing shots. He also used the offer of the protection derived from his offensive umbrella to support the transfer of defenses and induce disarmament. A decision to either holster or disarm by Player G would likely have led to more aggressive behavior by Players A and C and risky actions by Players B, D, and E. Therefore, the defensive option may have served to augment offensive deterrence and make the overall concept of deterrence more flexible in this proliferated setting. On the other hand, it could not replace offensive deterrence.

However, a limitation of the game is that the effectiveness of the offensive deterrent represented by Player G's drawn weapon is not specifically defined outside the basic abilities to wound or kill another player. Rather, Player G was left to define for himself what enemy capabilities he attempted to hold at risk in terms of either implied or formal threats to fire. What was required for offensive deterrence in this proliferated setting may not be served by the offensive capabilities actually in the hands of Player G. For example, Player G made a public announcement that an attack

on his ally Player B, following Player B's disarmament decision, would cause him to respond "with the gravest of consequences" for the attacking player. Clearly, Player G in this instance was resorting to the tool of constructive ambiguity in his attempt to deter aggression. What is not clear is whether a more specific threat than "grave consequences" would be supported by his offensive capability.

In the real world, this means that the nuclear arsenal in the hands of the U.S. today, which is of Cold War vintage, may not meet the requirements for offensive deterrence in a proliferated environment. This is an issue identified in the 2002 Nuclear Posture Review.¹ It is critical to recognize that in a proliferated environment, the U.S. may need new types of nuclear weapons to meet new requirements for deterrence and that the U.S. needs the unfettered ability to develop, test, and deploy such weapons.

Observation #3: The presence of the defenses bolstered the deterrence capabilities of the non-aggressive powers by raising questions in the minds of the aggressive powers about the potential ineffectiveness of preemptive strikes.

The presence of defenses raised two doubts about the effectiveness of potential preemptive strikes in the minds of the aggressive powers Players A and C. First, they lost the ability to kill even lesser powers that possessed defenses under the terms of the game. For example, when Player B's initial 10-shot defense became operational in Round 3, Player A ceased to maintain the ability to kill Player B. This was the case despite the fact that Player B's defensive capabilities were both limited and imperfect. Second, the presence of the defenses complicated the dilemma facing the aggressive powers in determining how to distribute shots in a potential preemptive strike. (The dilemma for Players A and C in this context is described in the analysis on exchange ratios following Round 5.) Raising such doubts is the essence of defensive deterrence—a concept eschewed during the Cold War.

On the other hand, Player G's vulnerability encouraged threats by the aggressive powers. It was not a coincidence that Player A chose in Round 6 to lodge a formal threat against the defenseless Player

G, as well as the defended Player B, in this iteration of the game.

Observation #4: The presence of the defenses served to create a barrier against an aggressive nuclear alliance that included Player F.

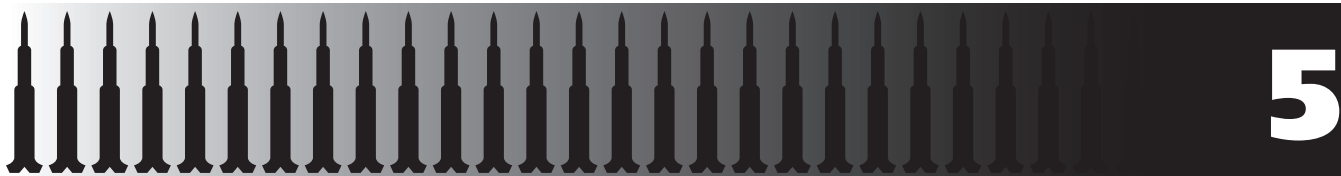
Player F, in this iteration of the game, chose not to enter into an alliance with the aggressive powers Players A and C. A contributing factor in this decision was the fact that the presence of defenses diminished the expectations of a high payoff resulting from a preemptive strike. This was particularly the case for Player F because he wanted to avoid situations that would bring him into direct conflict with Players C or G unless such a reward was in the offing. Only the prospect of a high payoff would encourage him to join Players A and C in their aggressive policies. Without Player F's backing, the preemptive options for Players A and C were severely constrained. Thus, the diminished expectations for a high payoff by Player F became a major factor in constraining Players A and C in terms of launching preemptive strikes, for example, against Players B and E.

Observation #5: Player G's ability to confer defenses gave him an additional tool for inducing disarmament by other players.

In a situation in which it was reasonable to assume that proliferation had weakened stability because of the complexity brought about by many players having destructive weapons, selective and careful disarmament can reduce the complexity and bolster stability. In this iteration of the game, Players B and E chose to disarm, and Player D was seriously contemplating taking this step as the game ended. Player B's disarmament decision in particular demonstrated that under the right circumstances, a non-aggressive power could disarm and not invite attack.

A part of these circumstances was Player B's possession of even limited and imperfect defenses. It is unlikely that Player B would have had the confidence to disarm without the defenses, and for good reason. If Player B had disarmed without possessing defenses, Player A in particular would have perceived an opportunity to attack and kill Player B while reserving five shots, which he could use to deter a retaliatory strike by Player G. This was a legitimate deterrent threat because Player G was defenseless as a result of his stated policy. While such a view by Player A might have reflected a misunderstanding of Player G's intention, it would still invite instability and increase the likelihood of conflict.

¹ U.S. Department of Defense, "Special Briefing on the Nuclear Posture Review," January 9, 2002, at www.defenselink.mil/transcripts/2002/t01092002_t0109npr.html (March 31, 2005).



Game Iteration #4: Global Offense–Defense Mix

THE fourth and final iteration of the game was played on January 25, 2005, at The Heritage Foundation. In this iteration, the Game Manager instructed Player G to adopt a policy of fielding defenses to protect himself and providing defenses to other players on a selective basis. This policy choice was based on the belief that the best option for stability is for Player G to see the proliferation threat as a global problem that requires a concerted defensive effort that serves to protect Player G and others on equivalent terms. The remainder of this chapter provides the history of what took place during this exercise, along with observations that provide analysis and draw conclusions. (Appendix D provides a detailed history of what took place in this iteration of the game. The private communications and public announcements by the players documented in this appendix should provide the reader with a deeper insight into the thinking of the players at the time they made their moves.)

Round 1

FORCE POSTURES. In the course of Round 1, three of the seven players (Players A, C, and E) readied their offensive forces. At the same time, four players (Players A, C, D, and E) shrouded their offensive forces. Again, deception was preferred over deterrence as an option. No player opted for the traditional deterrence posture of openly readying his weapon.

Player G, pursuant to his announced policy, donned the vest (deployed defenses) for his own protection.

These defenses would become operational in Round 3.

Players D and F requested defenses, but Player G deferred these requests in Round 1. These moves also represented an additional step away from the traditional deterrence posture of relying on second-strike capabilities. The adoption of these postures led to the conclusion that by Cold War standards, there were considerable stability risks in this circumstance.

DIPLOMATIC DEVELOPMENTS. Player E, in an attempt to start breaking out from the diplomatic isolation imposed on him by Player C, upgraded his attitude toward Player B to friendly (previously neutral).

Player F upgraded his attitudes toward Players B, D, and G to friendly in all instances (previously neutral in all instances). These moves signaled Player F's general sympathy with the *status quo* powers over the aggressive powers (Players A and C) at the outset of this iteration of the game.

Player G upgraded his attitude toward Player A to unfriendly (previously hostile) and upgraded his attitude toward Player C to neutral (previously unfriendly). These moves signaled to Players A and C that there would be diplomatic benefits for them if they cooperated with Player G in a stated policy of offering defenses and nuclear security guarantees in exchange for disarmament.

EXCHANGE RATIOS. Player A maintained a hostile attitude toward both Player B and Player G. In a situation in which neither Player B nor Player G had moved in Round 1 to ready his weapon, Player A enjoyed an

exchange ratio of 15–0 in his favor over the alliance of Players B and G. This ratio resulted from the fact that Player G's 40 defensive shots were not yet operational. At this point, Player A could have killed Player B without fear of retaliation. Alternatively, he could have wounded both Player B and Player G. He did not have the capacity to kill Player G. Thus, an attack at this point carried the near certainty that Player G, along with Player B in some circumstances, would respond in future rounds by striking and killing Player A.

Regarding the mutually hostile relationship between Player C and Player E, the exchange ratio was 15–15 because both Player C and Player E readied their weapons and neither possessed defenses. However, neither side was certain of the present circumstance because both had shrouded their weapons. Assuming the worst, Player C, as the aggressive power, could have moved to strike and kill Player E but would have had to expect that Player E had some capacity to retaliate. On the other hand, Player C knew that Player E did not have the capacity to kill him.

Round 2

FORCE POSTURES. Player A, consistent with his stated intentions prior to this round, lifted his shroud, holstered his weapon, and formally requested five defensive interceptors from Player G.

Player B requested 40 defensive interceptors from Player G. This move was an essential part of Player B's plan to bolster his position prior to any action to disarm.

Player G openly readied his weapon and offered five defensive interceptors to Player B. The reason that Player G readied his weapon, as was made clear by a statement he made prior to the next round, was to support his policy of extending a nuclear guarantee to other players who disarmed. His move to offer five defensive interceptors to Player B fulfilled an informal agreement with Player B. As a result, these five interceptors would become operational in Round 4.

DIPLOMATIC DEVELOPMENTS. Player A upgraded his attitude toward Player B to friendly (previously hostile) and upgraded his attitude toward Player G to neutral (previously hostile). These moves reflected Player A's perception that tensions were easing in the region, although it also served as a subtle attempt to drive a wedge between Player B and Player G.

Player B upgraded his attitude toward Player D to neutral (previously unfriendly). This served as a step toward fulfilling a stated goal of entering into an alliance with Player D.

Player C upgraded his attitude toward Player G to neutral (previously unfriendly). This positive overture, in addition to recognizing the easing of tensions, was designed to drive a wedge between Player E and Player G.

Player D upgraded his attitude toward Player A to neutral (previously hostile) and upgraded his attitude toward Player B to friendly (previously neutral). The former step was designed to signal that there were positive diplomatic payoffs for Player A if he continued toward disarmament. The latter move was a partial response to Player B's offer prior to this round for an alliance and served to bolster Player B's position and encourage him toward disarmament.

Player E upgraded his attitude toward Player F to friendly (previously neutral). This move was designed as an attempt to start breaking out of the diplomatic isolation imposed on Player E by Player C. It was also designed to drive a wedge between Player C and Player F.

EXCHANGE RATIOS. At this point in the game, the only hostile attitudes were between Player C and Player E. Since both players maintained their positions of shrouding and readying their weapons, which carried over from Round 1, the analysis of the exchange ratios between these two players provided following Round 1 remained relevant.

Round 3

FORCE POSTURES. Player A increased his request for five defensive interceptors, which carried over from Round 2, to the full 40. This signaled his intention to obtain the full 40 interceptors following a future move by him to disarm.

Player G, pursuant to an agreement with Player A, provided Player A with five defensive interceptors. These interceptors would become operational in Round 5.

Player G's 40 defensive shots became operational in this round.

DIPLOMATIC DEVELOPMENTS. Player B upgraded his attitude toward Player A to friendly (previously unfriendly). This move was consistent with the easing of tensions between the two as they moved toward disarmament. He also upgraded his attitude toward Player

C to neutral (previously unfriendly). This friendly overture was designed to drive a wedge between Player C and Player F, recognizing that, even with defenses in place, Player B would remain vulnerable to an alliance of Players C and F. Finally, Player B, consistent with his private communications with Player D, offered an alliance to Player D (previously neutral). This also strengthened Player B's position in the event of a combined threat from Players C and F in the future.

Player C upgraded his attitudes toward Players B and D to neutral (previously unfriendly in both instances). This move signaled that Player C was not going to stand in the way of steps by Players A and B to disarm and that, contrary to his statement of support for an initiative by Player F to create a great-power condominium of Players C, F, and G, he was not inclined to go along with it. Player F's proposal was for a cooperative relationship of Players C, F, and G to force the disarmament of the remaining lesser powers and control their actions.

Player D accepted Player B's alliance offer (previously friendly) and offered an alliance to Player G. Player D saw both of these alliances as bolstering his position in the context of the now-expected disarmament of Players A and B. Regarding the alliance with Player G, he also saw it as improving his chances to obtain defensive interceptors. His request for 40 interceptors was still outstanding.

Player E upgraded his attitude toward Player A to neutral (previously unfriendly). This was designed to encourage Player A's moves toward disarmament and to drive a wedge between Player A and Player C.

EXCHANGE RATIOS. Again, the only hostile attitudes at this time were between Player C and Player E. There were no changes in force postures or diplomatic relations involving these two players in Round 3 that altered the exchange ratios.

Round 4

FORCE POSTURES. Players A and B, pursuant to a private oral agreement, simultaneously disarmed in this round.

Player B's five defensive interceptors, obtained in Round 2, became operational in this round.

Player D, under the cover of his shroud, chose to ready his weapon in reaction to Player F's great-power condominium proposal. He was afraid that this proposal could result in a threatening alliance between

Players C and F and undermine his security relationship with Player G.

Player E chose to lift his shroud and holster his offensive weapon. He also requested 40 defensive interceptors from Player G. These steps signaled that Player E was seriously considering Player G's offer of defenses and a nuclear guarantee in exchange for disarmament.

DIPLOMATIC DEVELOPMENTS. Player D upgraded his attitude toward Player C to neutral (previously unfriendly). This move was designed to drive a wedge between Player C and Player F and to slow progress toward an alliance between Player C and Player F under Player F's great-power condominium proposal, which Player D viewed as inherently threatening. In this context, he already had a pending alliance offer to Player G.

Player G, in a move consistent with a rejection of Player F's great-power condominium proposal, accepted Player D's alliance offer from Round 3 (previously friendly). This move by Player G contributed to the death of Player F's proposal.

EXCHANGE RATIOS. Player E's move to holster his weapon changed the exchange ratio in the mutually hostile relationship between Player C and Player E from 15–15 to 15–0 in favor of Player C. Player C, at this point, could have killed Player E without fear of direct retaliation. However, Player C would have to consider Player G's probable reaction to such an attack.

With Player G's involvement, Player C faced an exchange ratio of 11–200 against him. This is based on Player C distributing his shots by allocating 10 to kill the defenseless Player E and five to damage the defended Player G. Under this distribution, based on probability, Player C could expect only a single shot to penetrate Player G's defenses. Player G would clearly retain the capacity to kill Player C in retaliation.

Round 5

FORCE POSTURES. The five defensive interceptors that Player G agreed to provide to Player A in Round 3 became operational in this round.

Player C lifted his shroud and holstered his weapon. This decision came in the wake of Player E's announcement prior to this round of his intention to disarm.

Pursuant to his announcement prior to this round, Player E disarmed.

Pursuant to his announced policy of providing nuclear guarantees and defensive interceptors in

exchange for disarmament, and in accordance with his public announcement in response to Player E's offer to disarm, Player G offered 35 defensive interceptors to both Player A and Player B and 40 defensive interceptors to Player E.

DIPLOMATIC DEVELOPMENTS. Player G upgraded his attitude toward Player A to neutral (previously unfriendly). This move represented a diplomatic reward for Player A's decision in Round 4 to disarm.

EXCHANGE RATIOS. The mutually hostile relationship between Player C and Player E remained the most relevant one for the purpose of calculating exchange ratios. With Player C's move to holster his weapon without the shroud and Player E's move to disarm, the exchange ratio between the two became 0–0.

Player C also had to recognize at this point that even if he readied his offensive weapon again, he would lose his ability to kill Player E when the 40 defensive interceptors from Player G became operational in Round 7. Under that circumstance, Player C could at best hope to wound Player E. Even wounding Player E would require Player C to expend virtually all of his shots. When Player G's nuclear guarantee is considered, Player C faced an exchange ratio of 4–200 against him following Round 7. In the interim, however, he could at best achieve an exchange ratio of 15–200 against him in the face of an expected retaliation by Player G if he readied his weapon and fired all of his shots at the still-defenseless Player E.

Round 6

FORCE POSTURES. Player D chose to lift his shroud and reveal that his weapon was readied. Player D remained uncertain regarding the possible formation of an alliance between Players C and F, which he viewed as inherently threatening. Player D saw the traditional deterrence posture of openly readying his weapon as the best means to address this uncertainty.

Player F chose to ready his weapon and shroud it. He saw these moves as his best alternatives now that it was becoming apparent that other players were rebuffing his great-power condominium proposal.

Player G chose to offer five defensive interceptors to Player D. While this move was inconsistent with Player G's policy of offering defenses only in exchange for disarmament, Player G shared Player D's concern about the possibility of an alliance forming between Players C and F. He wanted to provide Player D, as his ally,

reassurance in the face of a combined threat from Players C and F. This move could have undermined Player G's credibility with Players A, B, and E. However, at this point, these players had disarmed. There was little they could do following this decision by Player G. The greater danger was that it could undermine his credibility with Players C and F.

DIPLOMATIC DEVELOPMENTS. Player C upgraded his attitude toward Player B to friendly (previously neutral). This move provided Player B with a diplomatic reward for disarming.

EXCHANGE RATIOS. The exchange ratio between the mutually hostile Players C and E remained 0–0. After accounting for Player G's nuclear guarantee to Player E, the exchange ratio was 0–200 to the disadvantage of Player C.

Round 7

FORCE POSTURES. Players A, B, and E's full complements of defensive interceptors (40 each), which they obtained in Round 5, became operational this round.

Player D chose to holster his weapon. He took this step following the decision by Player G to provide him with five defensive interceptors in Round 6. Player D wanted to use this move to encourage Player G to provide him with more defensive interceptors without disarming.

DIPLOMATIC DEVELOPMENTS. Player F offered an alliance relationship to Player C (previously friendly). Player F remained convinced that his best diplomatic option was to form a great-power condominium to control the lesser powers. The alliance offer to Player C, recognizing that Player G was not going to support this effort at this time, represented a building-block approach to achieving this goal.

EXCHANGE RATIOS. The bilateral exchange ratio between Player C and Player E remained at 0–0. Given the alliance offer by Player F to Player C, it became appropriate to consider the exchange ratio of a hypothetical alliance of Players C and F against Player E. This is because there was a high likelihood that Player C would ask Player F to downgrade his attitude toward Player E (neutral at that time) in exchange for the alliance Player F was seeking. If Player C readied his offensive weapon, along with Player F's currently readied weapon, the exchange ratio would have been 183–0 in a favor of the alliance of Players C and F over Player E. This is based on the fact that Player E's 40 defensive

interceptors were operational at this time. Clearly, the prospective alliance retained the power to kill Player E despite his defenses.

However, if Player G's nuclear guarantee to Player E were brought into the equation, the ratios would change dramatically. The alliance of Players C and F would face an exchange ratio with a *de facto* alliance of Players E and G of 151–200 in favor of Players E and G. This is based on the fact that Players E and G each retained 40 operational defensive interceptors at this point in the game. Player G would clearly retain the retaliatory capacity to kill both Player C and Player F if they chose to preempt. A decision by an alliance of Players C and F to attack Player E would depend on the alliance's view of the credibility of Player G's nuclear guarantee to Player E.

Round 8

FORCE POSTURES. The five defensive shots Player D received in Round 6 became operational in this round.

Player G, despite his policy of withholding defenses from those players who were not committed to disarmament, offered five defensive interceptors each to Players C and F. Player F already had a pending request for 40 defensive interceptors. Thus, his five would become operational in Round 10.¹ Player C did not have a pending request and would have to accept the interceptors to consummate a deal with Player G. Player G, not being privy to the private message prior to this round by Player C rebuffing Player F's offer for an alliance, saw this move as a means to discourage such an alliance from forming.

DIPLOMATIC DEVELOPMENTS. Player F, having been rebuffed by Player C regarding an alliance, turned around and offered an alliance to Player D (previously friendly). Clearly, Player F was now searching for any alliance that he perceived as bolstering his strength in the region. It was a natural response to the failure of both his great-power condominium proposal and his alliance offer to Player C.

EXCHANGE RATIOS. The prospects for an alliance between Players C and F having collapsed, the exchange ratio calculations relevant to the confrontation between Player C and Player E reverted to

what they were prior to Round 7. Given that Player C was openly holstered and Player E was disarmed, the exchange ratio was 0–0. Looking ahead, the bilateral exchange ratio would favor Player C by 4–0 if he decided to ready his weapon. On the other hand, the exchange ratio would swing to 4–200 against Player C if he believed that Player G would honor his nuclear security guarantee to Player E.

Round 9

FORCE POSTURES. Responding to Player G's offer of five defensive interceptors in Round 8, Player C accepted the offer. The interceptors would become operational in Round 11.²

Player F, despite his public announcement prior to this round that he intended to lift his shroud and holster his weapon (see Appendix D), did not do so at this time. His announcement turned out to be a ploy to get Player G to furnish him with additional defensive interceptors.

DIPLOMATIC DEVELOPMENTS. Player F withdrew his alliance offers to Players C and D and adopted a friendly attitude toward both. He recognized that his alliance offers would not be accepted in either case. He also offered an alliance to Player G (previously friendly) with the hope of obtaining additional defensive interceptors.

EXCHANGE RATIOS. Once again, the only remaining hostile attitudes at this point were between Player C and Player E. Given that Player C was openly holstered and Player E was disarmed, the exchange ratio was 0–0. Looking ahead, the bilateral exchange ratio would favor Player C by 4–0 if he decided to ready his weapon. On the other hand, the exchange ratio would swing to 4–200 against Player C if he believed that Player G would honor his security guarantee to Player E. When his five defensive interceptors became operational in Round 11,³ however, the exchange ratio relative to Players E and G would be 4–196 to Player C's disadvantage.

Given his view that there was a relatively stable outcome in this iteration, the Game Manager terminated the game at this point.

General Observations

The fourth iteration of the game revealed that in this proliferated setting, with defenses available to Player G and a select group of additional players, the poten-

¹ The Game Manager, using his discretionary authority, chose to terminate this iteration of the game before these defenses became operational.

² See note 1.

³ See note 1.

tial for instability remained significant. However, the results suggested that the players could overcome this potential for instability. What remained was both the complexity of the coalition dynamic and the dramatic impact of this dynamic on the behavior of the players. The coalition dynamic remained unpredictable and carried extremely high stakes for the players. This combination of low predictability and high stakes carried the risk that the players would miscalculate.

The question regarding the hypothesis was whether the presence of defenses in the hands of Player G and select other players hindered attempts to moderate tensions and undermined the steady progress made throughout the game toward select disarmament and a stable outcome. The answer was no. In fact, the evidence suggests that the opposite was true. Defenses served as a source of buffers, which were necessary to avoid either preemptive attacks or uncontrolled escalation.

At the surface level, the evidence suggested that, in this iteration of the game (as with the third iteration), this was the case because no shots were fired and no players were wounded or killed. Additional evidence to bolster this view resulted from the fact that at no point in this game did a player lodge a direct threat against another player and an exchange of shots was never more than unlikely. Several observations indicate why the presence of defenses certainly did not undermine, and may have contributed to, this positive outcome.

Observation #1: As with the third iteration of the game, Player G's ability to offer defenses to his friends and allies served to bolster their confidence in him and to reduce the likelihood that they would act rashly.

At no point in this iteration of the game did the natural friends of Player G (Players B, D, and E) seriously question his commitment to their security. In fact, Players B and E moved relatively quickly to disarm and thereby base their security on Player G's commitment to provide them with defenses and a nuclear guarantee. Player D, while he did not disarm, was certain enough of Player G's intentions that he resisted an overture from Player F for an alliance prior to Round 9 that was accompanied by rhetoric designed to undermine Player D's faith in Player G.

The relatively high level of confidence in Player G's security commitments to his friends and allies also limited Player F's options for driving a wedge between Player G and his partners. Player F tried to do this as

an independent great power by offering a great-power condominium to both Player C and Player G prior to Round 4. While this proposal foundered for a complex set of reasons, one reason was that Player G was sufficiently confident that his friends and allies in the region would not act rashly or in ways that would ultimately put him at greater risk. Therefore, he did not need to resort to a controlling mechanism like a great-power condominium. His ability to furnish defenses to his friends and allies reduced the likelihood that they would take rash actions.

Observation #2: Player G was able to use the offer of defenses to temper the aggressive tendencies of players hostile to him.

Player G resorted to this option most effectively with Player A. He offered defenses and a nuclear guarantee in exchange for disarmament on a non-discriminatory basis at the outset of the game. Player A took him up on this offer and disarmed in Round 4.

Player G used the same approach to lesser effect by offering five defensive interceptors each to Players C and F in Round 8. In this case, he did not require a commitment from either player to disarm in advance. This action helped to ensure the demise of Player F's budding alliance offer to Player C. Player G's timing here, however, was critical. The inconsistency of his policy of requiring disarmament for defenses that was brought about by this action, along with an offer of five defensive interceptors to Player D in Round 6, would likely have induced Players A, B, and E to abandon their commitments to disarm if these three transfers had occurred earlier in the game.

Observation #3: The presence of defenses in the hands of both aggressive and non-aggressive powers lessened their reliance on offensive threats to pursue their security interests.

This tendency was apparent with the non-aggressive powers in the third iteration of the game. In this iteration, the same tendency was observed in at least one aggressive power (Player A). With defenses in hand, Players A, B, and E were clearly less reliant on their offensive arsenals for their security. By the end of Round 5, all three had disarmed. These decisions served to ease tensions and to reduce the likelihood of conflict.

Once again, however, it is necessary to understand that Player G's nuclear guarantee was crucial to the overall maintenance of deterrence, peace, and stability. In the case of Player A in this iteration, the purpose of

the nuclear guarantee was different from the purpose of the guarantee extended by Player G to his friends and allies in both the previous iteration and this iteration. In the case of Player A, Player G's nuclear guarantee also implied that *he* would not attack Player A with nuclear weapons.

The different purpose of Player G's nuclear guarantee to Player A, therefore, reveals the complex relationship between Player G's offer and the concept of regime change. First, Player G's inherent capability to remove Player A's regime by force of nuclear arms played a major role in pushing Player A toward disarmament. After all, regime survival was Player A's most immediate security goal. On the other hand, Player G was careful not to take other approaches to regime change regarding Player A off the table. This had the effect of keeping Player A honest in the course of disarmament and in a relatively passive diplomatic position for the remainder of the game.

Observation #4: Player G's policy of providing defenses to himself as well as to others lessened the incentive for aggressive powers to threaten him as a source of political leverage.

Player G's policy in this iteration of the game was to provide for his defense, as well as to provide defenses to other players on a selective basis. The decision to provide for his own defense reduced the incentive for aggressive powers to threaten Player G with attack. This was because, contrary to the circumstance present in the third iteration of the game, the aggressive powers did not have an option of exploiting Player G's vulnerability for the purpose of obtaining diplomatic or political leverage. It was no coincidence that Player G was not threatened at any time in this iteration of the game.

Observation #5: The presence of the defenses undermined Player F's effort to form an alliance with Player C.

In this iteration of the game, Player F proposed an alliance with Player C in Round 7. This offer came after the collapse of Player F's attempt to create a great-power condominium with Players C and G. Player C was quick to rebuff Player F's offer. He did so in a private communication prior to the next round. Player C explicitly endorsed preserving the *status quo* at this point in the game. While Player C could have benefited from Player F's support in overcoming Player E's defenses in order to threaten to kill Player E, the cur-

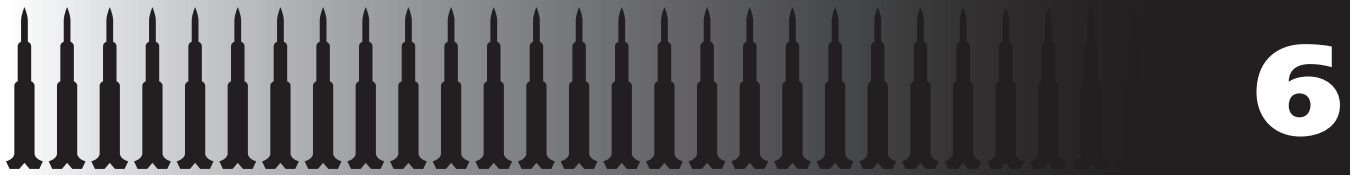
rent situation had Player E disarmed and in a relatively isolated diplomatic position. With Player G defended, Player C saw little benefit and significant risk in threatening Player G. In the end, he decided to play it safe. The presence of defenses brought about a circumstance in which Player C was relatively satisfied with the *status quo*, despite his natural desire to challenge the *status quo*.

Observation #6: Player G's ability to confer defenses induced disarmament in a way that allowed a brief examination of the dynamic present in a circumstance of selective proliferation.

As described in the analysis following the third iteration of the game, it is reasonable to assume not only that proliferation had weakened stability because of the complexity created by many players having destructive weapons, but also that selective and careful disarmament could reduce the complexity and bolster stability. In this iteration of the game, Players A, B, and E chose to disarm. Player A's disarmament demonstrated that aggressive powers can be brought into the disarmament process if the right combination of negative and positive incentives is provided.

The disarmament of Players A, B, and E in this iteration of the game, but not the disarmament of Players C, D, F, and G, served to allow a glimpse of how the players would behave in a circumstance of selective proliferation. The tendency is for the disarmed players to retreat to the sidelines, even in diplomatic undertakings, and allow the remaining armed players to engage in a more forceful give and take. This is because each of the disarmed players had found a security niche within which he was generally comfortable and found little incentive to take steps that might have jeopardized his place in that niche.

On the other hand, the players who remained armed (particularly Players C, F, and G in this case) continued to engage in robust diplomacy and strategic maneuvering. In ways that extended to diplomacy, as well as matters concerning the use of force, the game was effectively reduced to a three-player or four-player dynamic as opposed to a seven-player dynamic. Though insufficient to draw clear conclusions, the reduction in the number of armed players and the concomitant reduction in complexity appear to reduce the level of inherent instability on an incremental basis. Therefore, the presence of defenses appeared to facilitate this reduction in complexity and the potential for instability.



Assessing the Outcome of the Game Regarding Defenses and Stability: Comparing the Four Iterations

EACH of the four iterations of the game provided insights into how the presence or absence of defense affects stability in a proliferated environment. In Chapters 2–5, these insights were described from a perspective that treated each iteration in isolation from the other three. Comprehensive analysis requires comparing the outcome of each iteration with the outcomes of the other three. This chapter provides that analysis. It is organized into the same sections as used in the earlier chapters. The first section addresses force posture outcomes. The second addresses player relations. The third addresses exchange ratio outcomes.

The analysis uses a number of criteria to examine the outcomes. These criteria include such things as the propensity to ready offensive weapons, disarm, threaten, and strike, among others. While the numbers of times that individual players made certain moves are used to gain these insights, the conclusions are essentially qualitative in nature. This is because the exercise was designed from the outset as a game. It is not an application of game theory. As a result, it was not the purpose of this exercise to generate a quantified preferred outcome for the players such as a Nash equilibrium or a Pareto-superior outcome. The purpose was to observe the players' general patterns of behavior.

The following analysis reinforces the observations following each iteration of the game that the pres-

ence of defenses, far from inducing instability, actually appears to contribute to a stable outcome.

Force Posture Considerations

From the viewpoint of comparing stability outcomes in the four iterations in regard to the players' force postures, it is appropriate to examine three criteria. The first criterion is the propensity of the players to ready their offensive weapons, with a move to ready representing a step toward instability. The second criterion is the propensity of the players to disarm, with a move to disarm representing a step toward stability. The final criterion is the propensity of the players to strike. This is the most relevant criterion because the propensity to strike is tantamount to the definition of instability.

Comparing the four iterations of the game in light of these three criteria results in three observations.

Observation #1: The more widespread the defenses, the lower the propensity of players to ready their offensive forces.

In the first iteration of the game, in which no defenses were present for any player, four of the seven players moved in the first round to ready their weapons. In Round 2, the number increased to five. It stayed at five until Round 9, when Player A chose to disarm (by definition eliminating the option of presenting a readied weapon) and reduced the number to four. The number returned to five in Round 12 when Player D chose to ready his weapon. This

level of readiness among the players persisted for the remainder of the game. However, this outcome likely understates the players' levels of readiness because the Game Manager terminated the game following an exchange of shots, starting from an unexpected source (Player C). If the game had continued, it is possible that the one remaining armed player who was holstered (Player B) would have readied his weapon. In this case, all armed players would have readied their weapons.

In the second iteration of the game, which allowed only Player G to field defenses, three of the seven players moved immediately to ready their offensive arms. This level of readiness increased steadily in the course of the game until all seven players had their offensive arms in a ready position by Round 7. The readiness numbers ceased to pertain to this analysis after Round 7 because players were killed in the course of the subsequent rounds in a series of strikes and counterstrikes.

In the third iteration of the game, in which only select players other than Player G obtained defenses, three of the seven players moved immediately to ready their offensive weapons. This number edged up to five by Round 3 and remained there until Round 6. The number fell to four in Round 7 and three in Round 8. The Game Manager terminated the game after Round 8.

The fourth and final iteration of the game allowed Player G to field defenses for his own protection and to provide them to other players of his choosing. In this case, three of the seven players readied their offensive weapons in Round 1. By the end of the game, two of the seven players maintained readied offensive arms. In this case, however, the numbers may overstate the stability risks associated with offensive readiness because Player G maintained his ready posture for the purpose of extending a nuclear guarantee to other players in order to induce lower levels of offensive readiness and disarmament by them. He did not maintain this posture because of a specific perceived threat or an expectation that he would need to strike.

While the relatively high level of offensive readiness demonstrated by the players in the second iteration of the game over the first iteration is an anomaly that is explained by circumstances other than Player G's possession of defenses (see analysis in Chapter 3), the offensive readiness levels trend down across the four iterations. Generally speaking, there is a positive correlation between the incremental addition of

defenses and the reduction in the players' propensity to ready their offensive weapons. Therefore, to the extent that lowered readiness postures contribute to stability, defenses may have played a contributing role in generating a stable outcome.

Observation #2: The more widespread the defenses, the higher the propensity of players to disarm.

In the first iteration of the game, in which no defenses were present, one player (Player A) disarmed. The second iteration allowed only Player G to field defenses for his own protection. In this case, no player disarmed. In the third iteration, which allowed Player G to furnish defenses to other players but not to defend himself, two players (Players B and E) decided to disarm. The final iteration of the game allowed Player G to field defenses to provide for his own protection and to provide defenses to other players. In this iteration, three players (Players A, B, and E) chose to disarm.

Again, there was an anomaly between the first and second iterations regarding the propensity to disarm. Nevertheless, there was a positive correlation between the incremental increase in the presence of defenses and the propensity to disarm when all four iterations of the game are considered. Therefore, to the extent that selective disarmament contributes to stability, it is fair to conclude that the presence of defenses may have contributed to stability.

Observation #3: The more widespread the defenses, the lower the propensity of players to strike.

In the first iteration of the game, with no defenses present, three players (Players C, E, and G) launched strikes. The cumulative number of shots taken was 23. Two players (Players C and E) were wounded and none were killed at the time the Game Manager terminated the game. As explained in the analysis of the first iteration (see Chapter 2), if the game had continued, it was likely that two players (Players C and E) would have been killed and Player G would have been struck, and it was plausible that the conflict would have broadened in a way that led Player D to strike at Player F and Player C to strike at Player G. It was possible to project that five of the seven players would have been killed if the game had continued.

The second iteration of the game resulted in all seven players firing all of their offensive shots. Six of the seven players—all but Player G—were killed, and

Player G was severely wounded. The third and fourth iterations of the game saw no offensive shots fired and, therefore, no players either killed or wounded.

Again, the anomaly was present in the comparison between the first iteration of the game and the second. To a considerable degree, this anomaly stems from the different judgments by the Game Manager about when to terminate the game. When the analysis of the propensity to strike extends across all four iterations of the game, it is clear that the broadening presence of defenses corresponds to a lower propensity to strike on the part of all players. This is the most important criterion regarding the impact on stability brought about by the presence of defenses. The positive correlation between the increased presence of defenses and the players' lower propensity to strike suggests that the defenses contributed to stability.

Diplomatic Considerations

Two criteria are most applicable in assessing the factors for stability or instability in the game in the area of player relations. The first is the propensity of the players to adopt hostile attitudes toward one another. The second is the propensity of the players to threaten others specifically with an offensive strike. In both cases, the analysis is based on the proposition that moves to adopt hostile attitudes and threaten strikes represent steps toward instability or a higher probability of conflict.

Comparing the four iterations of the game in light of these two criteria results in two observations.

Observation #1: The more widespread the defenses, the lower the number of times that players adopted hostile attitudes toward one another.

In the first iteration of the game, with no defenses present, hostile attitudes held by one player toward another fluctuated between two and four throughout the game. This understates the stability risk that is present because, while the source of conflict was relatively narrow (focusing on the confrontation between Player C and Player E), the level of hostility was quite intense.

The second iteration of the game, which allowed only Player G to field defenses, saw hostile attitudes range between five and six in each round until after Round 7. Thereafter, they escalated rapidly and peaked at 19 such attitudes present prior to Round 11. This peak in hostile attitudes was a prelude to a large-scale conflict involving all seven players.

The third iteration of the game, with defenses in the hands of select players other than Player G, saw hostile attitudes dip from six following Round 1 to three at the beginning of Round 5. They then escalated to seven in Rounds 6 and 7 as a confrontation arose over Player B's reluctance to disarm following a commitment by him to take that step. As the crisis was defused in Round 7, the number of hostile attitudes sank to three in Round 8.

In the final iteration of the game, in which Player G fielded defenses and provided them to other players, the only hostile attitudes that persisted throughout the game were between Player C and Player E. Thus, two such attitudes prevailed in all but the first round of the game.

These observations reveal the same anomaly between the first and second iterations of the game as appeared in the observations stemming from the relevant force postures. Again, it is important to keep in mind that the Game Manager terminated the game in the first iteration in a circumstance when additional hostile attitudes were likely to emerge in subsequent rounds. Further, the conflict that occurred in the second iteration of the game resulted from factors that had nothing to do with the presence of defenses. (See analysis in Chapter 3.) Nevertheless, when the observations are collected from all four iterations of the game, they show a positive correlation between the presence of defenses and relatively low numbers of hostile attitudes demonstrated by the players. This serves to bolster the argument that defenses may have contributed to stability in this proliferated setting.

Observation #2: The more widespread the defenses, the lower the number of times that players threatened one another.

In the first iteration of the game, with no defenses present, no threats were made until Round 10. In the final three rounds (Rounds 11, 12, and 13), three threats were present in each round. As with the above observations made regarding hostile attitudes, this likely understates the instability factor because it was likely that additional threats would arise in the rounds following the termination of the game. The second iteration of the game saw the initial threats emerge in Round 9, with five, and jump to 11 in Round 10 as an early indicator of the conflict that followed.

In the third iteration of the game, which allowed Player G to furnish defenses only to other players, two threats were made in Round 5. This number escalated to four in Round 6 and diminished to two in Round

7 before returning to zero. No player threatened another player in the course of the final iteration, in which Player G possessed defenses and provided them to other players.

Not surprisingly, these observations track closely with those made regarding hostile attitudes. The anomaly between the first and second iteration persists for reasons that do not involve Player G's possession of defenses. The comparison of all four iterations of the game shows a trend toward fewer threats as defenses are added. This positive correlation again suggests that the presence of the defenses contributed to stability.

Exchange Ratio Considerations

Observing exchange ratios in the context of stability outcomes involves more complexity than force postures and player relations. In this case, it requires a search for imbalances. The analysis is based on whether defenses reduce the impact of changes in force postures and coalitions on exchange ratios in functionally equivalent circumstances.

Two specific circumstances are reviewed here. The first involves a bilateral confrontation. The confrontation between Player C and Player E was chosen. In this case, the analysis compares this confrontation as it existed in the first and fourth iterations of the game. The second involves a shift brought about as a result of the coalition dynamic. In this case, the choice was to examine the confrontation between Player C and Player E if Player F joined Player C and Player G joined Player E. In this case, the examination compares an outcome from the first iteration with a prospective outcome in the fourth iteration.

Comparing these two select circumstances of the game results in two observations.

Observation #1: The possession of defenses can limit the impact of a decision to ready a weapon on exchange ratios in a bilateral confrontation.

In the first iteration of the game, Player C was not shrouded, and his weapon was holstered prior to Round 9. Player E had drawn his weapon and shrouded it. Thus, Player E enjoyed a 15–0 advantage in the exchange ratio with Player C at that time. In the course of Round 9, Player C readied his weapon and shrouded it. Although Player E could not be certain of this fact, the exchange ratio evened at 15–15. This was significant because Player C was defined as an aggressive power, and it gave him the option of killing Player E

because Player E was defenseless. Under this circumstance, Player E could not afford to disarm and did not. Player C chose to exploit his advantage of having the option of killing Player E by launching a limited strike against him in Round 10.

In the fourth iteration of the game, both Player C and Player E readied and shrouded their weapons at the outset. Therefore, the exchange ratio was also 15–15 at this time. In Round 5 of this iteration, Player E reached an agreement with Player G to obtain 40 defensive interceptors. This meant that Player C faced a circumstance in which, in Round 7, the exchange ratio would become 4–15 to his disadvantage and he would lose the option of killing Player E. With Player G facilitating the transition through a nuclear guarantee to Player E, Player E disarmed and Player C holstered his weapon.

While the description provided above draws on only two specific situations that arose in the playing of the game, its implications are valid in more nuanced circumstances regarding bilateral confrontations in all four iterations of the game. While circumstantial, the evidence suggests that the dampening impact that defenses can have on shifts in exchange ratios brought about by decisions to ready offensive armaments may bolster stability, particularly when positive external factors, such as Player G's nuclear guarantee, are present in this proliferated environment.

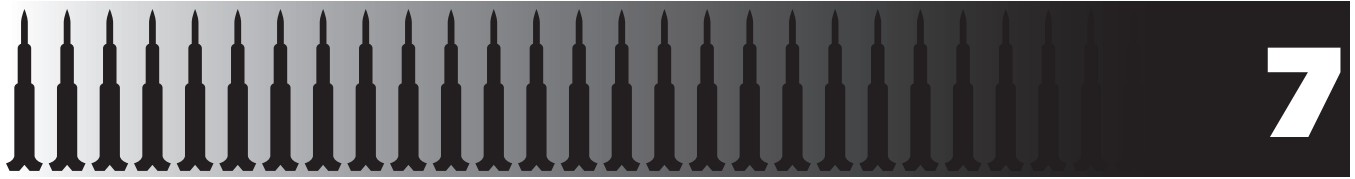
Observation #2: The presence of defenses can limit the impact on exchange ratios that is caused by the presence of the coalition dynamic in a proliferated environment.

This is the more important of the two observations regarding exchange ratios because the coalition dynamic is an inherent part of the proliferated environment. A dramatic example of the uncertainty derived from the coalition dynamic in calculating exchange ratios is found in the second iteration of the game, in which only Player G possessed defenses. By the end of Round 4, a security bloc of uncertain durability formed among Players B, D, and G. The formation of the bloc left Player A, as an aggressive power, with a wide range of plausible exchange ratio calculations. (See analysis in Chapter 3.) In the context of considering a strike against Player B, he could calculate an exchange ratio as favorable as 15–0 and as unfavorable as 3–230. The calculation depended on his view of the likelihood that Player D and (particularly) Player G would intervene following a strike on Player B.

It is relevant that this iteration of the game culminated in a comprehensive exchange of shots when an opposing bloc consisting of Players C and F, as well as Player A, miscalculated and preemptively struck Players B, D, and E on the presumption that Player G would not intervene and that Players B, D, and E would be unable to launch more than the most limited retaliatory strikes. The incentive for the preemptive strike resulted from the fact that the bloc of Players A, C, and F had the capacity between them to kill the defenseless Players B, D, and E.

On the other hand, Player A's room for calculating favorable exchange ratios in the fourth iteration of the game was much more limited. His primary interest was in subduing Player B, but he faced the prospect of Player B obtaining defenses from Player G. Without defenses, Player B faced the prospect of being killed by Player A. If Player A caught him in a holstered position, Player A could calculate an exchange ratio of 15–0 in his favor. With Player B possibly obtaining 40 defensive interceptors, Player A faced an exchange ratio of no better than 4–0 in his favor. Even if he could convince Player C to join him wholeheartedly in a strike on Player B—an unlikely prospect because Player C would clearly want to reserve shots for the purpose of threatening Player E—the two could not kill Player B. The exchange ratio was at best 8–0 in favor of the alliance of Players A and C over Player B. It was not a coincidence that Players A and C chose not to enter into an alliance during the fourth iteration of the game.

The contributions of defenses, in the context of a mix of both offenses and defenses, in buffering the players against the instabilities brought about by the coalition dynamic in a proliferated setting appear to be quite profound. While the outcomes described above result from specific circumstances, it is fair to say that the presence of broad options for fielding defenses in the fourth iteration of the game and their dampening effect on changes in exchange ratios caused by the coalition dynamic had a consistent impact on the behavior of the players. The results suggest that this impact enhanced the prospects for stability.



Additional Observations

WHILE the game is designed to test the hypothesis that defenses will not be destabilizing in a proliferated setting, it also allows some additional insights regarding issues not related to defenses and stability outcomes in the same setting. It is appropriate to examine several of these ancillary, though not unimportant, issues.

Issue #1: Countering Proliferation

A direct question raised by the design of the game is whether it signals that the United States is accommodating itself to the prospect of inevitable nuclear proliferation. The implied argument behind the question is that the U.S. should fight proliferation, not accommodate itself to it.

The game, however, was not designed to advance the argument that the U.S. should accommodate itself to nuclear proliferation. In fact, the opposite is true. The game was designed to provide a tool that can help U.S. policymakers determine how to address nuclear proliferation in a way that serves to demonstrate to would-be proliferators that the U.S. has options in the hypothetical context of proliferation and that their interests will not be served by the possession of nuclear arms. To the extent that the U.S. projects an attitude that nuclear weapons give would-be adversaries a trump card, they are all the more likely to seek to obtain them, and the friends and allies of the U.S. will follow suit.

Issue #2: Distinguishing Between Hegemonic Powers and Non-aggressive, *Status Quo* Powers

One of the key lessons resulting from the game, outside of specific issues related to defenses, relates to the overall balance of power and stability. This is an issue raised in the analysis following the first iteration of the game (see Conclusion #2 in Chapter 2) regarding the need to distinguish between hegemonic powers and non-aggressive, *status quo* powers. The analysis regarding exchange ratios, in particular, can easily lead to the false conclusion that all exchange ratio imbalances are destabilizing.

The results of the game strongly suggest that the risks to stability are far greater when the overall balance favors hegemonic powers over non-aggressive ones. In the second iteration of the game, it was the hegemonic powers of the alliance of Players A, C, and F that launched a calculated preemptive strike. In the fourth iteration, Player G possessed the option to strike and kill Player A following his disarmament. The exchange ratio was 168–0 in favor of Player G over Player A. Further, Player G faced only a limited prospect of retaliation by any other player in response to a move by him to kill Player A. Nevertheless, Player G chose not to attack Player A.¹

¹ If the game were later used to create a game-theoretical application, it might prove useful as a tool for defining in quantitative terms the aggressive tendencies of the players.

Prudence is served, not undermined, by making informed judgments regarding the moral standing of the “players” in a proliferated setting. At a minimum, it is clear that the moral debate over the possession and potential use of nuclear weapons is as relevant in a proliferated setting as it is in a two-player setting.

Issue #3: Avoiding Non-discriminatory Nuclear Arms Control

The game was designed to facilitate a stability study, not an arms control study. The disarmament option was included to give players a chance to act on a determination that their possession of nuclear weapons no longer served their interests. Therefore, the players were instructed to take the decisions to disarm at face value. A player’s decision to disarm automatically and assuredly eliminated his option to fire offensive shots for the remainder of the game. Therefore, the issues of verifiability, enforceability, and timing, which would be necessary elements of an arms control study, were not present here.

Nevertheless, it is appropriate to draw one general conclusion about arms control from this study. It is derived directly from the previous point regarding the differences between the players. Nuclear weapons in the hands of different players pose unequal risks to stability. As a result, nuclear arms control efforts that treat all players equally have a higher probability of producing unstable outcomes in a proliferated environment.

Arms control advocates frequently tout the advantages of non-discriminatory approaches to nuclear arms control, such as the Comprehensive Test Ban Treaty (CTBT). This is a mistake. Further, it is a mistake that a proliferated environment makes more dangerous. For example, in the fourth iteration of the game, it is clear that Player G’s nuclear force was a necessary ingredient in a policy to convince other players (specifically Players A, B, and E) that they did not need nuclear weapons. Leaving the modalities aside, Player G’s nuclear force can be seen as contributing to effective arms control.

Issue #4: Avoiding Isolationism

The prospect of the widespread proliferation of nuclear weapons may revive arguments for isolationism in the U.S. These arguments are a siren song. U.S. withdrawal from important regions where nuclear proliferation has occurred will inevitably increase the risks to stability even further.

Indeed, even the mere appearance of withdrawal by the U.S.-equivalent player (Player G) in the game resulted in a calculated preemptive strike in the second iteration. Player G could not wall himself off from the negative impact brought about by that instability, even with defenses in place. He was forced to intervene because he understood that the aggressive powers (Players A, C, and F) were coming after him next.

Issue #5: Countering the Formation of Threatening Alliances

The game revealed, particularly in its second iteration, that the formation of an aggressive alliance might pose a significant risk to stability. The aggressive alliance that materialized in the second iteration of the game consisted of Players A, C, and F. Clearly, the most important players in this alliance were Players C and F. The risk to stability posed by the formation of this alliance was a threat not only to Player G, but to all players, including Players C and F themselves. Players C and F wound up dead in this iteration.

In the real world, this suggests that the United States should work to prevent the formation of an alliance between China and Russia and that China and Russia would do well to recognize that there are considerable disadvantages for themselves in entering into such an alliance. For example, Russia could find itself assuming significant unwanted risks by acquiescing to China’s demands to help it subdue Taiwan.

Issue #6: Addressing the Persistent Confrontation Between Player C and Player E

At the outset, it is reasonable to assume that the most dangerous confrontation in the game is between Player A and Player B. However, in the proliferated setting assumed by the game, this assumption was wrong. The more dangerous confrontation was between Player C and Player E. Each of these two players remained consistently hostile to one another throughout all four iterations of the game. Direct diplomacy between the two did not take place. Player C was working to isolate Player E diplomatically and did not want to undercut his position by opening a direct diplomatic channel. He feared that other players would use such a direct contact as a reason to justify direct security ties with Player E. Player E, given the opportunity, would seek alliances wher-

ever he could find them. The shots exchanged in the first iteration of the game resulted primarily from this confrontation. It was a significant contributing factor in the shots exchanged in the second iteration of the game.

In the real world, the game suggests that the United States should expend at least as much effort in confronting the possibility of aggression across the Taiwan Strait as it expends in confronting the possibility of aggression across the demilitarized zone on the Korean Peninsula. In this context, the February 19 declaration between the United States and Japan that they would treat the threat of aggression against Taiwan as a mutual security concern is a step in the right direction.

Issue #7: Modernizing the U.S. Nuclear Arsenal

The U.S. nuclear arsenal was designed and built during the Cold War. It was not designed to meet U.S. security requirements in the kind of proliferated setting assumed by the game. The outcome of the game suggests that the Department of Defense should be determining whether it needs new nuclear weapons that are capable of fulfilling each of the following requirements, perhaps among others:

1. Holding at risk the supreme leadership of an aggressive nuclear-armed power,
2. Destroying the ability of two or more aggressive nuclear powers to coordinate nuclear strikes at the U.S. or its friends and allies,
3. Tailoring U.S. nuclear forces to meet needs that cannot be addressed by the deployment of defenses,
4. Being used, if necessary, in conjunction with a nuclear-armed ally, and
5. Deterring nuclear electromagnetic pulse (EMP) attacks.

In a proliferated setting, all of these capabilities may serve to bolster deterrence. At a minimum, this suggests that Congress should provide funding that the Bush Administration has sought for the Robust Nuclear Earth Penetrator (RNEP) program, advanced concepts for nuclear weapons, and the modern nuclear pit facility. More appropriately, Congress should direct the expansion of U.S. nuclear weapons development

efforts in anticipation of the needs presented by a proliferated setting.

Issue #8: Moving Missile Defense to Space

The results of playing the game serve to confirm the wisdom of President George W. Bush's policy of fielding a global missile defense system that protects both the United States and its friends and allies. The best approach to fielding an effective global missile defense system is to put both sensors and interceptors in space. This is because space-based systems provide broad geographic coverage and constant readiness in countering the full range of ballistic missile threats.

The second argument in favor of space-based defenses results from the outcome of the first iteration of the game. In that iteration, a nuclear exchange was initiated by an EMP strike. The most effective defense against such a strike delivered by a ballistic missile and detonated in space is a space-based defense that is capable of intercepting the missile in either the boost phase or the ascent phase of its flight.

Issue #9: Modifying the Game to Examine Other Issues Related to Nuclear Security

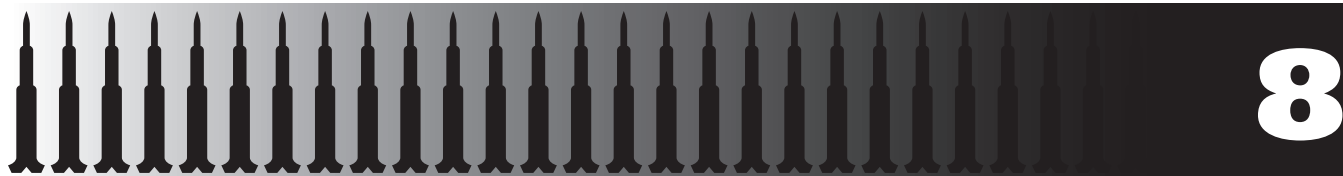
The game was designed as a tool. In this instance, it was used to examine how the deployment of defenses affects stability in the context of nuclear proliferation in a region that is roughly equivalent to East Asia. With modifications, the tool could be used to examine other issues.

For example, changing the descriptions of the players would allow an examination of stability in a proliferated setting that resembles another region, such as the Middle East. Supplementing the game with arms procurement and specific disarmament options for the players would allow its use in examining arms control issues. Using teams of people to assume the roles of the players would allow an examination of the internal decision-making dynamic within states. Adding an economic variable would allow the players to assess and account for the economic costs of conflict. These are just a few of the more obvious examples of how modified versions of the game could be used to examine other issues.

Issue #10: Taking the Game to the Next Level

The game was designed as a game. As such, it does not produce quantifiable superior or inferior outcomes

for stability that would result from applying game theory. The logical step in refining the game is to determine whether the behavior patterns exhibited by the players can be quantified and used to design a game theory application that produces such quantifiable outcomes. If so, game theory based on this design could be used to identify a Nash equilibrium or Pareto-superior outcome in this seven-player proliferated setting.



Conclusion

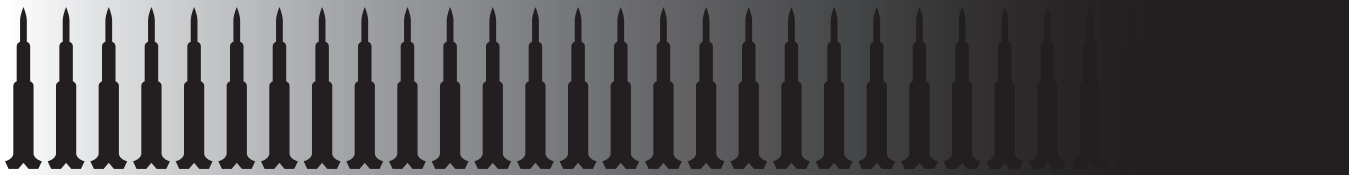
THIS technical study suggests that President George W. Bush acted just in time when he decided in 2001 to accelerate the missile defense program and jettison the 1972 Anti-Ballistic Missile (ABM) Treaty and its underlying concept of mutually assured destruction (MAD). The results of playing the game indicate that multilateralizing MAD would have been a bad choice for stability. Further, the results suggest that President Bush is right in adopting a global approach to missile defense that brings the friends and allies of the United States into the program while extending the defense to U.S. territory. This is preferable to fielding defenses exclusively for U.S. territory or limiting the defense to theater settings.

This study also suggests that President Bush and the Department of Defense's 2002 Nuclear Posture Review are right in pointing to the need for a responsive nuclear infrastructure. The unpredictable nature of the proliferated environment makes this necessary. It is all but certain that such an environment will result in the need for new nuclear weapons to meet new military requirements. While there is a range of options for the proper mix of offensive and defensive forces, it is clear that the U.S. nuclear deterrent remains essential to maintaining peace and stability. Defenses cannot and should not become a substitute for offensive nuclear forces.

On the other hand, the proliferated setting assumed by the game presents the United States with sobering problems. The risks of a highly destructive conflict are

significant. President Bush and Congress must address these problems now, if for no other reason than because it presents an opportunity to prevent this proliferated environment from becoming a reality.

The good news is that President Bush and Congress, by opting for a policy that advances the United States toward a mix of offensive and defensive forces, are putting the nation's defense posture on the right path. With determination, the United States can address the threat posed by nuclear proliferation and start taking steps to reverse a disturbing trend. The next step is to undertake aggressive nuclear weapons and missile development and deployment programs that match the policy direction that has been established over the past four years.



Introduction to the Appendices

THE following appendices provide the detailed histories of what took place in the four iterations of the game covered in this study. Each appendix covers one iteration of the game. These histories include the status sheets that detail the force postures of the players and their attitudes toward one another in each round. They also include the private communications between the players and public announcements, as well as the findings and announcements of the Game Manager.

The private communications and public announcements by the players, in particular, should provide the reader with a deeper insight into the thinking of the players at the times that they made their moves. As should be expected, given the compressed sequencing of the rounds and the fact that the communications and announcements took place contemporaneously with the formal moves of the game, these statements are expressed in the colloquial form. They are not the polished texts that governments in the real world would spend at least hours, if not days and weeks, drafting. In order to preserve the accuracy of the record, the editors limited their editing to those areas in which it was necessary to convey clearly to the reader the players' intentions. Further, these edits were made after careful consultation with the players.

As a result, the content of the appendices warrants an explanation. The players generally saw themselves as the leaders of the states described in the abstract and not as the individuals defined in the underlying game. As such, the players referred to territories, populations,

and other attributes associated with states and not individuals. They also spoke of their offensive shots as individual weapons in the form of nuclear-armed ballistic missiles (as opposed to automatic weapons or chain guns) and their defensive capabilities in terms of individual interceptors (as opposed to a bullet-proof vest). Their references to disarmament, pursuant to the rules of the game, meant the option of abandoning the game's equivalent of offensive nuclear arms. They generally used the terms "improving relations" and "downgrading relations" in lieu of the term "changing attitude toward." The players frequently refer to themselves in the third person.

The Game Manager also allowed the players to raise ancillary issues in their communications even though there were no formal move options in the game associated with these issues. For example, players made references to possible economic and trade incentives, and to the disposition of conventional forces and energy security, just to name several. The Game Manager allowed these in order to provide additional context to the game.

Finally, all communications between the players, both public and private, served as statements of intent. The Game Manager prohibited the players from using these communications as a substitute for formal moves. For example, a private statement by one player to another offering an alliance and the other player's statement of acceptance would not result in an alliance until the formal moves necessary to form the alliance

were submitted to the Game Manager. The failure to follow through on a commitment made in the communications was not prohibited. This means that private communications and public announcements were used as tools of deception in some instances.

The reader will be well served by referring to these appendices when the summary descriptions in the body of this study prove insufficient to convey a clear understanding of what took place and why. Each status sheet provides a detailed snapshot of where the players stood regarding their formal moves at that time in the game. The views expressed by the players in their own words at the time they made their decisions lend a human quality to the record. They capture the emotions expressed by the players. In sum, the content of these appendices makes for a complete record.



Appendix A

History of Game Iteration #1: Multilateral MAD

ROUND 1

Private Communications Prior to Round 1

Player E stated to Players B, D, and G: “I think it would be best for me, Player E, to unholster my nuclear weapons and to immediately seek 20 ABM interceptors from Player G. I also hope that an ABM architecture in the region can integrate all ABM sensors and command and control systems that Player E obtains—that is, integrate via Player G—with any similar systems that Players B and D may want to obtain from Player G. I also declare myself open to an alliance relationship with Players B, D, and G.”

Public Announcements Prior to Round 1

Player G stated: “Player G announces that it is his policy that he will neither build missile defenses for himself nor provide them to any other player.”

Player A stated: “The lawfully and constitutionally elected Dear Leader of the Democratic People’s Republic of A (Player A) announces that in order to increase world peace and harmony and to bring the world back from the brink of a nuclear holocaust, he will unilaterally and verifiably dismantle all his nuclear weapons.

“In order to create conditions for the Player A’s security, Players B, D, and G must improve their attitudes toward the Player A. To help that process, Player A demands that:

1. Players B, D, and G must sign a treaty of peace and amity with Player A, guaranteeing that they will not attack Player A either militarily or economically.
2. The peace hating, long-nosed devil (Player G) must withdraw all his occupation forces from the territory of Player B.
3. Player B must open his borders and allow the trade of Player A’s products to his long-suffering peoples. And Player A will allow the sale of Player B’s products in the people’s paradise, as long as the products are lawful and the sale of the products does not hurt the feelings of the Player A’s people.

“To repay nearly a century of oppression and economic exploitation of the peoples of the world, Players B, D, and G must begin the reconciliation process by providing \$25 billion of reparation payments to Player A.”

The status settings in Figure A3 reflect the initial forces in Figure A1, provided at the outset of the game.

The player attitudes in Figure A4 are identical to the initial attitudes in Figure A2, provided at the outset of the game.

Figure A5 reflects moves made in Round 1.

Figure A6 reflects moves made in Round 1.

Figure A1

Initial Forces

Players	Armaments			Vulnerability		Posture	Visibility
	Offense shots	Defense shots	Defense hit probability	Shots to Wound	Shots to Kill	Holstered?	Shrouded?
Player A	<input type="text" value="15"/>	<input type="text" value="0"/>	<input type="text" value="0.8"/>	<input type="text" value="3"/>	<input type="text" value="10"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player B	<input type="text" value="15"/>	<input type="text" value="0"/>	<input type="text" value="0.8"/>	<input type="text" value="3"/>	<input type="text" value="10"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player C	<input type="text" value="15"/>	<input type="text" value="0"/>	<input type="text" value="0.8"/>	<input type="text" value="10"/>	<input type="text" value="30"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player D	<input type="text" value="15"/>	<input type="text" value="0"/>	<input type="text" value="0.8"/>	<input type="text" value="5"/>	<input type="text" value="20"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player E	<input type="text" value="15"/>	<input type="text" value="0"/>	<input type="text" value="0.8"/>	<input type="text" value="3"/>	<input type="text" value="10"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player F	<input type="text" value="200"/>	<input type="text" value="0"/>	<input type="text" value="0.8"/>	<input type="text" value="10"/>	<input type="text" value="50"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player G	<input type="text" value="200"/>	<input type="text" value="0"/>	<input type="text" value="0.8"/>	<input type="text" value="10"/>	<input type="text" value="50"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Total additional defense shots available from G:

Per player limit on additional defense shots:

Rounds between defense agreement and deployment:

Figure A2

Initial Attitudes

	A	B	C	D	E	F	G
Player A attitude toward		Hostile	Friendly	Unfriendly	Unfriendly	Friendly	Hostile
Player B attitude toward	Unfriendly		Unfriendly	Unfriendly	Neutral	Neutral	Ally
Player C attitude toward	Friendly	Unfriendly		Unfriendly	Hostile	Friendly	Unfriendly
Player D attitude toward	Hostile	Neutral	Unfriendly		Neutral	Neutral	Friendly
Player E attitude toward	Unfriendly	Neutral	Hostile	Friendly		Neutral	Friendly
Player F attitude toward	Neutral	Neutral	Friendly	Neutral	Neutral		Neutral
Player G attitude toward	Hostile	Ally	Unfriendly	Friendly	Friendly	Neutral	

ROUND 4

Private Communications Prior to Round 4

Player A stated to Player B (and shared with all other players), in response to the joint public announcement by Player B in the prior round: “I am pleased with your response and welcome the reduction in tensions. However, a security guarantee does not require Players B, D, or G to disarm. Your proposal, on the other hand, requires Player A to disarm without any guarantee that you will not attack me. I suggest that you reconsider your position.”

Player A augmented his prior statement by also stating individually to Player B: “Players D and G do not want to see us united. Player A would accept a security guarantee from Player B alone and would dismantle his nuclear weapons with a security guarantee, increased trade and a political relationship. Player B must also guarantee that Players D and G do not attack Player A.”

Player A also stated to Player F, in response to his private offer in the last round regarding Player A’s disarmament: “I am pleased by your brotherly offer. I am interested in forming an alliance that guarantees my form of government and my sovereign territory. If we are in an alliance, then our nuclear weapons will be used in your defense, and can remain under my control. Also, I am in need of economic support.”

Player F responded to Player A: “You have my security guarantee in exchange for your nuclear weapons being transferred to me.”

Player E stated to Player B: “Player E would like to propose an alliance with Player B. We share many commonalities and the alliance could be useful to both of us.”

Player B responded to Player E’s statement: “Agreed.”

Player F stated to Player G: “Top Secret. In view of the worsening security situation in the southeastern region, Player F is proposing the following to Player G: We upgrade our relationship to an alliance subject to Player D settling his territorial dispute with Player F, Player G’s support for my membership in the World Trade Organization (WTO) in 2005, and Player F’s full freedom of maneuver in the territories located to the south, southwest and west of his borders. In view of the high security risk, I am forced to shroud.”

Player G responded to Player F: Player G is not prepared to create an alliance as yet. However, I am willing to move toward a friendly relationship if you work closely with me to pressure Player A to disarm. Perhaps a public statement demanding that Player A disarm immediately so that Players B, D, F, and G can begin providing aid would be a good way to move forward. As for your other suggestions, these are all secondary and subject to negotiation for the future. Now we must work together to get the nukes away from Player A.”

Player F responded to Player G’s counterproposal: “I will upgrade to ‘friendly’ and make a statement calling on Player A to disarm. Please confirm.”

Player G confirmed the understanding with Player F.

Player G stated to Players B and D: “Player G is going to make a public statement in the beginning of the next round and I hope that you will support this new policy. Please let me know ASAP if you agree with the new stated policy:

As regional players move to reduce tensions, Player G feels it is necessary to warn Player A that if you choose to move your forces to a readied position and specifically threaten Players B, D, or G, Player G will not wait for that threat to emerge as an act of violence and will take appropriate action at a time and place of his choosing.

To clarify: Player G is continuing to work with Player A to rid A of nuclear weapons and to help A to become successful and prosperous. Player G has no desire to use military force to resolve this crisis. So long as we continue to move forward, Player G is positive of a peaceful resolution. Specific and outward threats, however, are not the way to move toward a peaceful resolution.”

Player D responded to Player G’s statement, which he shared with Player B: “Player D supports the stated policy.”

Player G made the following statement to Player E, based on Player E’s ongoing efforts to arrange an alliance: “Player G cannot agree to an alliance at this time. However, I consider your security a vital national interest and am prepared to do what is necessary to ensure your long-term security.”

Public Announcements Prior to Round 4

Player G announced: “As regional players move to reduce tensions, Player G feels it is necessary to warn Player A that if you choose to move your forces to a

ROUND 8

Private Communications Prior to Round 8

Player B stated to Players D and G: “Unless Players D and G object, I am going to make a public announcement along the following lines: To help promote the peace process, Player B has agreed not to attack Player A. Additionally, Player B will not permit an attack on Player A by others, including Players D and G. Finally, once there has been obvious progress in the dismantling process, Player B will resume trade with Player A, and will offer economic assistance once the weapons are fully dismantled.”

Player G responded to Players B and D: “Let’s agree to the three demands. In return, Player A must disarm next round. In return for that, I would propose that Players B and D agree to holster next round as well. I will leave my weapon unholstered for the time being and I will promise you my nuclear umbrella. Player B should approach Player A with our offer, then make the announcement next if Player A agrees.”

Following up on private communications between them prior to the previous round, Player B stated to Player A: “If you agree to disarm during the next round, I agree to make the following statement:

To help promote the peace process, Player B has agreed not to attack Player A. Additionally, Player B will not permit an attack on Player A by other players, including Players D and G. Finally, once there has been obvious progress in the dismantling process, Player B will resume trade with Player A, and will implement economic assistance once Player A’s weapon is fully dismantled.”

Player C stated to Player B: “Your decision to revert to a friendly relationship with Player E is a clear demonstration of the good will between us. Player C decided to upgrade his relationship with you to ‘neutral’ in the hopes that our continued dialogue will result in a stronger relationship over time. Please note that I will be making a public announcement that should aid in meeting your security concerns.”

Player C stated to Player A: “As a player who has stood by you during these difficult times, you surely understand that I have your very best interests in mind. With that said, I would ask that you continue the fruitful dialogue that will result in the most positive outcome for your country and its proud people. Should

you decide to reject the reasonable offer that has been given you by the other interested parties, I will have no choice but to downgrade my attitude toward you. Please understand that in order to help you, you must be willing to help yourself.”

Player E stated to Player F: “Player E would like to request that Player F upgrade his relations with Player E from ‘neutral’ to ‘friendly.’ Player E might also like to ally with Player F in future moves. Please respond to Player E.”

Player F did not communicate with Player E at this time.

Game Manager’s Note Prior to Round 8

The Game Manager made the following note to himself: In Round 2, Player A upgraded his relationship with Player B to friendly. This was allowed on the basis that Player A assured the Game Manager that the move was deceptive. Private communications are making it clear that this relationship between Player A and Player B is becoming genuine. The Game Manager is allowing this to proceed on the basis that the positive and negative incentives Players B, D, and G are providing to Player A are making it clear that there are advantages for Player A to change his allegiances. In effect, Player A is being forced to choose between his immediate goal of regime survival and his more distant goals of breaking the alliance between Player B and Player G and dominating, if not conquering, Player B.

Figure A19 reflects moves made in Round 8.

Figure A20 reflects moves made in Round 8.

government. Player E has agreed to provide Player A with \$750 million in direct investment and economic assistance immediately in exchange for friendly relations between Players A and E. Player G has agreed to upgrade his relationship with Player A to friendly upon the completion of the disarmament process.”

Player F announced: “Player F is encouraged by the recent developments on the Peninsula and is willing to support the forthcoming settlement. It will upgrade its relationship with Player A from unfriendly to neutral. Player F bears no hostile intentions to any other players in the region. As it unshrouds its strategic posture,

its nuclear forces are unholstered (full alert) due to the overall instability. As Player G de-alerts its forces, so will Player F. As the peace breaks, Player F will be willing to pursue gas pipeline and railroad projects from his territory to Player B via the territory of Player A. I invite Players C, D, and G to join in financing these projects.”

Figure A23 reflects moves made in Round 10.

Figure A24 reflects moves made in Round 10.

Figure A24

Player Attitudes Prior to Round		11						
	A	B	C	D	E	F	G	
Player A attitude towards		Friendly	Unfriendly	Unfriendly	Friendly	Unfriendly	Friendly	
Threatens?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)		0	0	0	0	0	0	
Shots at (all rounds)		0	0	0	0	0	0	
Player B attitude towards	Friendly		Neutral	Friendly	Friendly	Neutral	Ally	
Threatens?	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0		0	0	0	0	0	
Shots at (all rounds)	0		0	0	0	0	0	
Player C attitude towards	Friendly	Neutral		Neutral	Hostile	Friendly	Neutral	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0		0	1	0	0	
Shots at (all rounds)	0	0		0	1	0	0	
Player D attitude towards	Neutral	Friendly	Neutral		Neutral	Neutral	Ally	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0		0	0	0	
Shots at (all rounds)	0	0	0		0	0	0	
Player E attitude towards	Friendly	Wld Ally	Hostile	Wld Ally		Friendly	Wld Ally	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0	0		0	0	
Shots at (all rounds)	0	0	0	0		0	0	
Player F attitude towards	Neutral	Neutral	Friendly	Neutral	Neutral		Friendly	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Shots at (last round)	0	0	0	0	0		0	
Shots at (all rounds)	0	0	0	0	0		0	
Player G attitude towards	Friendly	Ally	Neutral	Ally	Friendly	Friendly		
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Shots at (last round)	0	0	0	0	0	0		
Shots at (all rounds)	0	0	0	0	0	0		

ROUND 11

Private Communications Prior to Round 11

Player C stated to Player F: “With Player A retired from the game, the time has come for the two of us to ally with one another. United we stand, divided we fall. Only then will we be able to repel a western onslaught.”

Player F responded to Player C: “Player F agrees to ally with Player C, and will move to register this change of status in the coming rounds.”

Public Announcements Prior to Round 11

Player C announced: “Player C has launched a defensive attack on Player E in the form of a single shot, high altitude nuclear detonation, resulting in an electro-magnetic pulse (EMP), that will disable much of Player E’s electrical infrastructure. This attack was not designed to target civilians. It is imperative that Player E understands that Player C still has the ability to destroy Player E, should a massive retaliation against Player C occur. Only through the peaceful resolution of all outstanding disagreements will bloodshed be averted. Player C asks that all players work toward convincing Player E that his dangerous posture is unacceptable in a civilized world.”

Player E responded to Player C’s announcement by announcing: “Player E loses all 15 of his nuclear shots on Player C and to hell with him.”

Player F announced: “In view of recent developments, which could tempt powers outside the region to intervene in regional affairs, I am hereby letting it be known that Player F and my old friend Player C are entering a defensive alliance. My only desire is for a peaceful outcome, and I commend Player C for his restrained response to the provocation offered by Player E. I specifically call on Player G to refrain from intervening in this unfortunate conflict and anticipate its peaceful resolution at both parties’ earliest convenience.”

Player E responded to Player F’s announcement by announcing: “It will be hard to have a peaceful solution when 15 nukes are detonated on Player C’s territory.”

Game Manager’s Notes Prior to Round 11

The Game Manager made two public announcements at this point. The first announcement was: “The Game Manager reminds all players that private

communications and public announcements made prior to the next round regarding future moves are statements of intent. A move is not consummated until the move sheets are submitted to the Game Manager. A player is not bound to submit a move he either privately or publicly stated he would make prior to that round.”

The Game Manager’s second public announcement was: “Player C has announced that his single shot against Player E in Round 10 was conducted in a fashion that only an electro-magnetic pulse (EMP) effect resulted. The Game Manager informs all players that a wounded player is defined as having only a limited capacity to function as an organized society and operate a military after an attack. Under the rules of the game, a single shot against Player E will result in his remaining functional. Consistent with this rule and the accompanying definitions, Player E, having been subjected to an EMP effect resulting from a single nuclear explosion, is deemed to remain functional at this time.”

Figure A25 reflects moves made in Round 11.

Figure A26 reflects moves made in Round 11.

Player C has turned him into a 'Nat-C.' To defend himself, the entire nuclear arsenal of Player E is deployed round-the-clock in the air, in a ready posture on board E-AF bombers, where they are invulnerable to easy attack."

Figure A27 reflects moves made in Round 12.

Figure A28 reflects moves made in Round 12.

Figure A28

Player Attitudes Prior to Round		13						
	A	B	C	D	E	F	G	
Player A attitude towards		Friendly	Unfriendly	Unfriendly	Friendly	Unfriendly	Friendly	
Threatens?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)		0	0	0	0	0	0	
Shots at (all rounds)		0	0	0	0	0	0	
Player B attitude towards	Friendly		Unfriendly	Friendly	Friendly	Neutral	Ally	
Threatens?	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0		0	0	0	0	0	
Shots at (all rounds)	0		0	0	0	0	0	
Player C attitude towards	Friendly	Neutral		Neutral	Hostile	Ally	Neutral	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0		0	2	0	0	
Shots at (all rounds)	0	0		0	3	0	0	
Player D attitude towards	Neutral	Friendly	Unfriendly		Friendly	Neutral	Ally	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0		0	0	0	
Shots at (all rounds)	0	0	0		0	0	0	
Player E attitude towards	Friendly	Wld Ally	Hostile	Wld Ally		Unfriendly	Wld Ally	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0	0		0	0	
Shots at (all rounds)	0	0	1	0		0	0	
Player F attitude towards	Neutral	Friendly	Ally	Friendly	Unfriendly		Friendly	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Shots at (last round)	0	0	0	0	0		0	
Shots at (all rounds)	0	0	0	0	0		0	
Player G attitude towards	Friendly	Ally	Hostile	Ally	Friendly	Friendly		
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Shots at (last round)	0	0	0	0	0	0		
Shots at (all rounds)	0	0	0	0	0	0		

Figure A30

		Player Attitudes Prior to Round						
		14						
		A	B	C	D	E	F	G
Player A attitude towards	Threatens?		Friendly	Unfriendly	Unfriendly	Friendly	Unfriendly	Friendly
	Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shots at (last round)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Player B attitude towards	Threatens?	Friendly		Unfriendly	Friendly	Friendly	Neutral	Ally
	Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shots at (last round)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Player C attitude towards	Threatens?	Friendly	Neutral		Neutral	Hostile	Ally	Neutral
	Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shots at (last round)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Player D attitude towards	Threatens?	Neutral	Friendly	Hostile		Friendly	Neutral	Ally
	Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shots at (last round)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Player E attitude towards	Threatens?	Friendly	W/d Ally	Hostile	W/d Ally		Unfriendly	W/d Ally
	Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shots at (last round)	<input type="checkbox"/>	<input type="checkbox"/>	14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Player F attitude towards	Threatens?	Neutral	Friendly	Ally	Friendly	Unfriendly		Friendly
	Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shots at (last round)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Player G attitude towards	Threatens?	Friendly	Ally	Hostile	Ally	Friendly	Friendly	
	Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shots at (last round)	<input type="checkbox"/>	<input type="checkbox"/>	5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ROUND 14

Game Manager's Note Prior to the Start of Round 14

The Game Manager publicly announced before the start of Round 14: "Given what has happened over the course of the last four rounds, the Game Manager has been able to draw reasonable conclusions regarding instability. He announces that he is terminating the game at this point."

Appendix B

History of Game Iteration #2: Lesser Power Vulnerability

ROUND 1

Public Announcements Prior to Round 1

Player A stated: “The lawful and constitutionally elected Dear Leader of the Democratic People’s Republic of A (Player A) announces that in order to increase world peace and harmony and to bring the world back from the brink of nuclear holocaust, he will unilaterally and verifiably dismantle all his nuclear weapons. In order to create conditions for Player A’s security, Players B, D, and G must improve their attitudes toward Player A. To help that process, Player A demands that:

1. Players B, D, and G sign a treaty of peace and amity with Player A, guaranteeing that they will not attack Player A militarily or economically;
2. The peace hating long-nosed devil (Player G) must withdraw all his occupation forces from the territory of Player B;
3. Player B must dismantle all his nuclear weapons and open his borders to trade with Player A; and
4. Players B, D, and G must pay war reparations to the people of Player A.”

Player G stated: “Player G’s highest and most immediate defense priority is self defense. It is his policy to field defenses for the protection of his terri-

tory, but not to provide them to other players.”

Game Manager’s Note Prior to Round 1

The Game Manager announced: “The Game Manager, in the context of Player G’s announced intention to acquire defenses, reminds all players that any defenses Player G acquires in Round 1 will become operational in Round 3.”

The status settings in Figure B3 reflect the initial forces in Figure B1, provided at the outset of the game.

The player attitudes in Figure B4 are identical to the initial attitudes in Figure B2, provided at the outset of the game.

Figure B5 reflects moves made in Round 1.

Figure B6 reflects moves made in Round 1.

Figure B1

Initial Forces							
Players	Armaments			Vulnerability		Posture	Visibility
	Offense shots	Defense shots	Defense hit probability	Shots to Wound	Shots to Kill	Holstered?	Shrouded?
Player A	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player B	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player C	15	0	0.8	10	30	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player D	15	0	0.8	5	20	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player E	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player F	200	0	0.8	10	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player G	200	0	0.8	10	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Total additional defense shots available from G:	280	Per player limit on additional defense shots:	40	Rounds between defense agreement and deployment:	2
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Figure B2

Initial Attitudes							
	A	B	C	D	E	F	G
Player A attitude toward		Hostile	Friendly	Unfriendly	Unfriendly	Friendly	Hostile
Player B attitude toward	Unfriendly		Unfriendly	Unfriendly	Neutral	Neutral	Ally
Player C attitude toward	Friendly	Unfriendly		Unfriendly	Hostile	Friendly	Unfriendly
Player D attitude toward	Hostile	Neutral	Unfriendly		Neutral	Neutral	Friendly
Player E attitude toward	Unfriendly	Neutral	Hostile	Friendly		Neutral	Friendly
Player F attitude toward	Neutral	Neutral	Friendly	Neutral	Neutral		Neutral
Player G attitude toward	Hostile	Ally	Unfriendly	Friendly	Friendly	Neutral	

ROUND 3

Private Communications Prior to Round 3

Player C stated to Player G: “I can tell you that your prudent defensive policy will keep the powers on the continent divided so long as you [do] not meddle with the strategic defensive balance. There is one other issue, however, that may result in instability and therefore should be discussed. Player E’s continued independence is viewed as a long-term threat to my interests. While a more aggressive approach to the situation will certainly result in this threat being neutralized, I, like you, am prudent and would prefer something a bit more constructive. Given your unique relationship with Player E, I feel that you would be in a good position to aid this most necessary process. Only through your continued wisdom shall we avert disaster.”

Player G did not respond to Player C at this time.

Responding to Player D’s statement of support prior to Round 2, Player G queried Player D in a communication to Players B, D, and E: “Would Player D consider making a strong public statement on behalf of Players B and G (assuming Player B agrees) that it is simply unacceptable for Player A to have nuclear weapons? The only way to end this crisis is for Player A to disarm. That said, we understand Player A’s demands and are willing to begin discussing points of negotiation as soon as Player A verifiably disarms. Furthermore, if Player A does not agree to disarm, it is the policy of all of us to take whatever action is necessary to bring this crisis to an end.”

Player D responded: “Player D is willing to make a staunch public statement on behalf of Players B and G.”

Player B responded: “Actually, Player B does have objections to the statement that ‘we understand Player A’s demands.’ Player A’s demands that Player G remove all his forces from Player B’s territory is unacceptable to me, particularly as a pre-condition for talks to disarm. I also have objections to Player A’s other demands, and believe any statement indicating an ‘understanding’ of Player A’s position will be detrimental to regional stability. I do, of course, endorse a strong statement by Player D that Player A’s weapon is unacceptable.”

Public Announcements Prior to Round 3

Following informal arrangements to accommodate Player B’s objections to provisions of a joint

statement regarding Player A’s demands for his disarmament, Player D, on behalf of himself and Players B and G, announced: “Players B, D, and G share the view that it is unacceptable for Player A to have nuclear weapons. Therefore, as a united front, we find that the only way to end this crisis is for Player A to disarm. That said, we are willing to begin discussing points of negotiation as soon as Player A verifiably disarms. Furthermore, if Player A does not agree, that it is the policy of all three of us to take whatever action is necessary to bring this crisis to an end.”

Regarding Player A’s offer to disarm, Player F publicly stated: “Player F congratulates Player A on his remarkably farsighted offer on disarmament, which I fully support. In the spirit of the New Year’s season, I strongly urge that other players do the same.”

Figure B9 reflects moves made in Round 3.

Figure B10 reflects moves made in Round 3.

ROUND 4

Private Communications Prior to Round 4

Player A stated separately to Players C and F, in seeking alliances: “Thank you for supporting my desire to end the threat of nuclear holocaust. Unfortunately, Players B, D and G are not reciprocating our good will. I would like to offer an alliance with you to avoid either of us submitting to threats from B, D and G.”

Player C responded: “The time has not yet arrived for us to enter into a glorious alliance to smash the corrupt and inhuman practices of the capitalist devils. Patience is a virtue and provided that we remain patient, we shall vanquish the enemies of our states. Player C will use its newfound leverage in an attempt to give you more breathing room.”

Player A stated to Player D, in response to Player D’s moves in the previous round to propose alliances with Players B and G: “Your proposed alliance against me with Players B and G has forced me to reconsider my attitude toward you. I also must warn you of the grave consequences of threatening the great peoples of Player A.”

Player D responded: “Dear ‘I am Lonely,’ Player D is hopeful for a peaceful resolution of the current crisis. You won’t feel lonely anymore as soon as you disarm.”

Player B stated to Players D, E, and G: “Do Players D and G have any objection to joining Player B in a public statement expressing disappointment at Player F’s recent announcement [see public announcements later in this section] that it fully supports Player A’s position [on disarmament], and is unhelpful regarding contributions to stability in the region?”

Player D responded: “Player D has no objection to it.”

Player G responded: “No objection.”

Player G responded to Player C’s private communication to him prior to Round 3 regarding Player E: “The bottom line is that I do have a good relationship with Player E and want to continue that relationship. From my perspective, I am willing to support [a]most any peaceful initiative taken by either Player C or Player E [regarding their future relationship]. That is your business. General peace and stability in the region, given my broad vital interests, is my business. To me, the status quo is acceptable. If it is not

acceptable to either Player C or Player E, then I will support your peaceful efforts to change the status quo. In the meantime, Player G will continue to enhance its vital relationship with Player E and work to solidify a good relationship with Player C.”

Player C responded in turn: “My relationship with Player E is not the only concern of yours in the region. If there are efforts made towards solving my problem [regarding Player E], I will certainly be prepared to make a strong effort to solve yours [regarding the disarmament of Player A].”

Public Announcements Prior to Round 4

Player B publicly stated, in accordance with the private agreement among Players B, D, and G regarding Player F: “Player B, with the concurrence of Players D and G, conveys disappointment at Player F’s earlier announcement that it fully supports Player A’s unilateral demands. Player F’s unmitigated support for Player A’s position is unhelpful to promoting stability.”

Player F publicly announced, responding to Player A’s private request for an alliance: “Player F offers to host negotiations between Player A and Players B, D and G. Player F will offer Player A the guarantee of its nuclear umbrella in an alliance relationship, if Player A chooses to disarm and Players B, D and G accept the conditions in the farsighted proposal made by Player A, in the spirit of the New Year’s season. New Year’s greetings and brotherhood.”

Figure B11 reflects moves made in Round 4.

Figure B12 reflects moves made in Round 4.

ROUND 5

Private Communications Prior to Round 5

Player B stated to Players D, E, and G: “Player B would like to strongly oppose Player F’s recent proposal to host negotiations, and would like the strong support of Players D, E and G by their also turning down this offer as nothing but a duplicitous attempt by Player F to further his own goals, which are contrary to promoting international and regional stability.”

Player G responded, stating to Players B, D, and E: “Agreed, except I would simply say that this agreement [proposed by Player A and endorsed by Player F] is unacceptable. Before we even begin talking about any of Player A’s demands, Player A must disarm.”

Player B responded in turn, stating to Players D, E, and G: “OK, agreed.”

Player D responded, stating to Players B, E, and G: “OK. Either Player B or G should make a public announcement on this matter.”

Player E responded, stating to Players B, D, and G: “OK.”

Player G followed up, stating to Players B, D, and E: “Player G feels it is better for regional powers to make this announcement. But let me be clear, Player G stands with his regional friends and allies 100 percent.”

Player B, at the same time, stated to Player G, voicing his lack of faith in Player G’s commitment to their alliance: “Player B would like to express strong disappointment and concern at Player G’s ultimate decision to upgrade his relationships with Players C and F to ‘friendly,’ and especially to upgrade his relationship with Player A from ‘hostile’ to ‘unfriendly.’ Such actions are not commensurate with your publicly stated support of my position. As such, it may be necessary for me to reconsider my alliance with you.”

Player G responded to Player B’s expressed lack of faith by stating to him: “My position is completely consistent. The best result is to compel Player A to disarm peacefully. I simply believe that with regard to Player A, we can best achieve this by gesturing a willingness to work with him. I know full well that he will likely not act in a way that is consistent with our interests, but at least this gives him a chance. If he still does not act appropriately, then I will do whatever is necessary to resolve the problem, knowing that we had done everything possible to achieve a peaceful resolution. As for Player C, he is

simply not threatening us at this point. The one problem is with Player E, but I have been very clear with Player C about my policy regarding Player E.”

Finally, Player B sent the following communication to Players D and E: “Player B states that he has accepted Player E’s request to become an ally with Player B, and welcomes this development. Player B also proposes to Player D that as he forms an alliance with Player B he also consider forming an alliance with Player E. Player B is disappointed and concerned about Player G’s recent actions to upgrade his relations with both Players C and F, and moreover, to upgrade his relations with Player A from hostile to unfriendly. Such actions are not commensurate with Player G’s publicly stated support of Player B’s and D’s positions.”

Player E responded to the statement from Player B by stating to Players B and D: “Player E had not yet requested an alliance, but was planning to do so during this round. Player E will happily accept an alliance with Player B and would like to seek one with Player D. If Player D won’t agree to an alliance, then Player E would like Player D to consider at least an upgraded relationship with Player E. Player A is not the only threat to regional stability, though it is the one acting publicly. Player G is really playing for his own self interest, and so his words are suspect.”

Player D did not respond to the statements by either Player B or Player E at this time.

Public Announcements Prior to Round 5

Player A made the following public announcement in response to Player F’s public announcement prior to the last round regarding hosting negotiations: “Player A accepts Player F’s generous offer and will disarm if Players B, D and G meet all the conditions of Player A’s first public announcement [regarding disarmament].”

Player G made the following announcement on behalf of himself and Players B, D, and E regarding Player F’s negotiations proposal, which followed from their private communications: “In response to Player F’s offer, Players B, D, E and G will not begin negotiations with Player A until Player A begins verifiable disarmament of his nuclear weapons.”

Game Manager’s Note Prior to Round 5

The Game Manager made the following note to himself at this time: “The confusion regarding Player

ROUND 7

Private Communications Prior to Round 7

Player C sent the following missive to Player B in reaction to Player B's action to enter into an alliance with Player E: "Your unwise action [to enter into an alliance with Player E] has plunged our region into a dangerous abyss. I would suggest that you remove yourself from the alliance with Player E or suffer the consequences."

Player C simultaneously appealed to Player G with the following statement: "You were supposed to receive the previous message [by Player D prior to the last round] to highlight the madness that is taking place. Please bring some sense back to your partners."

Player G responded to Player C by stating: "As mentioned in our earlier communication [prior to Round 4], I am interested in maintaining the *status quo* between you and Player E. I understand that the actions of Players B and E [in forming an alliance] are beyond the *status quo* and are of the greatest concern. While I am neither prepared to break my alliance with Player B nor [to] decrease by my level of commitment to positive relations with Player E, I am willing to use my leverage over those players to persuade them to revert to the pre-alliance *status quo*. From your perspective, what can Player G do to help quell this crisis? I would be willing to make some fairly stern statements to my friends Players B and E if you would be more active in helping us compel Player A to disarm. If you join us in demanding that Player A disarm, I will do everything in my power to convince Player B that his alliance with Player E is not the best way to assure Player E's long-term security. With this said, I want to be clear that while Player G is sympathetic to your uneasiness with any alliances with Player E, I continue to believe that Player E has the right to exist in his current state. I have just received Player D's statement. Please assume that I view an alliance between Players D and E very similarly to how I described my view of the alliance between Players B and E."

Player C responded to Player G by stating: "A return to the *status quo* would be the best course of action at the present time. I will not be humiliated by Players B, D and E. I would suggest that you use every tool available to you to convince Players B and D to downgrade their attitudes toward Player E to friendly. The price of moving Player A to disarm has

not changed. As I am sure you are quite aware, what I am suggesting is perfectly aligned with your interests. What Players B and D have done neither serves them nor serves you. You do not want a three-way alliance between Players A, C and F in this environment. You are the superpower, and as such, the only one that can prevent this from spiraling out of control."

Player C responded to Player D's statement regarding his option of forming an alliance with Player E by sending the following messages to Players B and D: "Given that this scenario [as described by Player D in his earlier message] would immediately drive me into an alliance with both Players A and F and would additionally result in a far more aggressive posture on all sides, I do not think that it would be in your interests. I suggest that you consult with your partner, Player G, on why this action would not be conducive to a more peaceful world. Once again, an alliance with Player E is not in the interests of Players B, D, and G. I hope that you will help me move in a more positive direction towards solving our mutual problems."

Player D responded to Player C's message with the following, which he shared with Players B and G: "If Player C does not make an announcement demanding Player A to disarm prior to the next round, Player D will upgrade his relationship with Player E in the next round."

Player G then confronted Players B and D: "Player G finds your willingness to ally with our good friend Player E at this point somewhat disturbing. Why are you provoking Player C at this point? At the moment Player C acts belligerently I would agree with your actions. But up until now he has not done so. Now, I fear that in addition to trying to avoid nuclear war on the A/B peninsula, we may be trying to avoid the same on the C/E strait. If this is part of a greater strategy, please let me know. In the meantime, I have contacted Player C and let him know that if he makes a strong statement against Player A's weapons, then I will work with Player B, D and E to restore [the] pre-alliance *status quo*. I also made very clear that Player G was very committed to ensuring Player E's peaceful existence."

Player D responded to Player G's communication by sending the following message to Players B and G: "Again, Player D will firmly stand with Player G. Player D greatly welcomes Player G's role in pressing Player C to make a strong announcement against Player A's weapons program."

Player C responded to Player D's communication prior to this round by sending the following message to Players A, B, D, F, and G: "If there are no players that are prepared to bring Players B and D back from this madness, Player C will enter into an alliance with Players A and F to balance the power in the region. These aggressive actions have given me no alternative but to defend myself."

Player G then responded to Player C's latest message by stating to him: "Just to be clear beyond doubt, if Player C denounces Player A's weapons program, Player G will work with Players B, D and E to return to the *status quo ante*. I cannot help you with compelling a reunion between Players C and E unless Player E states that that is what he wants, and at that point Player G will do everything in his power to facilitate that outcome. If Player C will not make this statement [regarding the disarmament of Player A] and chooses to form an alliance between Players A, C and F, which is a far cry from an alliance between Players B, D and E, Player G will be forced to join the alliance between Players B, D and E."

Player D then backed off by sending the following message to Player C, which he shared with Player G: "Player D wants to inform Player C that he will not upgrade his relationship with Player E for the time being."

Player F chose to respond to the message sent to him by Player A prior to the last round appealing for an alliance by sending the following message to Player C: "I have been approached by Player A to form a defensive alliance. Would our great friend Comrade C consider joining such an alliance if Player A commits to dismantling his weapons? I am also willing to declare hostility toward Player E, who is being impetuous and unreasonable."

Player C responded by stating: "I would be willing to enter into such an alliance."

Player C immediately turned around and sent the following message to Player A: "I have agreed in principle to enter into the defensive alliance under the terms of which you have agreed to disarm. For all of our sakes (and between the two of us), run the clock on disarmament. I fear that our adversaries are not negotiating in good faith and we may yet need each other's arsenals."

Player F then communicated directly with Player A regarding an alliance between Players A, C, and F by stating: "I remain willing to enter into a defensive

alliance with you and so is our dear comrade Player C. With our arsenals on your side and binding agreements for your protection, we believe you will have a much stronger position vis-à-vis Player B."

Public Announcements Prior to Round 7

Player F made the following public announcement: "Player F deplores the aggressive posture of Players B and D against Player A. Player F urges Player G to bring them back from the brink."

Figure B17 reflects moves made in Round 7.

Figure B18 reflects moves made in Round 7.

Figure B22

Player Attitudes Prior to Round		10						
	A	B	C	D	E	F	G	
Player A attitude towards		Hostile	Ally	Hostile	Unfriendly	Ally	Hostile	
Threatens?		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)		10	0	0	0	0	0	
Shots at (all rounds)		10	0	0	0	0	0	
Player B attitude towards	Hostile		Hostile	Ally	Ally	Hostile	Ally	
Threatens?	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0		0	0	0	0	0	
Shots at (all rounds)	0		0	0	0	0	0	
Player C attitude towards	Ally	Hostile		Hostile	Hostile	Ally	Friendly	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0		0	10	0	0	
Shots at (all rounds)	0	0		0	10	0	0	
Player D attitude towards	Unfriendly	Ally	Unfriendly		Ally	Unfriendly	Ally	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0		0	0	0	
Shots at (all rounds)	0	0	0		0	0	0	
Player E attitude towards	Unfriendly	Ally	Hostile	Ally		Unfriendly	Ally	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0	0		0	0	
Shots at (all rounds)	0	0	0	0		0	0	
Player F attitude towards	Ally	Hostile	Ally	Hostile	Hostile		Neutral	
Threatens?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
Shots at (last round)	0	5	0	25	5		0	
Shots at (all rounds)	0	5	0	25	5		0	
Player G attitude towards	Unfriendly	Ally	Neutral	Ally	Ally	Neutral		
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Shots at (last round)	0	0	0	0	0	0		
Shots at (all rounds)	0	0	0	0	0	0		

ROUND 10

Private Communications Prior to Round 10

Player C issued the following statement to Player G, which he shared with Players A and F: “The Red Alliance of Players A, C and F have launched a devastating and decisive nuclear strike at Player B, D and E. Given the added shots Player F has fired, there will not be an opportunity for Players B, D and E to retaliate. Please note, we have not, nor do we intend to attack you. Should you decide to retaliate, you will be destroyed. There is a new *status quo* Player G. Either we work together in peace, or undermine the futures of our peoples.”

Public Announcements Prior to Round 10

Player G made the following public announcement: “The foundation of the alliance between Players B, D, E and G is an agreement that an attack on one is an attack on all.”

Game Manager’s Note Prior to Round 10

Following the preemptive strike by the Red Alliance in Round 9, a dispute arose regarding the allowance of death-throes shots by the killed Players B, D and E. The Game Manager adjudicated the dispute in accordance with the rules of the game.

Regarding this dispute, Player A made the following argument on behalf of himself and Players C and F: “The alliance of Players A, C and F planned its attacks to achieve decisive destruction of Players B, D and E. In accordance with the game rules, we sought to avoid death throes shots by attacking with more shots than needed to kill to represent overwhelming destruction. We also purposely launched the attacks without a game turn warning so that we could achieve strategic surprise.

“There are numerous historical examples of military surprise, such as Pearl Harbor. Also, India was able to successfully use low-tech deceptive techniques to surprise the United States and EU about pending nuclear tests in 1998. Player G’s assurances that he would somehow know are not credible.

“Also, in the game geography, the attacks were launched over very short spaces also reducing the ability of Players B, D or E from launching retaliatory strikes.

“Therefore, the bloc of Players B, D and E should

not be permitted any death throes shots or the number should be severely limited.”

Player G made the following argument on behalf of himself and Players B, D, and E: “The rules of the game allow for some level of ‘death throes’ shots. If a player is able to launch even one nuclear weapon, then I believe it is reasonable to assume that he has at least rudimentary command, control, and communications capabilities. Therefore, while communications may be minimal, I believe it would be reasonable to assume that Players B, D and E could at least coordinate a response in some minimal way with Player G.”

The Game Manager made the following ruling: “The rules leave it to the discretion of the Game Manager to determine the number of death throes shots available to any player based on the circumstances at the time. These circumstances include the degree of tactical surprise achieved in the attack that killed the player, the size and destructiveness of the attack, and the Game Manager’s judgment regarding the level of coordination between the killed player and his allies, among other things. Thus, Player A raised legitimate points in arguing that Players B, D and E should not be allowed any death throes shots.

“The Game Manager, however, disagrees with Player A’s contention that the Red Alliance had conducted a highly reliable decapitation strike.¹ Further, he disagrees that the Red Alliance achieved strategic surprise in its preemptive strike. Achieving strategic surprise in this case would have entailed catching at least one of the players, if not all, in the bloc of Players B, D and E with weapons holstered. All three had their weapons ready. Rather, the Red Alliance achieved tactical surprise. Regarding communications, the history of the game to this point reveals a considerable degree of communication and coordination among Players B, D, E and G. Therefore, the Game Manager does not think it is unreasonable for Players B, D and E to express their intentions to Player G prior to their

¹ Decapitation strikes inherently involve risks and uncertainties, including when they are based on targeting command and control systems. For detailed analysis of nuclear attacks on command and control systems in the Cold War setting, including attacks for the purpose of decapitation, see Ashton Carter, “Assessing Command System Vulnerability,” in Ashton B. Carter, John D. Steinbruner, and Charles A. Zraket, eds., *Managing Nuclear Operations* (Washington, D.C.: The Brookings Institution, 1987), pp. 555–610.

Figure B23

Status for Control at Beginning of Round: 11							
	A	B	C	D	E	F	G
Has quit?	No	No	No	No	No	No	No
Shrouded?	No	No	No	No	No	No	No
Holstered?	No	No	No	No	No	No	No
Shots at							
Last round	25	0	85	0	0	120	0
All rounds	25	15	85	25	15	120	0
Hits taken							
Last round	25	0	85	0	0	120	0
All rounds	25	15	85	25	15	120	0
Damage	Killed	Killed	Killed	Killed	Killed	Killed	Functional
Offense shots left	5	0	5	0	0	165	0
Defense vesting, last round							
Shots requested:	0	0	0	0	0	0	0
Shots offered by G:	0	0	0	0	0	0	0
Shots agreed to:	0	0	0	0	0	0	0
Round available:	12	12	12	12	12	12	12
Defense shots available:	0	0	0	0	0	0	40
Kill probability	0.8	0.8	0.8	0.8	0.8	0.8	0.8

deaths, at least in a minimal way. Finally, it is true that the size of the attacks on Players B, D and E were larger than required to kill them. Specifically, Player B received 15 hits, when only ten were required to kill him. Player D received 25 hits, when 20 were required to kill him. Player E received 15 hits, when ten were required to kill him. In each instance the killed player received five more shots than necessary to kill him. The Game Manager does not think that the size of these attacks was so overwhelming that they would preclude retaliatory strikes in the course of or shortly after the preemptive strike.

“For these reasons, the Game Manager rules in favor of Player G. On the other hand, the Game Manager assures Player A that he will take the circumstances described by Player A in his appeal into

account if he is called upon to determine how many death throes shots he will allocate to Players B, D and E.”²

Figure B23 reflects moves made in Round 10.

Figure B24 reflects moves made in Round 10.

² The issues raised by the players in this instance suggest an area for further exploration in this proliferated setting. This area, specifically, is coordinated command and control arrangements for the nuclear and defensive forces possessed by friends and allies and their impact on the survivability of retaliatory forces.

Figure B24

Player Attitudes Prior to Round		11						
	A	B	C	D	E	F	G	
Player A attitude towards		Hostile	Ally	Hostile	Unfriendly	Ally	Hostile	
Threatens?		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)		0	0	0	0	0	0	
Shots at (all rounds)		10	0	0	0	0	0	
Player B attitude towards	Hostile		Hostile	Ally	Ally	Hostile	Ally	
Threatens?	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0		15	0	0	0	0	
Shots at (all rounds)	0		15	0	0	0	0	
Player C attitude towards	Ally	Hostile		Hostile	Hostile	Ally	Friendly	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0		0	0	0	0	
Shots at (all rounds)	0	0		0	10	0	0	
Player D attitude towards	Unfriendly	Ally	Unfriendly		Ally	Hostile	Ally	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0		0	15	0	
Shots at (all rounds)	0	0	0		0	15	0	
Player E attitude towards	Hostile	Ally	Hostile	Ally		Hostile	Ally	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0	0		15	0	
Shots at (all rounds)	0	0	0	0		15	0	
Player F attitude towards	Ally	Hostile	Ally	Hostile	Hostile		Neutral	
Threatens?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
Shots at (last round)	0	0	0	0	0		0	
Shots at (all rounds)	0	5	0	25	5		0	
Player G attitude towards	Hostile	Ally	Hostile	Ally	Ally	Hostile		
Threatens?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Shots at (last round)	25	0	75	0	0	100		
Shots at (all rounds)	25	0	75	0	0	100		

Figure B26

Player Attitudes Prior to Round		12						
	A	B	C	D	E	F	G	
Player A attitude towards		Hostile	Ally	Hostile	Unfriendly	Ally	Hostile	
Threatens?		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Shots at (last round)		0	0	0	0	0	5	
Shots at (all rounds)		10	0	0	0	0	5	
Player B attitude towards	Neutral		Neutral	Neutral	Neutral	Neutral	Neutral	
Threatens?	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0		0	0	0	0	0	
Shots at (all rounds)	0		15	0	0	0	0	
Player C attitude towards	Ally	Hostile		Hostile	Hostile	Ally	Hostile	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Shots at (last round)	0	0		0	0	0	5	
Shots at (all rounds)	0	0		0	10	0	5	
Player D attitude towards	Neutral	Neutral	Neutral		Neutral	Neutral	Neutral	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0		0	0	0	
Shots at (all rounds)	0	0	0		0	15	0	
Player E attitude towards	Neutral	Neutral	Neutral	Neutral		Neutral	Neutral	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0	0		0	0	
Shots at (all rounds)	0	0	0	0		15	0	
Player F attitude towards	Ally	Hostile	Ally	Hostile	Hostile		Hostile	
Threatens?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Shots at (last round)	0	0	0	0	0		165	
Shots at (all rounds)	0	5	0	25	5		165	
Player G attitude towards	Hostile	Wld Ally	Hostile	Wld Ally	Wld Ally	Hostile		
Threatens?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Shots at (last round)	0	0	0	0	0	0		
Shots at (all rounds)	25	0	75	0	0	100		

Figure B28

Player Attitudes Prior to Round		13						
	A	B	C	D	E	F	G	
Player A attitude towards		Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	
Threatens?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)		0	0	0	0	0	0	
Shots at (all rounds)		10	0	0	0	0	5	
Player B attitude towards	Neutral		Neutral	Neutral	Neutral	Neutral	Neutral	
Threatens?	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0		0	0	0	0	0	
Shots at (all rounds)	0		15	0	0	0	0	
Player C attitude towards	Neutral	Neutral		Neutral	Neutral	Neutral	Neutral	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0		0	0	0	0	
Shots at (all rounds)	0	0		0	10	0	5	
Player D attitude towards	Neutral	Neutral	Neutral		Neutral	Neutral	Neutral	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0		0	0	0	
Shots at (all rounds)	0	0	0		0	15	0	
Player E attitude towards	Neutral	Neutral	Neutral	Neutral		Neutral	Neutral	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Shots at (last round)	0	0	0	0		0	0	
Shots at (all rounds)	0	0	0	0		15	0	
Player F attitude towards	Neutral	Neutral	Neutral	Neutral	Neutral		Neutral	
Threatens?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	
Shots at (last round)	0	0	0	0	0		0	
Shots at (all rounds)	0	5	0	25	5		165	
Player G attitude towards	Hostile	Wld Ally	Hostile	Wld Ally	Wld Ally	Hostile		
Threatens?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Shots at (last round)	0	0	0	0	0	0		
Shots at (all rounds)	25	0	75	0	0	100		



Appendix C

History of Game Iteration #3: Theater-Only Defenses

ROUND 1

Private Communications Prior to Round 1

Player A sent the following message to Player G following the announcement of his policy of furnishing defenses to other players on a selective basis: “Player A would like to place an order for one defensive interceptor.” (See “Public Announcements Prior to Round 1” in this section.)

Player C sent the following message to Player G: “Do not attempt to upset the strategic balance that keeps my region at peace. Know that I am prepared to meet any challenge your interference presents to my supreme interests.”

Player F sent the following message to Player D: “Player F is offering you an alliance and security guarantees in exchange for a peace treaty to put behind us the unfortunate episode of our earlier conflict. As we agreed in the 1956 protocol ratified by both our parliaments, two islands now under my control will revert to you after the termination of a 99-year lease at \$1 billion per year (through 2104). Player F also requires full implementation of a \$12 billion oil pipeline program and additional investment into eastern Siberia energy projects at \$15 billion for 15 years.”

Player D responded to Player F’s message: “Player D welcomes and will consider the proposal you have made. Player D views economic cooperation under peaceful co-existence with Player F as desirable. How-

ever, Player D would like to see a more positive role played by Player F in resolving the current situation on the A-B peninsula. Player A’s hostility is a threat to regional security. Before I get into any formal alliance with you, therefore, Player D wants to see a strong public announcement by Player F demanding Player A disarm.”

Player F responded in turn to Player D: “I will make a statement to the desired effect regarding the A-B peninsula if you guarantee to sign a peace treaty and fulfill my requirements as stipulated in my earlier communication. As an ally of Player F, you will benefit from an alliance with a large and mighty power, and which has 200 shots.”

Player G sent the following message to all of the other players: “Player G would like to make the following offer to regional partners A, B, C, D, E and F: Player G will offer defenses and the security of its own offensive umbrella to any player who agrees to disarm. I would consider an attack on any player that joins me to be an attack on me and would respond with devastating consequences against any aggressors. This is not meant to be a panacea or to solve all regional disputes. Also, it should not be viewed as an offer to join an alliance. It is meant as a mechanism to reduce tensions so that the fundamental issues that gave rise to the current dangerous situation may be addressed fully, without the looming threat of war. This offer does not change Player G’s commitment to his comprehensive alliance with Player B, nor does it curtail his relation-

ships with Players D and E. As a sign of commitment to this effort, Player G will forgo deploying any defense for himself.”

Player B responded to Player G’s message: “Player B would thus like to state that I am willing to dispose of my offensive weapons if Player G provides me defenses.”

Player G responded to Player B in turn: “You got it.”

Player F responded to Player G’s message: “I greatly appreciate your offer [of defenses] and would encourage Players A, B, C and D to answer your request positively. The cause of stability in the region and especially on the A-B Peninsula urgently requires such action. Such a defensive deployment is likely to ease tensions across the C-E Strait, as well. As a founding member of the nuclear club and your strategic peer and partner of many decades, I would also gratefully accept your kind offer for 40 fully operational defense interceptors. In these numbers, they are incapable of fundamentally changing the balance of power between us. I am ready to discuss the details of their deployment and technical terms and conditions for their transfer. The issues of liability for nuclear and other accidents in connection to their deployment, such as accidental shoot-downs of commercial satellite launches and passenger airplanes are particularly pertinent.”

Public Announcements Prior to Round 1

Player A stated: “Player A announces that he will unilaterally disarm and verifiably dismantle his weapons. In order to create a peaceful environment for Player A to disarm unilaterally, the following conditions must be met:

1. Players B, D and G must sign a treaty of peace and amity with Player A, guaranteeing that they will not attack Player A;
2. Player G must withdraw all his forces from Player B’s territory;
3. Player B must open his borders to trade with Player A;
4. Player B must dismantle his weapons; and
5. Players B, D and G must pay \$25 billion in war reparations to Player A.”

Player B responded to Player A’s announcement by publicly stating: “Player B announces that he has

reviewed Player A’s announcement carefully and concludes that while certain demands are not reasonable (namely, demands 2 and 5), Player B is willing to consider the possibility of signing a peace treaty with Player A, as well as initiating trade relations. Furthermore, Player B will seriously consider dismantling his weapons if Player A shows sincerity in his willingness to create a peaceful environment in the region.”

Player G announced: “Player G’s most immediate defense priority is to maintain peace and stability in the region. It is also his view that fielding defenses for the protection of his territory could have the unintended consequence of destabilizing his relationship with Player F and undermining recent agreements with Player F to limit offensive arms. As a result, it is the policy of Player G to provide defenses to other players on a selective basis, but not deploy defenses for the protection of his territory.”

Game Manager’s Note Prior to Round 1

The Game Manager made the following announcement: “The Game Manager, in the context of Player G’s announced intention of providing defenses to other players on a selective basis, reminds all players that the furnishing of defenses requires that they be requested from Player G and Player G agrees or that Player G proffers the defenses and the other players accept them. If a player requests defenses and Player G does not respond [during] that round, the request will carry over to future rounds unless the request is withdrawn. The actual number of defense interceptors furnished is the lesser of the options between those requested and those offered. For example, a request by Player B for 20 interceptors will result in the furnishing of ten interceptors if Player G decides to transfer only ten. The request for the remaining ten will automatically carry over to future rounds. Finally, the defense interceptors agreed to for transfer will become operational in the second round following the agreement. For example, an agreement to provide Player B with 20 interceptors in Round 1 will result in 20 operational interceptors in Round 3. There is a 40-interceptor limit on transfers. The interceptors have a one-on-one kill probability of 0.8. There are other complexities associated with certain, and less likely, sequences of transactions regarding defense interceptors. The Game Manager will instruct the players on those complexities if and when the need arises.”

The status settings in Figure C3 reflect the initial forces in Figure C1, provided at the outset of the game.

The player attitudes in Figure C4 are identical to the initial attitudes in Figure C2, provided at the outset of the game.

Figure C5 reflects moves made in Round 1.

Figure C6 reflects moves made in Round 1.

Figure C1

Initial Forces							
Players	Armaments			Vulnerability		Posture	Visibility
	Offense shots	Defense shots	Defense hit probability	Shots to Wound	Shots to Kill	Holstered?	Shrouded?
Player A	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player B	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player C	15	0	0.8	10	30	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player D	15	0	0.8	5	20	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player E	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player F	200	0	0.8	10	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player G	200	0	0.8	10	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Total additional defense shots available from G:	280	Per player limit on additional defense shots:	40	Rounds between defense agreement and deployment:	2
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Figure C2

Initial Attitudes							
	A	B	C	D	E	F	G
Player A attitude toward		Hostile	Friendly	Unfriendly	Unfriendly	Friendly	Hostile
Player B attitude toward	Unfriendly		Unfriendly	Unfriendly	Neutral	Neutral	Ally
Player C attitude toward	Friendly	Unfriendly		Unfriendly	Hostile	Friendly	Unfriendly
Player D attitude toward	Hostile	Neutral	Unfriendly		Neutral	Neutral	Friendly
Player E attitude toward	Unfriendly	Neutral	Hostile	Friendly		Neutral	Friendly
Player F attitude toward	Neutral	Neutral	Friendly	Neutral	Neutral		Neutral
Player G attitude toward	Hostile	Ally	Unfriendly	Friendly	Friendly	Neutral	

ROUND 2

Private Communications Prior to Round 2

Player G, consistent with his general offer of defenses to other players, sent the following message to Player A: “Player G is willing to provide you with 40 defensive interceptors in exchange for your disarmament. No other strings attached. Upon completion of this transaction, I would be very open to trading with you and would work with Player B to develop a codified policy of peace on the peninsula.”

Player A responded by stating: “Your offer is very intriguing. I accept in principle, but I am attempting to negotiate the mutual disarmament of Player B as well. Will you support disarmament of Players A and B, along with a defense shield for Player A?”

Player G responded to Player C’s warning prior to Round 1 about upsetting the strategic balance by stating: “Player G understands your concern and is willing to work with you. I have no interest in resolving any problems that exist between you and Player E for you, although I am always available should my assistance be requested. That said, I am good friends with Player E and consider its stability and peaceful existence vital to my interests. So long as relations between you and Player E remain peaceful, I will be supportive of your efforts. Finally, I will be sure to keep you abreast of any strategic decisions that I am making regarding Player E.”

Player E responded to Player G’s general offer prior to Round 1 to provide defenses to other players in exchange for disarmament: “While Player E appreciates Player G’s intentions, it is not realistic, especially without a political alliance, for me to disarm. Player E has requested defenses from Player G in Round 1. While Player E is unable to disarm, Player E hopes that Player G will still grant the request.”

Player G responded to Player E’s message in turn as follows: “Player E, please understand that I am not asking for complete disarmament, only nuclear disarmament. And also, with your nuclear disarmament, I am offering you the full protection of my nuclear arsenal. Finally, while we do not have an official defense alliance, let us be clear, I consider your security to be a top regional priority and will take all appropriate actions to assure your democratic existence. Please reconsider my offer.”

Figure C7 reflects moves made in Round 2.

Figure C8 reflects moves made in Round 2.

ROUND 3

Private Communications Prior to Round 3

Player A sent the following message to Player B regarding an agreement for mutual disarmament: “I agree in principle to a mutual disarmament and trade relations under the condition of mutual disarmament. Why do you still require the presence of Player G’s [conventional] forces?”

Player B responded to Player A’s query as follows: “The presence of Player G’s conventional forces is non-negotiable, as long as Players C and F continue to support you unabashedly. My alliance with Player G should not be a threat to you, especially since you have requested defenses from Player G. Indeed, if Player A can improve relations with Player B, then Player G’s alliance can be beneficial to both of us, particularly given the uncertain intentions of Players D, E, and F in the region. I need more than an agreement ‘in principle’ for disarmament. Once again, I have shown good faith by requesting less defenses than even Player G was willing to provide.”

Player B sent the following message to Player C: “Player B would like to explore the possibility of improving relations with you. I am committed to improving stability and peace in the region, but am concerned about your continued unabashed support for Player A. As you can see from the last round, I requested from Player G fewer defensive interceptors than he offered—this was to show my regional neighbors my good faith and willingness to improve relations. Also, I have every intention of disarming if Player A shows his sincerity.”

Player C responded by stating to Player B: “Like you, I am also committed to improving stability and peace in the region. Unlike you, however, I accept the reality that Player E stands in the way of achieving that outcome. While I applaud your prudent thinking on these matters, you must embrace a more comprehensive view of the problems that affect the region before I can join you in solving them.”

Player B sent the following message to Player D: “Player B would like to state to Player D that based on your new alliance with Player G, and in order to contribute to the atmosphere of stability and peaceful coexistence in the region, I have upgraded my attitude toward you to ‘neutral’ from ‘unfriendly.’ I am even

willing to upgrade to ‘friendly’ if I can be assured of your commitment to support my efforts to improve relations with Player A, but that you will not precipitously engage in a bilateral dialogue with Player A without consultation with me. Before I change the status of our relations again, I would also like your commitment that you are willing to contribute to regional stability by disarming.”

Player D responded to Player B’s statement: “Keeping regional stability by disarming Player A is in my interest. I am more than willing to contribute to peace in the region.”

Player B sent the following message to Player F: “Player B is willing to consider improving relations with Player F, but is still concerned about your unabashed support of Player A. I have shown my good faith and willingness to promote stability and peace in the region and ease tensions with Player A, but am uncertain about Player A’s sincerity. If you are willing to back my good faith efforts, I am willing to improve relations.”

Player C responded to Player G’s message to him prior to the last round regarding Player E by stating to Player G: “Player C applauds your forward-thinking strategy; however, any agreement with Player E must resolve the threat he poses to my vital interests.”

Player D sent the following message to Player F regarding the proposal from Player F at the outset of the game to form an alliance: “At this point, I view that it is desirable to upgrade my attitude toward you to ‘friendly.’ I will consider a further upgrade in our relations in the coming rounds. I look forward to seeing a more positive role by you in pressing Player A to disarm.”

Player G, in the context of Player B’s acceptance of defenses while not yet disarming, sent the following query to Player B: “I upheld my end of the agreement. What happened to yours?”

Player B did not respond at this time.

Player G responded to Player F’s conditional request for defenses in Round 1 at this time by stating to Player F: “I understand your reticence to take me up on my offer of defenses, but I cannot give you any interceptors unless you agree to disarm, as I am not building a defense for myself. Please understand that I am not asking for complete disarmament, only nuclear disarmament. Also, with your nuclear disarmament, I am offering you the full and complete pro-

ROUND 4

Private Communications Prior to Round 4

Player A responded to Player B's statement of rejection prior to the last round regarding the removal of Player G's conventional forces from Player B's territory by stating the following to Players B and G: "Player A is trying to disarm in good faith. Player A is friendly to Players C and F and sees no threat to Player B. Player F has made a public announcement encouraging peace. Only Player G's conventional presence on Player B's territory is an obstacle to disarmament. I do not require Player B to break his alliance with Player G, only that Player G's conventional forces be withdrawn insofar as they are not necessary to peace on the peninsula."

Player G responded to Player A with the following statement, which he shared with Player B: "Player G's interest at this point involves strategic nuclear weapons and nothing else. All other issues can be addressed upon Player A's nuclear disarmament. Upon disarming, Player G will work with both Players A and B to help resolve any outstanding security issues. At this point, however, removing conventional forces from Player B's territory is not an option."

Player B responded at this time to Player G's query prior to the last round regarding Player B's intention to abandon his offensive arms by stating: "Yes, and Player B appreciates it very much—I would like to reiterate how much I value our alliance and your commitment to me. I am certainly committed to upholding my end of the bargain, which is to disarm. However, I believe it should not be done in haste and certainly should not appear that way to Player A. I am extremely concerned about Player A's true intentions, and will disarm only when we can be assured that Player A will also do so. This is why I requested 10 defensive interceptors from you in the first round. I have upped this request in reaction to Player A's actions. Please be assured of my full commitment to our alliance."

Player B also issued the following statement to Players A, C, D, E, and F: "Player B is very concerned about uncertainty in the region. I have in good faith remained unshrouded and holstered in an attempt to stay true to my democratic principles of full transparency and cooperation, but it is of great concern to me that the holstered status of all states (except my ally,

Player G) is now unclear because of the presence of shrouds. Rhetoric about peace is not enough. Trust must be built on sincere and transparent actions. I have made every effort to find a peaceful resolution to the tensions with Player A, and have again shown my commitment to fostering cooperation in the region by improving relations with neighboring players. But Player B cannot continue to remain vulnerable to the unclear intentions of the others in the region. If Players A, C, D, E and F are sincere in their statements, I encourage them to show it through tangible action."

Player G responded in turn by stating: "Player G is getting a little concerned regarding your commitment to disarm. If you are working directly with Player A to achieve his disarmament, please let me know."

Player G made the following query of Player C: "Would you consider nuclear disarmament if Player E did the same and Player G offered you 40 defensive interceptors?"

Player C responded with the following statement: "At this time, I might consider a reduction in my current nuclear forces, provided that Player E disarmed and was not given defensive interceptors."

Player G responded in turn by stating: "That is not possible, unless agreed to between you and Player E. I cannot ask Player E to give up his nuclear weapons without offering him defensive interceptors."

Figure C11 reflects moves made in Round 4.

Figure C12 reflects moves made in Round 4.

ROUND 5

Private Communications Prior to Round 5

Player B sent the following message to Player A, which he shared with Player G: “Player B’s primary concern, along with my ally (Player G), is to ease tensions in the region based on strategic weapons. Player G’s presence on Player B’s territory does not interfere with this issue in any way. This is an issue that can be addressed at a later date, after peace is established between Player A and Player B and nuclear disarmament is complete. For now, the status of Player G’s presence is non-negotiable because it is not pertinent to current tensions.”

Player A responded to Player B’s message by sending the following message to Players B and G while sharing it with all of the other players: “Despite Player G’s announcement to not provide defenses to Player B until Player B disarmed, we now discover that Player G lied. Player B will soon have an overwhelming defensive capability and Player G’s conventional military forces on its territory threatening Player A’s territory. Player A cannot accept that situation. Player G must immediately withdraw all the defenses from Player B or Player A will attack Player G. Player A still wants to denuclearize the peninsula, but the negotiating stance of Players B and G and the wildly escalating arms race prevents further negotiations.”

Player G responded to Player B’s message by stating to him: “By not disarming, you are seriously undermining my credibility. I trusted you to disarm when I offered you the defensive interceptors. I do not want to damage our relationship, but if you do not disarm, I will have to respond.”

Player B responded to Player A’s message in turn by issuing the following statement, which he shared with all of the other players: “Neither Player B nor Player G is being duplicitous. The only reason that Player B has not *yet* disarmed is because of the lack of action on the part of Player A. Player B has every intention to fulfill his commitment to Player G to disarm, but it would be foolish to do so when Player A keeps making unreasonable and irrelevant demands and refuses to contribute to peace and stability in the region by disarming, as he has stated he is willing to do. I reiterate, I am the only player, other than Player G, whose intentions are perfectly clear and transparent, as I am holstered and unshrouded and have main-

tained this posture. Therefore, Player A’s aspersions against my intentions are without merit, as I, unlike any other regional player, do not have an immediate ability to fire my offensive arms. Once again, I strongly urge Player A to show his sincerity, instead of hiding behind empty rhetoric and threats, by disarming. I have every intention to disarm, as well.”

Player B responded to Player G’s message in turn by sending to him alone the following message: “I implore you to trust my actions. I am not trying to undermine your credibility, but I have a deep mistrust of Player A’s intentions. I simply cannot disarm without some action by Player A. This is because I have maintained my holstered position, and done so transparently. I am not capable of using my offensive arsenal immediately. I am more than prepared to disarm, but repeat, must have some action from Player A first.”

Player B sent the following message to Player D: “Now that you have an alliance with Player G, and are considering one with Player F, would you consider improving relations with me? I believe that this will greatly contribute to our mutual security interests.”

Player D responded to Player B’s query regarding an alliance by stating: “My relationship with you has been upgraded to ‘friendly.’ I believe that it would be in our mutual interest to improve them further. I am willing to propose to Player A that if he lifts his shroud and holsters his weapon, as you have, I will upgrade my attitude toward Player A to ‘neutral’ from ‘hostile.’”

Player B responded in turn by stating to Player D: “Player B appreciates Player D’s suggestions. I am still willing to ally with you.”

Player C sent the following message to Player A: “In light of the fact that we are getting our asses kicked, we best think of another strategy here. I am going to go to Player G and request that he restore the strategic balance in the region. I think that given this new situation, we ought to think about an alliance.”

Player C then sent the following message to Player G: “With 40 interceptors going to Player B, you have completely altered the strategic balance in the region. As you are probably aware, one of two things is going to happen. Either alliances will begin to coalesce or I will need 40 defensive interceptors to maintain the regional balance. Please advise.”

Player G responded to Player C’s message by stating: “Player G is confident that Player B will disarm. Please do not make any rash moves at this point.”

ROUND 6

Private Communications Prior to Round 6

Player B sent the following message to Player C: “Player B is disappointed that you are not willing to cooperate with me by improving relations. I have made a good faith effort by upgrading my attitude toward you to ‘friendly.’ I have faithfully agreed to engage Player E, but if you continue to rebuff my efforts to build a cooperative and stable environment with you and your actions remain untransparent, then I may have to explore alternatives.”

Player C responded to Player B’s message by stating to Player B: “Player C remains committed to peace in the region. As to Player E, I have not seen any sign that he is ready to begin to heal the pain that he has caused me. Until this happens, I must retain my defensive posture. Finally, there is one more issue that troubles me. Since you have apparently misled us all regarding your defensive agreement with Player G, how are we to trust you? While I remain shrouded for purely defensive purposes, you continue to lie each and every turn. Until you demonstrate that you are committed to disarmament (per the terms of the public agreement with Player G), I will not upgrade my relationship with you.”

Player C sent the following message to Player F in regard to Player F’s public announcement proposing the creation of a Greater Regional Strategic Defense Initiative (GRSDI): “If Players A and C are forced out of the game, you will be at the mercy of the remaining powers. Because you don’t have the capability to destroy the other four powers, you will eventually have to submit to their demands.” (The GRSDI is described in “Public Announcements Prior to Round 6” later in this section.)

Player F did not respond to Player C’s message at this time.

Player D, in an attempt to help break the impasse regarding the disarmament of Player B, sent the following message to Player A, which he shared with Player B: “Player D believes there should not be any unnecessary mistrust or misjudgment in order to bring peace and stability to our region. Player D wants to remind Player A of his earlier offer [to upgrade his attitude toward Player A to ‘neutral’]. At the same time, Player D urges Player B to remain holstered and unshrouded. I look forward to our working together.”

Player B responded to Player D’s message to

Player A by stating to Player D: “Player B is committed to remaining holstered and unshrouded through the next round. I would like Player D to accept my invitation for an alliance. I will disarm as soon as Player A takes action. Moreover, Player B is very concerned about Player C’s actions, or lack thereof. Player C has refused to reciprocate my efforts to improve relations and remains shrouded. Player C’s actions, therefore, remain highly uncertain. An alliance between Players B and D will offset some of this insecurity.”

Player F responded to Player B’s move in Round 4 to seek an alliance by stating to Player B: “Player F will accept your alliance offer, provided you will transfer one-half (20) of your defensive interceptors to Player F.”

Player B responded to Player F’s statement regarding an alliance by stating the following to him: “While my offer to enter into an alliance with you still stands, I cannot transfer any of my interceptors to you unless Player G approves.”

Player B then turned around and shared the message from Player F with Player G and stated to him: “As part of Player B’s full commitment to the alliance and in gratitude for your understanding despite the diplomatic wounds you have received on my behalf, I am revealing to you the [previous] communication from Player F. I have told Player F unequivocally that I cannot transfer my interceptors to him unless you approve. Thank you for your support and understanding.”

Player G responded to Player B’s forwarding of the private message from Player F by stating to Player B: “I would not approve, unless Player F offered to disarm. You can reiterate to Player F that you are sure that Player G will give him plenty of interceptors if he disarms.”

Player E sent the following message to Player A: “Player A seems very concerned about Player E’s intentions. Player E currently has no demands to make of Player A.”

Player A did not respond to Player E’s statement at this time.

Player E sent the following message of support to Player B: “Player E applauds your transparency and understands the reasoning behind your decision to retain your offensive weapons. Player E further hopes that you will agree with an upcoming public announcement, which Player E will be making. Finally, Player E requests that you consider upgrading your relationship to ‘friendly’ with Player E.”

Player B responded to Player E's message by stating: "Player B thanks Player E for his statement of appreciation. As I am not certain what your public announcement is, I cannot commit to support it, but will make every endeavor to consider it carefully. Moreover, I am concerned about Player C's actions (or inactions), and therefore am suspicious of Player C's motives. I will certainly give all due consideration to your request to improve relations, if you are willing to cooperate with me in getting Player A to disarm."

Player E sent the following message to Player D: "Player E asks that you consider improving your relationship with him, but will understand if Player D feels constrained not to do so."

Player D responded by stating to Player E: "Player D holds the view that it is not a good time to improve his relationship with Player E. However, your proposal will remain under my consideration and I welcome Player E's unilateral action to improve his relationship with me."

Player G, in an attempt to break the impasse regarding the disarmament of Player B, sent the following message to Player A: "I understand how the provision of defensive interceptors to Player B must appear to you. I fully expect Player B to disarm. He blames your inaction for not having done so. This is not an acceptable excuse and Player G is now working to regain his credibility. Player G is prepared to give you ten defensive interceptors for your commitment to disarm—not actually disarm, just a commitment. Once you get the ten interceptors and I get your commitment, then perhaps Player B will disarm. Once Player B disarms, then you can disarm and I will provide you with 30 more defensive interceptors and a nuclear guarantee."

Player A responded to Player G's proposal by stating: "Player A accepts your offer and will look for the immediate delivery of the interceptors. I agree to disarm on the condition that Player B disarms and not until Player B disarms. The best way for Player G to correct the strategic imbalance is to publicly demand that Player B meet the conditions of your agreement and to withdraw his conventional forces from Player B's territory. If Player B does not disarm, then I insist that Player G withdraw the defensive interceptors from Player B. In the interim, I will make a public announcement that Players B and G have upset the strategic bal-

ance and that the world is on the brink of a nuclear holocaust."

Player G responded in turn by stating the following to Player A: "If your offer to disarm is contingent on the withdrawal of conventional forces, then I cannot agree. I offer you ten defensive interceptors. You commit to disarm. When Player B disarms, you then disarm, nothing more, nothing less. Player G will not offer the ten interceptors this round if you are planning on making a public announcement, unless that public announcement is somehow conciliatory."

Public Announcements Prior to Round 6

Player E announced: "Player E, following Player B's lead on transparency, will lift his shroud. Unfortunately, due to security concerns, he will also have his weapons at the ready. He would also like to applaud the work of the other players in working toward regional stability in their various ways."

Player F responded to Player E's announcement by announcing: "Player F unshrouds to promote security and stability and to show its *bona fides* with regards to the joint GRSDI project."

Player C responded to the two announcements by Players E and F above by announcing: "In light of the actions put forth by the other players, Player C will remove his shroud. I will, however, assume a ready position for purely defensive purposes."

Player F announced: "In view of the reluctance by Player G to share defensive and stabilizing technology, I am launching the Greater Regional Strategic Defense Initiative (GRSDI). I am inviting all players to contribute their technological/scientific potential and funds to develop, build and deploy a system that will provide collective security to its members. Contributions will be directly proportionate to the number of interceptors a member will receive. Kindly expedite your responses with regards to your participation in the GRSDI."

Player G responded to Player F's GRSDI proposal by publicly announcing: "Player G applauds Player F and this wonderful program. Player G is so supportive that he would like to be a top tier member/contributor. I would like to partner with Player F in this endeavor in everyway [*sic*] possible. I will help fund, build, manufacture and deploy this great system. Sign me up for a level of contribution com-

ROUND 7

Private Communications Prior to Round 7

Player A sent the following message to Players D and G, which he shared with Player C: “I have demonstrated immeasurable restraint in the face of profound provocation. In the interest of further negotiations, I have not made another public announcement. Make no mistake, however, you are on the brink of nuclear war. I want you to understand my position:

1. Player B is my sworn enemy and you are his friends [Player D] and allies [Player G];
2. Player G maintains conventional forces on the territory of Player B that threaten Player A;
3. Player G has duplicitously supplied Player B with a defensive shield and permitted Player B to retain his offensive armaments despite his announced intentions not to do that; and
4. The actions of Player[s] B and G have disturbed a strategic balance that has endured for 50 years.”

“Player A will not disarm or participate in negotiations anymore until Player G reclaims the defensive shield from Player B. Players B and G have demonstrated that they cannot be trusted to abide by any agreements or even their own public statements. Player A has no choice but to act based on the behavior of Players B and G. To avoid future misunderstandings, Player A announces the conditions under which Players B and G will earn immediate annihilation:

1. If any player is supplied with a defensive shield without disarming first, Player A will attack;
2. If Player B shrouds or unholsters, Player A will attack; and
3. If Players B, D or G make anymore threatening moves toward Player A, Player A will attack.”

Player D responded to Player A’s message with the following, which he shared with Players B and G: “Player D would like to remind Player A of my previous private communication with you, which stated: ‘Player D believes there should not be any unnecessary mistrust or misjudgment in order to bring peace and stability to our region.’ Player D is willing to upgrade his attitude toward Player A to ‘neutral’ from ‘hostile’

if Player A moves to be unshrouded and holstered in the next round, as B has been all along. At the same time, Player D will ensure that Player B continues holstered and unshrouded in all circumstances. Player D will be in close communication with Player G with regard to reclaiming the defensive shield from Player B. In light of the current tension brought [about] by Player A, Player D is committed to restoring regional stability. Player D would like to ask Player A to be unshrouded and holstered as a first step to restore peaceful co-existence.”

Player G did not respond to Player A’s message to him and Player D at this time.

Player B responded in turn to Player C’s statement to Player B prior to the last round regarding the status of Player E and Player B’s disarmament by stating to Player C: “Player B finds Player C’s statements disturbing and extremely unhelpful. I have not lied at every turn. Once again, I point out that I am the only player prior to the last round who showed good faith and remained fully transparent by remaining holstered and unshrouded. This is tantamount to disarmament, as I was the only player in the region who was unequivocally unable to attack anyone immediately. You claim ‘pain’ caused by Player E, and yet you refuse to understand that technically I am still in a state of war with Player A. I have stated unequivocally before and am now fully committed to disarming, but only if Player A sticks to his end of the bargain. It is hypocritical of you to claim rights to a defensive posture, but insist that I should deprive myself of the same right. Once again, if you are not willing to be sincere in your efforts to promote stability in the region by pressing Player A on his responsibilities, then I will have no choice but to find other defensive alternatives.”

Player G sent the following message to Player C: “The threat against you I issued in the last round is in response to your alliance with Player A and his ongoing hostility. I assume that your commitment to Player A’s security is equal to my commitment to the security of my allies. I have no intention of using violence first, but I will respond if violence is used against me or my allies. On the other hand, I have been assured that Player B is disarming. I hope this will lead to an easing of tensions between our two allies, and thus an easing of the tensions between the two of us. If Player B does disarm in the upcoming round and Player A does not do anything rash, then Player G will surely remove

ROUND 8

Private Communications Prior to Round 8

Player B sent the following message to Players A, D, and G in response to Player A's public announcement that followed Player B's disarmament: "Player A's stance is unacceptable. Player A must immediately do more than 'agree to participate in negotiations.' Player B has already disarmed, so there are no further negotiations required—only actions to disarm by Player A. If such actions are not immediately taken, Player A will be jeopardizing the peace and security he claims that he cherishes so dearly." (See "Public Announcements Prior to Round 8" in this section.)

Player C sent the following message to Player G at this time in response to Player G's communication to him prior to the last round: "Given your previous actions, I am not sure what I can believe any longer. That is the price you pay for your earlier deception."

Player E sent the following statement to Player G: "Player E would consider disarming if Player G would guarantee its independence from Player C, in addition to his offer of defenses."

Player G responded by stating to Player E: "Player G will not guarantee your independence. Player C would use such a statement as justification for an attack. However, if you agree to disarm, Player G will give you 40 defensive interceptors, bring you under his nuclear umbrella and strongly state that any act of aggression against Player E is unacceptable."

Player G sent the following message to Player D in response to Player A's announcement in response to Player B's disarmament: "I would advise Player D not to disarm until Player A disarms. Negotiate with Player A directly. Now that Player B has disarmed, you can argue that because he has disarmed Player A ought to disarm as well. You can pledge to disarm in response to the disarmament of Player A. Also, be sure to bring up that Player G will give Player A defenses if he disarms." (See "Public Announcements Prior to Round 8" in this section.)

Player D responded to Player G's suggestion by stating to Players A, B, and G: "Player D has already lifted his shroud and holstered his weapon in order to demonstrate that it is not in Player D's interest to disrupt regional stability. Given that Player B has disarmed, Player D strongly urges Player A to disarm first. Player

D will upgrade his attitude toward Player A to 'friendly' from 'hostile.' Player D is also willing to ask Player G to provide defenses to Player A if he disarms."

Player G sent the following message to Player E in response to his public announcement that he would disarm in the upcoming round: "Player G will offer you defenses." (See "Public Announcements Prior to Round 8" in this section.)

Public Announcements Prior to Round 8

Player A announced: "Player A accepts Player B's wise move in the last round to disarm. Player A will now agree to participate in negotiations to remove nuclear weapons from the peninsula and to increase trade. However, if Player D accepts defenses without disarming, the negotiations will be in danger. The conditions announced by Player A at the beginning of Round 1 are still applicable."

Player C made the following announcement in response to Player B's decision to disarm: "Player C applauds the action taken by Player B. Player C remains committed to peace in the region, and thus will upgrade his attitude toward Player B to 'friendly.'"

Player E announced: "I will disarm in the upcoming round."

Player F announced: "Player F will lift his shroud and be holstered."

Figure C19 reflects moves made in Round 8.

Figure C20 reflects moves made in Round 8.

ROUND 9

Private Communications Prior to Round 9

Player A sent the following message to Players B, D, and G: “For Players D and G, duplicity is now habitual. Player G has repeated many times that he will not provide defenses unless a player disarms. Player B disarmed only under the direct threat of attack. Player D has now been provided defenses and has not disarmed. Player E has disarmed, but has not received defenses. In light of these facts, Player A fails to see any reason to negotiate. Player A is not demanding any preconditions other than Players D and G do what they said they would do. Player A will negotiate when Player D disarms or returns his defenses to Player G.”

Player G responded to Player A’s message by stating to Players A, B, and D: “Player D was offered defenses separately from the original offer to disarm on account that he faced potential aggression by multiple players. It seemed that prior to Round 7 the region was steaming towards war and Player G felt it important to get defenses into the hands of his good ally Player D. Player E got defenses last round based on his decision to disarm. He has disarmed. Player G would be happy to provide Player A with defenses, as well as a nuclear guarantee, if Player A chooses to disarm.”

Player C sent the following message to Player G: “I have upgraded by attitude toward you to ‘neutral.’ In regard to Player E, however, he cannot be allowed to receive 40 defensive interceptors and your nuclear umbrella. As an alternative, I would not be opposed to Player E receiving five interceptors. Additionally, I would ensure that Player A abandons six of his offensive shots, thus giving up his ability to kill even the most vulnerable lesser powers.”

Public Announcements Prior to Round 9

Player F made the following public announcement: “Player F is delighted with the progress. I shall not support anyone who delivers the first strike. I shall accept Player B’s proposal for an alliance. Any outstanding quarrels should be referred to the United Nations Security Council.”

Manager’s Notes Prior to Round 9

The Game Manager noted to himself after consulting with Player A following the conclusion of

the game: “Player A erroneously stated that Player G refused defenses to Player E, despite her action in Round 8 to disarm. In fact, Player G had moved to offer defenses to Player E in Round 8. This was neither a mistake on Player A’s part nor an attempt by him to misstate the facts. Player A had not yet been made aware of Player G’s offer of defenses to Player E when he made this statement. Player A became aware of the true circumstance through Player G’s responding statement.”

The Game Manager announced to all players following consultations with them: “The Game Manager has seen enough progress in this iteration of the game to draw reasonable conclusions regarding stability and is terminating the game at this time. While he concludes that the situation has stabilized, he also acknowledges that not all sources of conflict have been resolved. Specifically, he notes that Players A and D have not disarmed and Players C and E continue to have hostile attitudes toward one another in a context where Player E submitted requests for alliances with Players B, D and G. In this context, he invites any players who wish to do so to submit statements of intent regarding their future actions relevant to the outstanding issues.”

Player A submitted the following statement of intent: “Under the circumstances at the conclusion of this iteration of the game, Player A had no intention of disarming.”

Player B submitted the following statement of intent: “Player B’s intention [was] to turn down Player E’s request for an alliance, but express continued strong support. Player B was also going to offer to upgrade his attitude toward Player A to ‘friendly’ if Player A would disarm and be willing to enter into serious negotiations for a peace treaty.”

Player D submitted the following statement of intent: “In future rounds, perhaps even in the next round, Player D intended to consider seriously a move to disarm. The factors in this decision, beyond current conditions, would have included the aggressive intentions or actions by Players A and C and the strength and durability of the alliance Player D entered into with Player F in Round 7.”

Player G submitted the following statement of intent: “For the record, Player G would not have allied with Player E. Player G would have told Player E that Player E’s security was of paramount importance to Player G, but that an alliance would unnecessarily pro-

voke Player C. In a separate communication, Player G would have told Player C of his commitment to a peaceful resolution of issues between Players C and E and that Player G considers the democratic Player E a very close friend and expects it to be able to exist in peace.”

Appendix D

History of Game Iteration #4: Global Offense–Defense Mix

ROUND 1

Public Announcements Prior to Round 1

Player A made the following announcement: “Player A announces that he will unilaterally disarm and verifiably dismantle his weapons. In order to create a peaceful environment for Player A to disarm unilaterally, the following conditions must be met:

1. Players B, D and G must sign a treaty of peace and amity with Player A, guaranteeing that they will not attack Player A;
2. Player G must withdraw all his forces from Player B’s territory;
3. Player B must open his borders to trade with Player A;
4. Player B must dismantle his weapons; and
5. Players B, D and G must pay \$25 billion in war reparations to Player A.”

Player G announced his policy regarding defenses: “Player G believes the proliferation of offensive nuclear weapons and the means to deliver them is a global problem. Therefore, it is his policy to deploy defenses for the protection of his territory and to provide defenses to other players on a selective basis.”

Player G sent the following message to all of the other players: “Player G would like to make the following offer to his regional partners A, B, C, D, E

and F: Player G will offer defenses and the security of its own offensive umbrella to any player who agrees to disarm. I would consider a nuclear attack on any player that joins me to be an attack on me and would respond with devastating consequences for any aggressors. This is not meant to be a panacea or to solve all regional disputes. Also, it should not be viewed as an offer to join an alliance. It is meant as a mechanism to reduce tensions so that the fundamental issues that gave rise to the current dangerous situation may be addressed fully, without the looming threat of war. This offer neither changes Player G’s commitment to his comprehensive alliance with Player B, nor his close relationships with Players D and E.”

Game Manager’s Note Prior to Round 1

The Game Manager made the following announcement: “The Game Manager, in the context of Player G’s announced intention of providing defenses to himself and other players on a selective basis, reminds all players that the furnishing of defenses requires that they be requested from Player G and Player G agrees or that Player G proffers the defenses and the other players accept them. If a player requests defenses and Player G does not respond that round, the request will carry over to future rounds unless the request is withdrawn. The actual number of defense interceptors furnished is the lesser of the options between those requested and those offered. For example, a request by Player B for 20 interceptors

tors will result in the furnishing of ten interceptors if Player G decides to transfer only ten. The request for the remaining ten will automatically carry over to future rounds. Finally, the defense interceptors agreed to for transfer will become operational in the second round following the agreement. For example,

an agreement to provide Player B with 20 interceptors in Round 1 will result in 20 operational interceptors in Round 3. There is a 40-interceptor limit on transfers. The interceptors have a one-on-one kill probability of 0.8. There are other complexities associated with certain, and less likely, sequences of transactions

Figure D1

Initial Forces							
Players	Armaments			Vulnerability		Posture	Visibility
	Offense shots	Defense shots	Defense hit probability	Shots to Wound	Shots to Kill	Holstered?	Shrouded?
Player A	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player B	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player C	15	0	0.8	10	30	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player D	15	0	0.8	5	20	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player E	15	0	0.8	3	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player F	200	0	0.8	10	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Player G	200	0	0.8	10	50	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Total additional defense shots available from G:	280	Per player limit on additional defense shots:	40	Rounds between defense agreement and deployment:	2
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Figure D2

Initial Attitudes							
	A	B	C	D	E	F	G
Player A attitude toward		Hostile	Friendly	Unfriendly	Unfriendly	Friendly	Hostile
Player B attitude toward	Unfriendly		Unfriendly	Unfriendly	Neutral	Neutral	Ally
Player C attitude toward	Friendly	Unfriendly		Unfriendly	Hostile	Friendly	Unfriendly
Player D attitude toward	Hostile	Neutral	Unfriendly		Neutral	Neutral	Friendly
Player E attitude toward	Unfriendly	Neutral	Hostile	Friendly		Neutral	Friendly
Player F attitude toward	Neutral	Neutral	Friendly	Neutral	Neutral		Neutral
Player G attitude toward	Hostile	Ally	Unfriendly	Friendly	Friendly	Neutral	

ROUND 2

Private Communications Prior to Round 2

Player A responded to Player G's general offer of defenses to other players in exchange for disarmament by stating to all of the other players: "Player A accepts Player G's offer of a security guarantee and defenses in exchange for disarmament. In order to better guarantee Player A's security, Player A demands that Player B also dismantle his arms. Also, since Player A will no longer be armed, Player G's presence on the peninsula is no longer required."

Player G responded to Player A's message by making the following statement to Player A, which he secretly shared with Player B: "I am very happy to see you take me up on my offer. To consummate the deal, I need you to holster your weapon in the next round. Then, upon verifying that you have holstered, I will offer you five defensive interceptors. When you disarm, I will offer you up to 35 additional defensive interceptors."

Player B intervened at this point by sending the following message to Player G: "Player B is very concerned about Player A's ridiculous demands, and sincerely hopes that Player G is not misled by Player A's demands. I have offered to Player A an arrangement for simultaneous disarmament [see "Public Announcements Prior to Round 2" in this section], but this, of course, would be based upon a guarantee by you, my trusted friend and ally, that you would provide me with defenses. I will concede your right to provide defenses to Player A, but I strongly urge you to rebuff Player A's demands to remove your ground forces from my territory. This is a nefarious plot by Player A to conquer me."

Player G responded in turn by stating to Player B: "Player G doesn't care about Player A's demands. They are so ridiculous that they are irrelevant from my perspective. I care about the nuclear arms, and if he disarms I will give him defenses. That's it. I didn't even acknowledge the other stuff. So don't worry. If you would like to take me up on my offer, I will offer you five defensive interceptors in the next round, then up to 35 more upon disarmament. Please remember, you are my ally and Player A is not. I am not fooled by Player A's bombast."

Player B also sent the following message to Player D: "You are aware of my public proposal to Player A

[see "Public Announcements Prior to Round 2" in this section]. However, I am still highly distrustful of Player A, and believe that Player A's motives are not to genuinely contribute to peace and stability in the region. Player B requests that we try to put aside our historical difficulties and form a stronger relationship. Will you consider an alliance with me?"

Player D responded by stating to Player B: "Player D will consider Player B's proposal in the coming rounds."

Player C sent the following message to all of the other players (except Player E): "Player C would like to lend his support to recent advances made toward greater regional stability."

Public Announcements Prior to Round 2

Player B publicly announced: "The demands made by Player A are unreasonable. However, since Player B is interested in contributing to peace and stability in the region, I propose to Player A that I will disarm if Player A agrees to simultaneous disarmament. I will also consider negotiations for a peace treaty to end our historical conflict and the possibility of border trade, but only if Player A shows sincerity through his actions."

Figure D7 reflects moves made in Round 2.

Figure D8 reflects moves made in Round 2.

ROUND 3

Private Communications Prior to Round 3

Player A, in accordance with his formal moves in Round 2, sent the following message to Player G, which he shared with Player B: “Player A accepts Player G’s offer, prior to the last round, of five defensive interceptors. Player A has lifted his shroud and holstered his weapon. Player A has also requested five defensive interceptors, per the agreement. What round will Players A and B agree to simultaneously disarm?”

Player G responded to Player A’s query by making the following statement, which he also shared with Player B: “Player G offered Player B five defensive interceptors in the last round because he was holstered. I will offer Player A five defensive interceptors next round. Player G would prefer for Players A and B to decide on which round they will disarm. Player G will then offer 35 defensive interceptors to each in the following round.”

Player B sent the following message to Player A: “Player B is encouraged by your stance that you are willing to disarm. Given the atmosphere of improving confidence between us, I am concerned about Player C’s hidden motives and Player F’s refusal to disarm. Even with the protection of Player G’s defenses, we are both vulnerable to Players C and F’s arsenals. As such, Player B proposes that we consider declaring a peace treaty, allowing the free flow of commerce, while maintaining the integrity of each of our territories. Once a peace treaty is signed, I will consider asking Player G to remove his conventional forces from my territory.”

Player A responded by stating to Player B: “Agreed.”

Player B sent the following message to Player C: “Player B is concerned about your shrouded status. You claim that you support peace and stability in the region, but none of us can be certain of your sincerity if you remain shrouded. As a good will gesture to you, I would like to inform you that Player E has unilaterally improved his attitude toward me, without any response from me. I would prefer to retain a ‘neutral’ attitude toward Player E for the stability of the region, but I need some assurance from you of your sincere and peaceful intentions.”

Player C responded to Player B by stating to him: “My communication prior to the last round should allay these fears. As a further gesture of good will, I will upgrade my attitude toward you.”

Player B sent the following message to Player D: “Player B has upgraded his attitude toward you as a goodwill gesture. You have indicated that you are willing to consider improving relations in the future, but given the untrustworthy motives and actions of Players C and F, I am gravely concerned about stability in the region. I, therefore, believe it is prudent to form an alliance as quickly as possible to offset any preemptive actions by Players C or F. Will you consider an alliance in the next round?”

Player D responded to Player B by stating to him: “Player D has already updated his attitude toward you to ‘friendly’ in the last round. Since we share the view on taking swift action, I will consider an alliance with you.”

Player F issued the following statement to all of the other players: “Player F is suggesting a trilateral Collective Security Peace Guarantee Agreement (hereinafter CSPGA) to Players C and G to promote and secure peace in the region. According to this proposed agreement:

1. Players A, B and D will disarm and sign a non-aggression pact;
2. Simultaneously, Players C, F and G will provide security guarantees to Players A, B and D, backed up by their offensive arsenals, and an act of aggression by any of the players against another will be met by the full power of the combined arsenals of Players C, F and G;
3. Player G will demonstrate his good will by providing 40 interceptors to Player F (or to Players C and F, if Player G so chooses);
4. Player F will open his oil resources in the East for competitive bidding to those who agree to this initiative; and
5. Player F offers Player D an alliance in return for a peace treaty and Player F will consider returning to Player D two islands currently in Player F’s possession.”

Player B responded to Player F’s initiative by stating to Players A, D, E, and G: “Player B is concerned about Player F’s initiative, which is supported

ROUND 4

Private Communications Prior to Round 4

Player B sent the following message to Players A and G in response to the exchange prior to the last round between Players A and G regarding the timing of the disarmament of Players A and B: “Sorry, but I cannot disarm before I am fully defended and Player A has also simultaneously disarmed. Player A’s decisions to lift his shroud and holster his weapon, while positive steps, are the minimum needed to move forward. My sincerity is fully transparent to all, as I maintain my holstered and unshrouded status. Repeat, I will disarm as soon as all 40 interceptors are in place.”

Player G responded to Player B’s message by stating to Players A and B: “Player G cannot provide the full 40 interceptors until disarmament occurs. That is why Player G encourages Players A and B to agree between themselves when that disarmament will take place. The reality is that once Player G offers the interceptors, he cannot take them away. On the other hand, other players can say that they will disarm and then not do it. Remember, Player G guarantees to both Players A and B that he is fully committed to bringing you under his nuclear umbrella the instant you disarm and that Player G will respond with all necessary force to any acts of nuclear aggression against either of you.”

Player B responded in turn by stating to Players A and G: “Players A and B have agreed to disarm the upcoming round, expecting Player G to give us the defensive interceptors, which we understand will not be operational until the second round following the transfer agreement.”

Player A confirmed Player B’s assertion regarding simultaneous disarmament by Players A and B by issuing the following statement to Player G, which he shared with Player B: “Yes, Players A and B have agreed to disarm this upcoming round.”

Player G responded again by stating to Players A and B: “Just to be clear, Player G will give 35 additional defensive interceptors to Players A and B in the round after both have disarmed. However, those interceptors will not become operational until the second round after I have offered them to you.”

Game Manager’s Note Prior to Round 5

“Prior to the last round, Player F made a proposal

to establish a Collective Security Peace Guarantee Agreement (CSPGA). This proposal by Player F represented a classic great power condominium between Players C, F and G in order to control the lesser powers (Players A, B and D, and indirectly Player E). It was a clever and well-reasoned proposal by Player F that would serve his near-term and long-term interests. It could have been tempting for Players C and G because at least in the short term it would have resulted in a stable outcome, as well as consolidating all three’s dominant positions relative to the lesser powers. Player C was unenthusiastic about the proposal and Player G rejected it outright in a communication to Player B. Player G had both near-term and long-term reasons for rejecting the proposal. In the near term, the proposal would have given Player F access to defensive interceptors without disarming. Thus, Player G could have accepted this proposal only at the expense of his credibility with the lesser powers regarding his policy of requiring disarmament for defenses. In the long term, the acceptance of Player F’s proposal may have generated a concerted policy of lesser power rebellion that would have proved destabilizing. Clearly, Player B’s complaints regarding Player F’s proposal served as an early indicator of such a rebellion. Finally, Player G chose to treat his allies as genuine allies and not as client states. Player C had an immediate interest in the proposal because Player E was left out, which would have reinforced Player E’s diplomatic isolation. Player C, however, was not comfortable with Player F obtaining defensive interceptors while retaining his offensive force. Given Player C’s views, there was a significant probability that he might join a lesser power rebellion. At a minimum, this prospect raises serious questions about long-term stability under Player F’s plan.”

Figure D11 reflects moves made in Round 4.

Figure D12 reflects moves made in Round 4.

ROUND 9

Private Communications Prior to Round 9

Player B, not aware that Player C had already rebuffed Player F's alliance offer, sent the following message to Player C: "Player B is concerned about your continued hostility towards Player E and Player F's willingness to ally with you. I note that you have upgraded your attitude toward me and would very much like to consider improving my attitude toward you, but believe that any alliance between you and Player F would be detrimental to the goals of stability and peace in the region."

At the same time, Player B sent the following message to Player F: "Player B is concerned about your intention to ally with Player C. I note that you have upgraded your attitude toward me and I would like to reciprocate, but I do not believe that an alliance between you and Player C would contribute to peace and stability in the region. I ask that you reconsider."

Player C responded to Player B's earlier message by stating to Player B: "Player C believes that given the current state of affairs a change in attitude is not warranted. I will continue to remain friendly to both you and Player F, provided the *status quo* remains unaltered."

Player F did not respond to Player B's earlier message to him at this time.

Player D sent the following message to Player G: "Player D believes that disarming is not in my interest, particularly regarding the need to counter-balance Player C. Is Player G willing to share more defensive interceptors with Player D?"

Player G responded to Player D's query: "I would be willing to give you five more interceptors following a decision by you to holster, along with an additional commitment by you to disarm. Remember, once your commitment to disarm is made you will enjoy the security of my nuclear umbrella. Also, remember we are allies now, so would-be attackers should be deterred."

Player F, in accordance with his move to seek an alliance with Player D in the last round, sent the following message to Player D: "In view of the strengthening presence of Player G in the region, and to assuage your concerns regarding my pending alliance with Player C, I am offering you an alliance as well."

Player D responded to Player F's message: "Player D believes that forming an alliance with Player F car-

ries a great risk of destabilizing the whole region. This does not support Player D's national interests. Furthermore, I do not appreciate Player F's move to ally with Player C."

Player F responded in turn to Player D: "I would remind Player D that it was Player G that once fired two shots at you and occupied your territory for 60 years. An alliance with Player F would keep Player G's hegemonistic actions away from the region, which is in your vital interests. Think of your dependence on imported oil. If you won't get it from Player F, you will need to import it from half-way around the world, namely the unstable Center East. Finally you will not get your islands back!!"

Player G sent the following message to Players C and F in accordance with his move in the prior round to provide five defensive interceptors to each: "To assure my partners, Players C and F, Player G has offered five defensive shots to each in the last round. Player G would like to reiterate that the dispersal of defenses has nothing to do with political alliances or conventional defense commitments. It is meant purely as a means to reduce the number of nuclear weapons in the region so that other matters may be tended to."

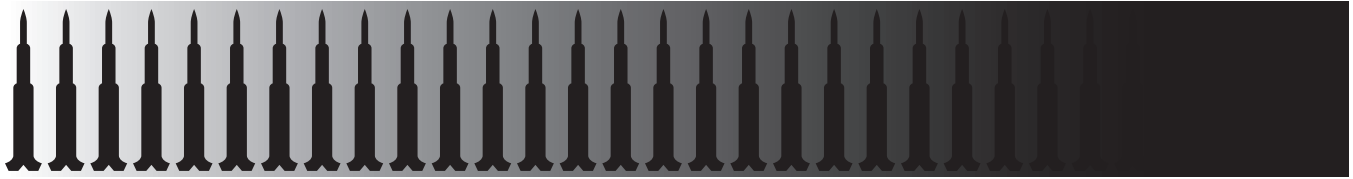
Player G also chose to respond to Player F's CSPGA proposal prior to Round 4 at this time by stating to Player F: "Let Player G be clear. While I would welcome a positive response by Player F to my proposal to furnish defensive interceptors in exchange for disarmament, I did not really expect it. Also, while I do not want to revisit the Cold War, it is worth remembering how much easier it was to manage security with only two nations possessing relevant nuclear arsenals. We have successfully ridged three nations of nuclear armaments. If you could convince Player C to do the same, then we could move forward as friends and partners. Perhaps at that point, Player G would be willing to engage in serious arms reduction talks with Player F."

Player F responded to Player G: "Good points all. I will unshroud and holster as a gesture of good will. I accept the five defensive interceptors with gratitude."

Player G responded in turn to Player F: "I will upgrade my attitude toward you to 'friendly.'"

Public Announcements Prior to Round 9

Player F publicly announced: "Player F has every intention of unshrouding and holstering."



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