Perceptual Illusions and Military Realities

THE NUCLEAR ARMS RACE

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Past research on game theory has used the Prisoner's Dilemma as a model of the nuclear arms race between the superpowers. According to such a model, the United States and the Soviet Union are always better off individually by arming, but if both superpowers arm, the outcome is lower in utility than if both countries disarm. Using survey data from the United States Senate and surrogate Soviet political elites, supplemented by a review of American and Soviet political declarations, the present study suggests that the nuclear arms race may be best characterized as a "perceptual dilemma." Rather than sharing the same matrix of perceived utilities—as in a Prisoner's Dilemma—players locked in a perceptual dilemma hold discrepant perceptions of the payoff matrix, and neither perception corresponds to true outcome utilities. The present article concludes with a brief discussion of the major political and methodological implications arising from the new model.

Our species has been evolving for a quarter of a million years. Today, through the use of thermonuclear weapons, that evolution can be arrested in less time than it takes to mow an average-sized lawn. American Pershing 2 missiles deployed in West Germany can reach the Soviet Union in six minutes—less time than it took the United States government to discover that its nuclear alerts in June of 1980 were false alarms. How did the fate of our species come to depend on nuclear weapons? What are

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the forces that maintain this dependency? And what can we do to break the dependency forever? The purpose of this article is to explore the first two questions in hopes that practicable answers to the third will be suggested.

To account for the dilemma posed by nuclear weapons, I will draw heavily from the literature on experimental gaming (e.g., Rapoport et al., 1976; Schelling, 1960). The focus will be on the arms race between the United States and the Soviet Union, and the responses available to both parties will be dichotomized. "Arming" will denote the status quo, a decision to continue the testing, production, and deployment of nuclear weapons. "Disarming" will denote significant reductions in nuclear weapons, as perceived by the assortment of individuals involved. The obvious disadvantage of dichotomizing the arms race is that many subtle distinctions are lost. For instance, how should one categorize a nuclear freeze, moratorium on testing, or nuclear build-down? What if an individual simultaneously favors the elimination of Pershing II missiles and the production of MX missiles? In such borderline cases, only the roughest approximation of underlying beliefs will be possible. The advantage gained by sacrificing this information, however, is that patterns that are ordinarily obscured may emerge at higher levels of abstraction.

It is precisely at this level of abstraction that experimental gaming may contribute to an understanding of the nuclear arms race. The United States and the Soviet Union can be seen as playing a 2 × 2 game with four possible outcomes: mutual disarmament, mutual armament, American armament and Soviet disarmament, or Soviet armament and American disarmament. Depending upon the matrix of perceived utility that each side attaches to the four outcomes, any one of 576 distinct ordinal payoff matrices may theoretically represent the nuclear arms race (assuming both sides have a strict order of preference for each of the four outcomes). By interchanging rows and columns or relabeling the players, Rapoport, Guyer, and Gordon (1976) have further shown that there are 78 strategically nonequivalent payoff matrices. They have numbered and organized these matrices into a taxonomy according to certain features present or absent in each game.

Of all possible matrices, the one that has received the most attention in psychological research and in application to the nuclear arms race is game 12, known as the Prisoner's Dilemma (represented ordinally in Table 1). To understand this dilemma, it is first necessary to define three terms: dominating strategy, equilibrium, and Pareto-deficient. A *dominating strategy* is a strategy in which one particular choice yields a higher payoff than another *regardless of what the other player chooses*. Some

TABLE 1
Ordinal Preferences in Game 12

	USSR Disarms	*USSR Arms*
U. S. Disarms	2, 2	4, 1
U. S. Arms	1, 4	3, 3

NOTE: *Prisoner's Dilemma.* First number in each cell corresponds to American utility, second number to Soviet utility. A 1 represents the most preferred outcome and a 4 the least preferred outcome.

games involve dominating strategies and others do not. An *equilibrium* is an outcome (cell in the payoff matrix) from which neither player can shift without reducing his or her payoff. And a *Pareto-deficient* outcome, as opposed to a Pareto-optimal outcome, is one in which the joint payoffs accruing to both players are less than they could be if the players were to choose differently. What makes game 12 unique is that it is the only game in the taxonomy in which each player's dominating strategy, in this case armament, leads to a stable Pareto-deficient equilibrium. Cast in terms of the nuclear arms race, each side will always do better if it arms, but if both sides arm, neither will do as well as if both sides disarm. If one side sees the problem and moves to disarm, not only must it endure its worst payoff until the other side reciprocates, it actually removes the incentive for the other side to disarm because the other side is now receiving its highest payoff. Hence the dilemma.

There is a long history of applying Prisoner's Dilemma research to the nuclear arms race. Research on the Prisoner's Dilemma has been sponsored by the United States Arms Control and Disarmament Agency (Lindskold et al., 1972; Shubik, 1968), the United States Air Force (Scodel, 1962), and the Office of Naval Research (Deutsch et al., 1967; Luce and Adams, 1956; Pruitt, 1967, 1970). It has involved members of the International Peace Research Institute (Lumsden, 1966, 1973) and the British Ministry of Defense and Department of Atomic Energy (Brew, 1973). A large body of excellent research, mostly attributable to Svenn Lindskold and his colleagues, has used Prisoner's Dilemma games to test the efficacy of Charles Osgood's GRIT (Graduated and Reciprocated Initiatives in Tension-reduction; Osgood, 1962) proposal[1] for reversing the

1. According to the GRIT proposal, either party to a conflict would elicit cooperation through a series of previously announced unilateral initiatives (e.g., the United States might begin by announcing the withdrawal of all Pershing II missiles from Western Europe). The initiatives would not be tied to specific counterdemands, but would be offered as evidence of the initiating side's sincerity and as an invitation for the other side to participate. The GRIT proposal is discussed at length in Osgood's (1962) book *An Alternative to War or Surrender*.

nuclear arms race (Hamner, 1974; Lindskold, 1978, 1979; Lindskold and Bennett, 1973; Lindskold et al., 1976; Lindskold and Collins, 1978; Lindskold and Finch, 1981; Lindskold et al., 1983; Pilisuk and Skolnick, 1968). And for every classic text that explicitly compares the problems of disarmament or surprise attack to a Prisoner's Dilemma (e.g., Rapoport, 1960; Rapoport and Chammah, 1965; Schelling, 1960), there are many other books, such as Alva Myrdal's *Game of Disarmament* (1982), that make implicit use of gaming.

In addition to myriad psychological studies that have likened the nuclear arms race to Prisoner's Dilemma (e.g., Boulding, 1967; Brams, 1975; Guyer et al., 1973; Miller and Holmes, 1975), Pilisuk and associates have conducted a line of research that explicitly describes the options open to players in terms of a hypothetical arms race (an overview of variations is contained in Pilisuk and Rapoport, 1964). In these studies, Pilisuk extended the standard Prisoner's Dilemma responses to encompass a 21-step gradient of options, ranging from complete armament to complete disarmament. Disarming responses converted missile tokens into factory tokens, symbolic of economic conversion, and in some cases inspection procedures were even built into the simulation (Pilisuk, 1967, 1984; Pilisuk and Skolnick, 1968; Pilisuk et al., 1967). While specific reference to an arms race was not found to increase or decrease overall cooperation relative to a traditional Prisoner's Dilemma variant (Pilisuk et al., 1965), research using an extended Prisoner's Dilemma has led to a number of interesting findings. For example, in a test of Osgood's GRIT proposal, Pilisuk and Skolnick (1968) found that confederates employing matching and conciliatory strategies (in which the confederates displayed missile levels either equal to or slightly less than those held by the subject) elicited greater cooperation than subjects paired naturally, with or without honest prior expressions of intent. Moreover, none of the subjects who faced matching or conciliatory strategies was able to state satisfactorily the principle of the adversary's strategy. Successful disarmament was dependent upon neither expressions of intent nor precise awareness of the opponent's strategy. Deeds spoke louder than words.

THE ROLE OF PERCEPTIONS IN EXPERIMENTAL GAMING

Despite the valuable contributions of Lindskold, Pilisuk, and others, research on experimental gaming has inherited two characteristics from its parent discipline—mathematical game theory—that are not at all descriptive of how people behave. The first holdover from game theory is the notion that N persons play a game. Normatively this shortcut is permissible, but descriptively N people play N games. Even the case in which N players perceive the utility of all outcomes equivalently, in which all have equal knowledge of the game, in which all aspects of the game are equally salient to all individuals, and all players are similarly motivated—even then the players will behave differently from each other, if for no other reason than that each will face a different configuration of adversaries. In laboratory life no less than daily life each player plays a distinct game, whether by motivation, perception, or rules, and it is precisely this interface that contributes to the richness and complexity of social gaming (Berne, 1964). Yet experimental research rarely pairs, for example, two players whose outcome preferences differ ordinally (see Bixenstine et al., [1964], Marwell and Schmitt [1968], and Solomon [1960] for some exceptions). In the few studies that have utilized unique payoffs for each player, the impression that all players are engaged in one game has usually been preserved by labeling the situation an "asymmetric game" (Bixenstine et al., 1964; Schellenberg, 1964; Sheposh and Gallo, 1973; Talley, 1975).

This is not simply a matter of semantics. The strategies each player will employ depend critically upon perceptions concerning the other player's payoffs. Accordingly, any descriptive account of a 2×2 game should include not one but two payoff matrices. The cells in the first player's matrix should contain his or her own self-estimates of utility for each outcome, followed by estimates of how the other player would assign self-estimates of utility (estimates of the first entries in the second player's payoff matrix). Conversely, cells in the second player's matrix should contain self-estimates and estimates of the first player's self-estimates, respectively. There is nothing to prevent both matrices from being identical, but a truly descriptive theory of game behavior must include situations in which players perceive the outcome utilities differently. By reducing a generic conflict situation to one payoff matrix shared by all players, experimental game research has overlooked a major cause of conflict—misperception.

This reduction is related to the second characteristic that experimental gaming has inherited from mathematical game theory: the benign neglect of assessing player's perceptions. Rather than initially determining interval or ordinal utility estimates *in vivo* and later testing variations experimentally, virtually all game research begins by dictating a payoff matrix to the players. Applications and extensions of the game situation to out-

side conflicts are subsequently described through exposition in the discussion section. A literature review of psychological game research has yielded only one published account in which players directly involved in conflict were surveyed about the utilities they attached to various outcomes. During the Cyprus conflict, Lumsden (1973) asked 134 Greek Cypriot and 51 Turkish Cypriot student teachers to evaluate the utility of jointly modifying their positions (peace), jointly maintaining their positions (war), unilateral modification of the Greek position (called "Enosis"), and unilateral modification of the Turkish position (called "Taksim"). It is unfortunate that both groups were asked to estimate only their own utilities for each outcome; as mentioned previously, without utility estimates for the opposing side, the game structure for each group cannot be determined conclusively. It is also true that because they did not participate directly in regulating their countries' moves, student teachers were admittedly not an ideal choice of players. Presumably, those leaders who had a direct hand in regulating the conflict were inaccessible at the time. Even so, Lumsden's work is important in two respects. First, it demonstrates the feasibility of gathering utility estimates to fit an appropriate model empirically to a particular conflict. And second, the configuration of payoffs that Lumsden found was that of a Prisoner's Dilemma, lending support to Prisoner's Dilemma as an ecologically valid model of naturally occurring conflict.

AN ALTERNATIVE MODEL OF THE NUCLEAR ARMS RACE

The present nuclear arms race between the United States and the Soviet Union may well be a Prisoner's Dilemma, but there are other possibilities too. It is conceivable that the nuclear arms race is not a dilemma defined by dominating strategies leading to a Pareto-deficient equilibrium but is instead a *perceptual* dilemma. Specifically, suppose that both the United States and the Soviet Union

(1) prefer mutual disarmament to all other outcomes;

(2) want above all to avoid disarming while the other side arms; and

(3) perceive the other side as preferring unilateral armament to all other outcomes.

In this case neither side has a dominating strategy, such as the arming response in a Prisoner's Dilemma. Disarmament may lead to the best outcome or it may lead to the worst outcome. Because each side believes that its own disarmament is an invitation for the other side to arm—even though both in fact prefer mutual disarmament—an arms race is bound to occur. Furthermore, because neither side can attribute the arms race to its own desire to arm, each will interpret the arms race as confirming evidence that the other side wishes to arm (Jervis, 1976).

Most traditional models of the nuclear arms race, such as the Prisoner's Dilemma, have assumed that each side would ideally prefer unilateral armament. In contrast, a perceptual dilemma assumes that each side most prefers mutual disarmament (whether for economic, strategic, or other reasons) but is prevented from disarming by the perception that the other side favors unilateral armament. Game 48 of the Rapoport, Guyer, and Gordon (1976) taxonomy contains a matrix that, if held by two players who both share the same perspective, would constitute a perceptual dilemma (see Table 2). Game 48 is identical to game 12 in every respect, except that one of the players favors mutual disarmament over unilateral armament[2] (compare the preferences of a player with the row position in Table 2 with the row position in Table 1). Rapoport, Guyer, and Gordon (1976) have therefore referred to game 48 as a "one-sided Prisoner's Dilemma" because the side that favors disarmament is forced, by the other side's half of a Prisoner's Dilemma, to continue arming. If both sides believe that they are the ones in game 48 who favor mutual disarmament, a perceptual dilemma obtains.

As a model of the nuclear arms race, the dually held matrix of game 48 (or any perceptual dilemma) differs in several important ways from a Prisoner's Dilemma. First, although political statements can obviously be used for ulterior purposes, one would expect the American and Soviet press to contain assertions that (1) each side has as its primary objective mutual disarmament; (2) neither side is willing to accept unilateral disarmament; and (3) both sides suspect that the other's objective is unilateral armament. One would also expect a good deal of public frustration on each side, allegations that the other side is responsible for the arms race, "nonmoves" disguised to look like real disarmament initiatives, and allegations that each side is arming defensively while the other is arming aggressively. It is plausible that each side would view the arms

2. Russett (1983: 105) has proposed game 48 as a model of the nuclear arms race during the 1960s, when the United States, taking the row position of Table 2, had a sufficient margin of nuclear superiority to make mutual reductions the most desirable alternative.

TABLE 2
Ordinal Preferences in Game 48

	USSR Disarms	*USSR Arms*
U. S. Disarms	1, 2	4, 1
U. S. Arms	2, 4	3, 3

NOTE: *One-Sided Prisioner's Dilemma.* First number in each cell corresponds to American utility, second number to Soviet utility. A 1 represents the most preferred outcome and a 4 the least preferred outcome.

race as more destructive to itself than the other side, considering that it, after all, is the side that truly desires disarmament.

The clearest difference between a perceptual dilemma and a Prisoner's Dilemma, however, lies in the solution each one dictates. Unlike a Prisoner's Dilemma, in which players are bound in conflict by the structure of the situation, a perceptual dilemma is solved by persuading each side that the other side sincerely desires mutual disarmament, even more than unilateral armament.[3] For example, if members of the Politburo were assured that row's preferences in Table 2 were representative of American utilities, and if, as they have said, mutual disarmament is more highly favored than unilateral armament, little reason would remain for their continued participation in the nuclear arms race. The problem for research in conflict resolution would then become how best to convince each side of the other's true perceptions.

IS THE NUCLEAR ARMS RACE A PERCEPTUAL DILEMMA?

In order to determine outcome preferences for the nuclear arms race empirically, a survey of political leaders was designed to solicit utility ratings for (1) mutual disarmament; (2) mutual armament; (3) unilateral armament by the United States; and (4) unilateral armament by the Soviet Union. Individuals were also asked to take the perspective of the other

3. The difference between a perceptual dilemma and a Prisoner's Dilemma parallels Boulding's (1959) distinction between "illusory" and "real" incompatibility. According to Boulding, in illusory incompatibility "there exists a condition of compatibility which would satisfy the 'real' interests of the two parties but in which the dynamics of the situation or illusions of the parties create a situation of perverse dynamics and misunderstandings, with increasing hostility simply as a result of the reactions of the parties to each other, not as a result of any basic differences of interest" (1959: 130).

country's leadership estimating the same four outcomes according to its own utility. The scale ranged from a minimum of -10 (worst possible consequences) to +10 (best consequences imaginable),[4] with 0 as the midpoint (consequences neither good nor bad). Respondents were not asked to include their names or any identifying information, although a coding system on the back of all surveys allowed for the identification of respondents.

Respondents were selected on the basis of direct participation in regulating their country's moves (Brody, 1966). It is undoubtedly true that all of us, to a degree, share this responsibility. For purposes of the survey, however, the American players chosen were the president, secretary of defense, and the United States Senate (N = 1, 1, and 100). Soviet players included all members of the Politburo, members of the Secretariat who were not members of the Politburo, and the chairman of the Soviet Peace Committee (N = 19, 4, and 1).[5]

RESULTS OF THE SURVEY

As might have been predicted, the president of the United States, the U.S. secretary of defense, and the Soviet leaders declined to participate.

4. This measurement technique is somewhat similar to the Self-Anchoring Scale used by Kilpatrick and Cantril (1960) for interpersonal and cross-cultural utility comparisons.

5. Each survey was accompanied by a one-page cover letter reproduced on watermarked stationery from Stanford University and hand-signed by a well-known professor of psychology. I hand-signed cover letters to the Soviet Union also. Written in English, the Soviet letters addressed each respondent by name, requesting assistance with "research on peace and arms control." Requests to the president of the United States and the U.S. secretary of defense were very similar to the Soviet letters, with the addition of a stamped, self-addressed envelope and an offer to send a free report of the survey results.

Unlike the other cover letters, requests sent to the United States Senate were not personalized. These letters, which opened only with "Dear Senator," were co-signed by the professor mentioned earlier and a prominent dean at Stanford University (the dean was unable to sign the other letters due to scheduling constraints). Survey requests mailed to the United States Senate were similar to those sent the President and Secretary of Defense, with the following five exceptions: (1) a stamped, self-addressed postcard was enclosed, should respondents wish to obtain a copy of the research results under separate cover (so as to avoid associating a completed survey with the addressee listed on the postcard); (2) the survey forms began with two additional questions—one on political party affiliation and the other on whether current defense spending should be increased, decreased, or maintained; (3) all requests were sent by certified mail, in order to make them stand out in importance; (4) "ATTN: Legislative Assistant on Foreign Policy" was typed in the lower left corner of each envelope to help route surveys to the appropriate individuals efficiently; and (5) one to three days in advance of arrival, calls were placed to each senator's legislative assistant on foreign policy to alert them to the coming letter. All surveys were mailed between April 25 and May 21 of 1984.

Their positions will therefore be examined later in a review of the American and Soviet press. Of the 100 survey requests sent to the United States Senate, 32 were completed and will form the basis of the present analysis. The background of those senators who responded was subjected to a number of analyses, and no selection biases emerged. The survey did not seem to draw senators with any one view of defense: 11 senators favored reductions in defense spending, 7 supported the status quo, and 14 favored spending increases. Respondents hailed from the Northeast, Southeast, the South, Central Plains, Midwest, Northwest, Southwest—in short, from all over the country. The average population of respondents' home states was 4,251,860, close to the national average of 4,516,780, and state per capita incomes averaged 96.5% of the national average (based on 1980 census figures; Barone and Ujifusa, 1983). Of the senators 53% were Republican, almost identical with 55% of the Senate at large; and the mean age of respondents, 55.3 years, was only six months older than the 54.8-year mean for all U.S. senators. Even the percentage of committee chairmen—6%—compared favorably with the 10% figure for the Senate as a whole. Thus, although the return rate was only 32%, the respondents were surprisingly representative of the entire Senate.

To determine whether senators responded seriously to the survey, an indirect manipulation check was conducted. Answers on the first two survey questions were compared with actual political affiliations and past votes on defense spending. A 0-2 point defense spending index, predicated on whether senators supported or opposed two major defense spending bills in 1983, was computed for each senator. Scores of 2 indicated that the senator voted in favor of Senate Concurrent Resolution 27 and Defense Authorization S 675, scores of 1 indicated that the senator voted in favor of only one of these bills, and scores of 0 indicated opposition to both bills (higher index numbers denoted greater defense spending). By combining the first two survey questions in the following multiple regression equation, 63% of the variability in voting behavior was explained:[6]

6. Political party was assigned a 1 if Democratic and a 2 if Republican. Positions on defense spending were coded as 1 (decrease), 2 (maintain), or 3 (increase). As an aside, it is interesting to note that the best predictor of the "defense spending index" was not a senator's position on defense spending but rather his or her political party affiliation. Positions on defense spending correlated .45 with the voting index (Cramer's statistic, n.s.), while party membership correlated .72 with the index (Cramer's statistic, $p < .001$). Party membership was not significantly related to positions on defense spending (Cramer's statistic = .17, n.s.). One plausible explanation is that senators are free to hold their own opinions—opinions that they may express in a seemingly anonymous survey—yet they find themselves highly constrained along party lines when partisan issues come to the floor. If true, this might explain why politicians so often find it difficult to fulfill campaign promises (Graber, 1976; Tetlock, 1981). It would also imply that a Democratic senator, even one who favors increases in defense spending, is more likely to reduce defense spending than a Republican senator who wishes to cut the military budget.

$$\text{Index} = \underset{(.37)}{-1.38} + \underset{(.20)}{1.15}(\text{political party}) + \underset{(.11)}{.33}(\text{opinion on defense spending})$$

It seems, then, that answers to at least the first two survey questions were quite consistent with the senators' actual behavior.[7]

When examining senators' utility estimates, it is important to keep in mind that ratings were made on an interval scale and that there is no problem-free way to average utilities across individuals. It is a bit like averaging temperature estimates from Fahrenheit and Celsius scales; higher numbers correspond to greater heat, and much higher numbers correspond to much greater heat, but an interpretation of the average heat between fifty degrees Fahrenheit and fifty degrees Celsius depends upon the conversion rule: $C = 5(F - 32)/9$. Utility estimates have no standard conversion rule. Although the utility scale was bounded by −10 and +10, and the centerpoint and endpoints of the scale were explicitly defined in the survey, it is likely that the scale was used differently by each senator. Average utilities across individuals must therefore be regarded only as rough estimates of the collective utility of an outcome.

Average utility ratings across all 32 senators are shown in Table 3. As seen, the payoff matrix matches game 48, a one-sided Prisoner's Dilemma with the United States cast as the side that favors mutual disarmament. Indeed, unilateral armament by the United States is barely viewed as a positive outcome, falling fully 7 scale points behind the first choice of mutual disarmament. Unlike the United States, however, unilateral armament was perceived as the Soviet Union's most highly desired outcome, significantly higher than corresponding utility estimates for the United States (6.97 versus .97, $t(31) = 5.22$, $p < .0001$). The senators also tended to grant the United States significantly higher utilities than the Soviet Union for mutual disarmament (7.97 versus 5.88, $t(31) = 3.95$, $p < .001$), and lower utilities for a mutual arms race (−5.31 versus −.91, $t(31) = 6.03$, $p < .0001$).

Because a small number of extreme ratings may have influenced the ordinal arrangement of average utilities, each senator's utility estimates were transformed to an ordinal scale and subjected to separate analyses for American and perceived Soviet preferences. Combining both sets of

7. There were other indications that the senators took the survey seriously. Many added comments or qualifications in the margins, and others modified or corrected initial estimates. None of the senators skipped over a question, and in only one case were values mistakenly entered in the wrong slot (the questionnaire appeared to repeat the same four outcomes in the same order, but the two unilateral armament outcomes were actually reversed in the second half of the survey). Senators used the full range of the scale, and most important, the responses they gave corresponded closely with a priori expectations of strategically defensible positions.

TABLE 3
American-Soviet Utility Estimates
for Nuclear Arms Race Outcomes

	USSR Disarms	*USSR Arms*
U. S. Disarms	7.97, 5.88 (1, 2)	−6.66, 6.97 (4, 1)
U. S. Arms	.97, −7.31 (2, 4)	−5.31, −.91 (3, 3)

NOTE: Utility estimates as perceived by 32 United States senators. First number in each cell corresponds to American utility, second number to perceived Soviet utility. Higher numbers denote higher utility. Ordinal preferences are given within parentheses.

TABLE 4
Ordinal Utilities for the United States

	DD[1]	*DD-AD*[2]	*AD*	*AD-DA*	*AD-AA*	*AA*	*AA-DA*	*DA*
First choice	26	3	3	0	0	0	0	0
Second choice	3	3	18	2	1	3	0	2
Third choice	0	0	3	3	1	21	1	3
Fourth choice	0	0	1	1	0	6	1	23

NOTE: Frequencies based on utility estimates from 32 United States senators.
1. Outcome labels are as follows:
DD–mutual disarmament.
AD–American armament and Soviet disarmament.
DA–American disarmament and Soviet armament.
AA–mutual armament.
2. Hyphenated categories represent outcomes of equal utility.

preferences, payoff matrices from 10 of the respondents fulfilled all three conditions for a perceptual dilemma, and 7 of these matrices directly corresponded to game 48. No other utility configuration was selected as often as game 48. Contrary to the historical assumptions of experimental game research, none of the senators viewed the nuclear arms race as a Prisoner's Dilemma.

This analysis is somewhat misleading, however, because senators do not regulate the arms race as individuals; they vote as a legislative body. That being the case, the frequency with which senators adopted particular outcomes as a first, second, third, or fourth choice was tabulated in Tables 4 and 5 (hyphenated outcomes denote equal utility estimates for the two alternatives). As is apparent, the most frequently selected outcome for each choice position is the one that corresponds to game 48. More important, all three components of a perceptual dilemma were endorsed by the majority of senators: 66% believed that unilateral armament is the first choice of the Soviet leadership, 72% believed that unilateral armament by the Soviet Union would be the worst outcome for the United States, and 81% attached the greatest American utility to mutual disarmament. In other words, if the senators had to vote on each of the assumptions underlying a perceptual dilemma, the assumptions would pass comfortably in each case.

TABLE 5
Ordinal Utilities for the Soviet Union

	DA[1]	*DD-DA*[2]	*DD*	*DD-AA*	*AA*	*DA-AA*	*AA-AD*	*AD*
First choice	21	3	8	0	0	0	0	0
Second choice	5	3	16	3	4	1	0	0
Third choice	1	0	3	3	20	1	2	2
Fourth choice	0	0	0	0	2	0	2	28

NOTE: Frequencies based on utility estimates from 32 United States senators.
1. Outcome labels are as follows:
DD–mutual disarmament.
AD–American armament and Soviet disarmament.
DA–American disarmament and Soviet armament.
AA–mutual armament.
2. Hyphenated categories represent outcomes of equal utility.

THE SURROGATE STUDIES

Although Soviet leaders did not respond to the mail survey, their beliefs concerning the three components of a perceptual dilemma can be reconstructed from the results of an earlier program of survey research conducted by the United States International Communication Agency (Guroff and Grant, 1981). In these studies, known informally as the "surrogate" studies, a large number of Americans and Western Europeans who had close ties to Soviet political elites were asked to answer questions as their Soviet counterparts would. The American and European surrogates represented government officials, academicians, foreign policy specialists, journalists, and individuals in business. Despite certain obvious drawbacks in using surrogates, the authors found near consensus on several critical questions that could not be addressed to Soviet leaders directly. Unbeknownst to the researchers, among these questions were the three components of a perceptual dilemma.

In discussing Soviet priorities, Guroff and Grant (1981) stated repeatedly that questions of war and peace were of overriding importance to

Soviet leaders and that the Soviets viewed arms control as "logical, even imperative" (p. 16). The authors also wrote, however, that "Soviet elites find it difficult to interpret proposed massive new arms expenditures in the United States as other than attempts to, first, gain military superiority and, second, drive the Soviet economy to bankruptcy" (p. 16). According to Guroff and Grant (1981: 16), "Soviets say that they will never allow the United States to gain outright military superiority over them again, that they will make whatever sacrifices are necessary to prevent this." The three components of a perceptual dilemma could hardly be stated more succinctly.[8] Additional support for the Soviet half of a perceptual dilemma is found in the work of such eminent Sovietologists as Bialer and Afferica (1982), Caldwell and Legvold (1983), Garthoff (1978), Holloway (1984), and Talbott (1984), and among Soviet writers who specialize in international security affairs (see Bykov, 1980; Luzin, 1981).

A SUPPLEMENTAL REVIEW OF AMERICAN AND SOVIET POLITICAL DECLARATIONS

Of course, senators who responded to the mail survey are not the only American leaders involved in the nuclear arms race, and a surrogate study of Soviet elites does not examine the Soviet view of Soviet views. In the absence of direct survey responses from Soviet leaders or American leaders outside of the Senate, we turn now to excerpts from the American and Soviet press (represented in Table 6). An assumption of this analysis

8. An equally clear treatment of the Soviet perspective is found in the introduction of *Whence the Threat to Peace* (third edition), published in 1984 by the Moscow Military Publishing House:

> The measures the socialist countries are taking to strengthen their defenses are a legitimate reply to the danger that has been created, to the attempts of the United States and the other NATO countries to tip the military balance in their favor. The USSR is not striving for military superiority and has no intention of dictating its will to others. But it will not allow the existing military equilibrium to be destroyed. At the same time the Soviet Union speaks out consistently against the buildup of nuclear arsenals and in favor of halting the dangerous trend of events and reversing the arms race [p. 4].

Ironically, U. S. Secretary of Defense Caspar Weinberger prefaced the 1983 edition of *Soviet Military Power*, the equivalent publication by the Pentagon, with the following words: "The updated facts presented in this report leave no doubt as to the USSR's dedication to achieving military superiority in all fields" (p. 3).

is that, while it is true that ulterior motives may be implicated in political statements, public declarations are probably not at great variance with the beliefs of the constituency to which they are addressed (for evidence on the validity of political declarations, see Axelrod and Zimmerman, 1981; Hermann, 1980; Tetlock, forthcoming). Table 6 contains statements that directly document the three components of a perceptual dilemma, as well as additional statements that bear on questions of defense and aggression. The sampling of American statements is taken from the time period marked by the presidency of Ronald Reagan. Most Soviet statements cover the time period since arms control negotiations were broken off in December of 1983.

In neither case are the statements intended to be exhaustive, nor do they constitute a random sample. Rather, representative statements have been culled from the American and Soviet press in an attempt to illustrate the official positions of both governments with respect to nuclear disarmament. Eckhardt and White (1967) did conduct a controlled content analysis of statements by two American and Soviet leaders, however, and their results strongly supported the similarity of American and Soviet political declarations. In a 31-category value analysis of 1,400 statements by John F. Kennedy and 2,564 statements by Nikita S. Khrushchev, these authors found a striking similarity between the two leaders on five indices of "conflict-mindedness," including the relative frequency of denunciation, statements of justified aggression, and declarations of strength.

Table 6 begins by isolating statements made by the President of the United States and the three most recent General Secretaries of the Soviet Union (Yuri Andropov, Konstantin Chernenko, and Mikhail S. Gorbachev). On numerous occasions, these leaders have spoken unambiguously on topics that correspond to the conditions necessary for a perceptual dilemma, and in all cases the results have supported the implication of a perceptual dilemma in the nuclear arms race. The same is found when examining statements made by the American secretaries of state and of defense,[9] Soviet foreign and defense ministers and deputies, and high-ranking political advisors and commentators on both sides. Both sides have declared that (1) mutual disarmament is their goal; (2)

9. Although U. S. Secretary of Defense Caspar Weinberger did not complete the survey, he instructed Frank J. Gaffney, Jr., the deputy assistant secretary for strategic and theater nuclear forces policy, to reply on his behalf. According to Gaffney, Secretary Weinberger "is committed to the achievement of significant, equitable, and verifiable arms reductions." In other words, mutual disarmament is most desirable, but an arms race is preferable to an inequitable agreement. Taken in tandem with the material in Table 6, it would appear that Secretary Weinberger's views conform to a perceptual dilemma.

TABLE 6
American and Soviet Political Statements

Statements by the President	*Statements by the General Secretary*
Assumption 1: Mutual Disarmament Most Favored	
"We want more than anything else to join with them in reducing the number of weapons" [Reagan, *NYT*, 6/15/84: 8].	"We have been and remain convinced advocates of halting the arms race and reversing it. The whole set of proposals advanced by the Soviet Union is directed to this end" [Chernenko, *Pravda*, 4/9/84: 1-2].
"We seek neither military superiority nor political advantage" [Reagan, *NYT*, 6/15/84: 8].	"The only reasonable way out of the existing situation is agreement of the confronting forces on an immediate termination of the race in arms, above all, nuclear arms. . . . We do not strive to acquire unilateral advantages over the United States, over NATO countries, for military superiority over them; we want termination, not continuation of the arms race" [Gorbachev, *NYT*, 3/12/85: 6].
"We want to develop a more realistic working relationship with the Soviet Union, one marked by greater cooperation and understanding and by progress in arms reductions" [Reagan, *NYT*, 6/22/84: 3].	"Retalitory measures by the Soviet side will be kept strictly within the limits that are dictated by the actions of the NATO countries. The Soviet Union–and we stress this anew–does not seek military superiority. . . . The Soviet Union states, in no uncertain terms and as firmly as possible, that it remains attached to a principled course aimed at ending the arms race–above all, the nuclear arms race" [Andropov, *Pravda*, 11/25/83: 1].
Assumption 2: Unilateral Disarmament Least Favored	
"My administration, our country, and I are committed to achieving arms reduction agreements. . . . But we cannot reduce arms unilaterally" [Reagan, *NYT*, 11/19/81: A17].	"We do not demand military superiority, we have no intention of dictating our will to others, but we will not allow the military equilibrium that has been achieved to be upset" [Chernenko, *Pravda*, 2/14/84: 1-2].
"We refuse to become weaker while potential adversaries remain committed to their imperialist adventures" [Reagan, *NYT*, 6/18/82: A16].	"Our country does not seek [nuclear] superiority, but it also will not allow superiority to be gained over it" [Chernenko, *Pravda*, 4/9/84: 1-2].
Assumption 3: Unilateral Armament Perceived as Most Favored by Other	
"For the Soviet leaders peace is not the real issue; rather, the issue is the attempt to spread their dominance using military power" [Reagan, *NYT*, 6/28/84: 8].	"The main obstacle–and the entire course of the Geneva talks is persuasive evidence of this–is the attempts by the U.S. and its allies to achieve military superiority" [Andropov, *Pravda*, 1/13/84: 1].

TABLE 6 Continued

Statements by Other American Leaders	*Statements by Other Soviet Leaders*
Assumption 1: Mutual Disarmament Most Favored	
"What we should be doing is reducing the number of nuclear weapons and their destructive capability" [Secretary of State George P. Shultz, January 17th Press Conference reported in the *NYT*, 1/18/84: A1:A4].	"The Soviet Union remains attached to its principled course aimed at ending the arms race, above all the nuclear arms race" [Ogarkov, Former First Deputy of Defense, *Pravda*, 12/6/83: 4].
"We have consistently taken the position that reducing nuclear weapons must be the most important objective facing both countries" [Robert C. McFarlane, National Security Advisor, *NYT*, 11/23/84: A6].	"It is necessary above all to abandon attemps to upset the existing military-strategic equilibrium, to stop the buildup of nuclear arms, and to undertake efforts to limit and reduce these arms" [A. A. Gromyko, Foreign Minister, *Pravda*, 2/15/84: 2].
Assumption 2: Unilateral Disarmament Least Favored	
"Nothing less than equality is acceptable in the provisions of any future strategic arms limitation agreement" [Alexander Haig, Secretary of State, *NYT*, 5/12/82: A8].	"We have repeatedly stated that the arms race is not our goal. But the Soviet Union has been compelled to take the necessary steps to prevent the imperialists from gaining advantages that would allow them to dictate conditions in their favor" [Marshal D. F. Ustinov, Minister of Defense, *Pravda*, 4/7/83: 4].
Assumption 3: Unilateral Armament Perceived as Most Favored by Other	
"The configuration of the Soviet buildup in the arms-control era is unambiguous. The arms are not designed for defense but for producing a world pliant to Soviet designs" [George Will, Political Commentator, *Newsweek*, 6/18/84: 104].	"The U.S. and a number of NATO countries are trying to eliminate the approximate equality of military forces, that exist in Europe" [L. M. Zamyatin, head of the Central Committee's Department of International Information, *Pravda*, 12/6/83: 4].
"Moscow and Washington are not at loggerheads today because of misperception or misunderstanding. . . . The Soviet Union is shocked and even angered to find that the USA has reversed its course and will no longer accept efforts by the Soviet Union to achieve military advantage. It is for this reason that the Soviet Union walked out of the arms control talks" [Colin S. Gray, member of the general advisory committee of the Arms Control and Disarmament Agency, *USA Today*, 6/15/84: 10A].	"The international situation remains tense as a result of the course adopted by the U.S. and the NATO bloc to achieve military superiority over the U.S.S.R. and the Warsaw Treaty bloc" [B. Orekhov, Staff Correspondent, *Pravda*, 3/17/84: 4].

(continued)

TABLE 6 Continued

Statements by Other American Leaders	*Statements by Other Soviet Leaders*
In response to the questions "Why do you think the Russians are doing what they're doing?", Mr. Weinberger said the following: "Well, it's very hard to get inside the Soviet mind. I have not attempted to do that. We have a lot of people who spend their lives doing that and writing about it, and most of the people who do that seem to feel that since this [Soviet military buildup] is entirely offensive in character and since it includes all kinds of preparations for what appear to be very long conflicts and since it includes an enormous amount of global power projection all over the world, that they are simply doing what they have, what their original doctrine has always talked about, and that is world domination" [Caspar W. Weinberger, Secretary of Defense, June 9th Press Conference reported in the *NYT*, 3/10/83: A1, A10].	"The White House is openly pursuing a course aimed at the achievement of military superiority for the U.S. over the U.S.S.R. and for NATO bloc over the Warsaw Treaty Organization. . . . The U.S. administration's course aimed at achieving military superiority is also distinctly manifested in its approach to the talks on the limitation and reduction of nuclear arms. The White House is not interested in achieving positive results. . . The U.S. does not want any accords, and it is openly working toward the achievement of military superiority over the countries of the socialist commonwealth" [Marshal D. F. Ustinov, *Pravda*, 11/19/83: 4].
American Leaders	*Soviet Leaders*
Attributions of Defense and Aggression	
"Our defense policy is based on a very simple premise: the United States will not start fights. We will not be the first to use aggression. We will not seek to occupy other lands or control other peoples. Our strategy is defensive" [Reagan, June 9th Press Conference reported in the *NYT*, 3/10/83: A1, A10].	"The measures we are taking to strengthen our defense capability, as has been stressed more than once in Soviet government statements, are dictated by the actual situation developing in the world. . . . Soviet military doctrine is defensive in nature" [Marshal D. F. Ustinov, *Pravda*, 11/19/83: 4].
"Our whole strategy and our whole program is defensive. NATO is a defensive alliance, we are a defensive power. We do not start fights, we do not launch wars, we do not seek to impose our wills on any other nation. Our aim is simply to preserve our peace and freedom and that of our allies" [Caspar W. Weinberger, Secretary of Defense, June 9th Press Conference reported in the *NYT*, 3/10/83: A1, A10].	"In view of the increasing nuclear threat, the Soviet leadership has been forced, as is known, to take appropriate retaliatory measures" [Ogarkov, Former First Deputy of Defense, *Pravda*, 12/6/83: 4].
"The United States does not start fights. We will never be an aggressor. We maintain our strength in order to deter and defend against aggression" [Reagan, *NYT*, 3/24/83: A20].	"Difficulties in international life have forced us to divert considerable resources to needs related to the strengthening of the country's security" [Chernenko, *Pravda*, 3/3/84: 1-2].

SOURCES: Soviet statements taken from the *Current Digest of the Soviet Press* unless otherwise noted; *NYT* denotes *New York Times*.
NOTE: Political offices listed were those held at the time statements were made.

unilateral disarmament is unacceptable; and (3) the goal of the other side is unilateral armament.

In the final portion of the table, the president of the United States, former General Secretary Chernenko, and those in charge of defense for both countries claim that their own armament has been purely defensive, in response to international aggression. While it is true that neither side would publicly claim its own behavior was aggressive, these statements should not be dismissed out of hand as propaganda. In a perceptual dilemma, the intention behind an arming response is ambiguous; the other side might arm in order to secure its highest payoff (as perceived by the first side), or it might arm in order to prevent its least preferred outcome. Let us assume that each side sincerely believes that, by arming itself, it is preventing its least preferred outcome—unilateral armament by the other side. What intention will it infer if the other side arms?

The logical response is that the other side views unilateral armament as its highest payoff. "If the other side truly wanted mutual disarmament," each side might reason, "it could easily have it, since we have repeatedly stated that mutual disarmament is our goal." The problem is, of course, that although both sides have declared mutual disarmament as their goal, neither believes the other wants anything short of nuclear superiority, however unattainable.[10] Said another way, the problem is that the other side does not perceive the same payoff matrix as does the first side; it perceives a mirror image of sorts (Bronfenbrenner, 1961).

10. Although many American leaders have argued that it is clear the United States has eschewed nuclear superiority, there is reason enough for Soviet leaders to remain skeptical. U. S. Secretary of Defense Weinberger has prepared a comprehensive proposal to "regain nuclear superiority over the Soviet Union within this decade" (*New York Times*, August 14, 1981: A1, A11). Equally revealing, the majority of Americans agreed with the following Harris Survey item in 1984: "Even though he says he wants to negotiate with the Russians, President Reagan doesn't really want to negotiate until the U. S. has real military superiority over them, and he is only agreeing to sit down with them now to ease criticism of his handling of relations with the Russians during the campaign for reelection" (*World Opinion Update*, October 1984: 157).

The tendency to view armament by the other side as aggressive is reinforced by a number of social-psychological biases. For example, Nisbett, Caputo, Legant, and Marecek (1973) found a tendency to make situational attributions for one's own behavior and dispositional attributions for the behavior of others. Translated in terms of the nuclear arms race, this bias results in perceptions of one's own behavior as the natural response to dispositionally aggressive adversaries. Labeling biases also preserve the other side's "aggression" (Plous and Zimbardo, 1984). Labeling works like this: (1) Superpower A arms; (2) Superpower B takes the armament by Superpower A as evidence of an aggressive disposition; (3) Superpower B arms; (4) Superpower A takes the armament by Superpower B as evidence of an aggressive disposition; (5) thereafter, any armament by Superpower A is aggressive *because* it is Superpower A that is doing it and (6) the same goes for Superpower B. The initial identification of a superpower as aggressive has come full circle to become evidence of aggression, thereby obstructing disconfirmation and perpetuating a self-fulfilling prophecy (Deutsch, 1983; Frank, 1983). Because the arming response appears to signify not only the other side's highest payoff but the sole choice in which the other side can attain superiority, the same mechanisms that lead to perceptions of aggression may also lead to dispositional attributions of ambition, world domination, or imperialism. Thus, the arming response serves to confirm a critical assumption of the perceptual dilemma that gave rise to armament in the first place (Jervis, 1976). Finally, disarmament and armament resemble trust and distrust; the asymmetry that makes it more difficult to trust than distrust, or to prove than disprove, makes it more difficult to disarm than to arm. This is because any generalization can be discredited with one or two counterexamples, but a large number of positive cases do not necessarily prove that a generalization is true. Considering that the attribution of trustworthiness is essentially a generalization, lies lead to distrust more quickly than truths lead to trust (Plous, 1983).

To take an example, suppose that the Soviet Union were suddenly to increase its armed forces by one million troops. Unquestionably, the United States would view the Soviet move as aggressive. But what would happen if the Soviet Union were suddenly to announce, in the name of disarmament, a unilateral reduction of one million troops? Would American leaders respond enthusiastically with reciprocation or greater trust?

As a matter of fact, the Soviet Union announced just such a reduction of forces on May 14, 1956. "Wishing to make a new contribution toward

the cause of disarmament and safeguarding peace," the Soviets said, the Soviet government would take the following steps:

> 1. To carry out in the course of one year, i.e., by 1st May 1957, a new and still greater reduction in the armed forces of the Soviet Union, namely by 1,200,000 men in addition to the reduction of 640,000 carried out in 1955.
>
> 2. In conformity with this, to disband sixty-three divisions and independent brigades, including the disbanding of three air divisions and other military units numbering more than 30,000 men which are stationed on the territory of the German Democratic Republic. Also to disband a number of military schools of the Soviet Army. To put into reserve 375 warships of the Soviet Navy.
>
> 3. In conformity with the above, to reduce the armaments and military equipment of the Soviet armed forces, as well as Soviet military expenditure within the Soviet state budget.
>
> 4. The demobilized service men from the armed forces will be given the opportunity of obtaining employment in industry and agriculture [*New York Times*, June 15, 1956: 8].

What was the American response? The day following the Soviet announcement, the *New York Times* ran a cover story reporting that

> Officials in the State and Defense Departments welcomed the Soviet action, but explained that such a manpower cut meant little, for the world had no way of checking it or knowing whether it was accompanied by reductions in armament. Yet these officials acknowledged the Russians would probably reap broad propaganda advantages. . . . By announcing now that it is unilaterally cutting its forces by 1,200,000 men, United States officials observed, the Soviet seeks to give the impression that it is making a sacrifice in the interests of peace. . . . Some military men observed today that it was easier for the Soviet than for the United States to make large and swift cuts in military manpower because the Soviet forces are less tied to elaborate equipment and services. In any event, it was said, the Russians have immense additional manpower resources in the satellite states and Communist China.

In other words, American leaders said that the Soviet cuts (a) were done as propaganda; (b) were easier for the Soviets to do than for the Americans; (c) were meaningless, because cheating was possible; and (d) even if cheating did not occur, would have little military impact.

On the next day, the *New York Times* quoted Charles E. Wilson, then secretary of defense, as saying that the Soviet move will "not appreciably

alter Soviet military power, nor does it clearly disclose what their intentions might be" (June 16, 1956: 8). Calling the Soviet cut a "logical realignment of Russian military power," Wilson went on to say that the reduction, if carried out, would not justify "any appreciable cut in our military strength." The secretary of state, John Foster Dulles, was even less hopeful. According to the same article,

> A Canadian reporter, somewhat baffled by the Secretary's consistently negative comments, asked whether it was not fair to conclude that Mr. Dulles would be happier if the Soviet Union kept the 1,200,000 men in its armed forces.
>
> "Well, it's a fair conclusion that I would rather have them standing around doing guard duty than making atomic bombs," Mr. Dulles said.

CONCLUSIONS

The purpose of the present study has been to demonstrate that, given the data available, a perceptual dilemma has more support than any other model of the nuclear arms race. The Prisoner's Dilemma, a tacit model of the arms race in a great deal of research, was not endorsed by a single senator surveyed, even under conditions of seeming anonymity. This is not to say that peace research using a Prisoner's Dilemma is without value—far from it. As Lumsden (1973) has shown, the Prisoner's Dilemma has been an excellent model of at least one serious international conflict and is probably applicable to a wide variety of naturally occurring conflicts. It is conceivable, too, that the nuclear arms race will be best approximated by a Prisoner's Dilemma once substantial reductions have been made in the nuclear arsenals of both superpowers; without the overkill represented in each country's present stockpiles, unilateral armament may become more appealing than mutual disarmament.[11]

Two qualifications precede any conclusive interpretation of the present results. First, to suggest that a perceptual dilemma underlies the nuclear arms race is to make a generalization about how a majority of individuals view the nuclear arms race. It is not a statement about how all individuals view the situation. Any comprehensive resolution of the nuclear arms race will need to address the perspectives of individuals for whom a perceptual dilemma does not apply. Second, while the present results suggest that the nuclear arms race is largely a perceptual dilemma, the data are limited in several respects. Direct utility estimates are needed from a wide range of individuals beyond the United States Senate and need to include members of the Soviet leadership. Some means are necessary to ensure that leaders, and not their staff members, are the ones making estimates (although it might be argued that legislative assistants closely parallel political leaders anyway, and that they are responsible in many cases for developing policy in the first place). Also, it should be noted that the utility measures used in the present study were, for the sake of expediency, phrased as a one-trial game, although the nuclear arms race has already encompassed hundreds of moves. Until techniques are developed to partition and order individual moves, taking into account fluctuations in utility and other aspects of the game, little can be said about the temporal course of the nuclear arms race.

11. A Prisoner's Dilemma may have also been implicated in early stages of the nuclear arms race. At one time, for example, former U. S. Secretary of Defense Robert S. McNamara stated that the United States posesses and "will maintain" nuclear superiority over the Soviet Union (*New York Times*, September 19, 1967: 18-19).

The present findings underscore the importance of assessing outcome utilities whenever possible, instead of assuming a priori that a particular payoff matrix corresponds to a particular conflict. If experimental gaming is to reflect the psychological richness of naturally occurring conflict, each player must be accorded his or her own matrix of perceived payoffs. By traditionally representing conflict situations with a single payoff matrix, experimental gaming has underemphasized misperception as a controlling variable in studies of conflict (Gamson and Modigliani, 1971; White, 1970). The present results also demonstrate the value of using field research to link specific game matrices empirically to specific conflicts; without such a linkage, researchers may be providing the right solutions to the wrong problems.

Several questions might be addressed through future laboratory research. First, if two subjects are presented with payoffs conforming to a perceptual dilemma (e.g., the perspective of the player favoring mutual disarmament in game 48) but are in fact facing another player with payoffs identical to their own, will behavior similar to the nuclear arms race evolve? Second, how long will these players continue without realizing that the other player prefers the same outcome as do they? Third—and most important—in the absence of trust and in the presence of tenacious opposition, what are the best ways to resolve a perceptual dilemma?

Politically, it has never been more critical for America to perceive Soviet intent accurately and for the Soviet Union to perceive American intent accurately. How bitterly ironic it would be if our species, with the gift of intellect that distinguishes it from more aggressive brethren, were to

destroy itself over a psychological *illusion* of aggression—and yet how consistent with the history of the nuclear arms race. As Walter Millis (1958: 12) observed long ago,

> The world's first atomic bomb was borne out of the frantic fear that the Germans might beat us in the race for the weapon. The Germans, it turned out later, were not even in the race. The race was a fantasy; the bomb, when it appeared, was tragically real.

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