Double deterrence: Two challengers, one defender

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During the cold war the conventional wisdom was that an all-out war between the United States and the Soviet Union was all but precluded. The key to this strategic nirvana was a carefully calibrated *balance* of strategic weapons and the high costs associated with nuclear conflict. The policy that was credited to bringing this state of affairs about was labeled Mutual Assured Destruction, or MAD. Each side threatened to obliterate the other if it were attacked. Based on this logic, some strategic thinkers argued for the selective proliferation of nuclear weapons, to Iran for example, in order to stabilize the relationship between two otherwise hostile states (Waltz, 2012). Others argued that Ukraine was misguided to have surrendered its nuclear arsenal in 1994 (Mearsheimer, 1993).

However, the theory underlying this policy, sometimes called Classical (or inappropriately, rational) Deterrence Theory, does not pass the test of strict logic (Zagare, 1996). It assumes, simultaneously, that the players are both rational and irrational—rational when they are being deterred and irrational when they are deterring. Bernard Brodie, considered by many to be the seminal deterrence theorist, put it this way: “For the sake of deterrence before hostilities, the enemy must expect us to be vindictive and irrational if he attacks us” (Brodie, 1959, p. 293). The noted game theorist, Thomas Schelling, who was the recipient of the 2005 Nobel Prize in economics, also argued that nuclear deterrence only worked if an aggressor was convinced that its opponent would retaliate—irrationally. As he wrote so succinctly: “… another paradox of deterrence is that it does not always help to be, or to be believed to be, fully rational, cool headed, and in control of one’s country.” In other words, it was rational to be irrational (Schelling, 1966: 37).

Logically inconsistent theories are *prima facie* seductive, yet fatally flawed. They invite theorists with a point of view to draw almost any conclusion, including its exact opposite, depending on the analyst’s policy preferences. So, it is unsurprising that other classical deterrence theorists, working from the same set of assumptions, oppose disseminating nuclear weapons to Iran or to any other state actor including Ukraine.

To overcome the logical inconsistency of Classical Deterrence Theory, Marc Kilgour and I have constructed an alternative theory that insists that the players are rational (or purposeful) at all times. We call it Perfect Deterrence Theory (Zagare and Kilgour, 2000)[2]. In this alternative specification there are certain conditions under which wars cannot be avoided. For example, it is *possible* that Russia may still have invaded Ukraine even if the Ukrainians had not given up their nuclear capability once the Soviet Union broke up. Low level conflicts are very difficult to deter, as are situations where one state seeks to deter an attack on an ally. Worse still is the propensity of these conflicts to escalate. Sunk costs may play a role here. But so may uncertainty about the extent of resistance, if any. Risk taking leaders are the most dangerous.

For obvious reasons, both Classical Deterrence Theory and Perfect Deterrence Theory have focused on dyadic relationships. It is clear, however, that that focus now needs adjustment. In the current environment, there are currently two dissatisfied major nuclear powers that would prefer, *ceteris paribus*, an adjustment of the rules that support the international political and economic system as it operates today. At the global level, then, a key question is how a defender of the status quo might deal with two potential challengers.

The answer to this question depends, in part, on the relationship of the two challengers. There are three possibilities:

1. Both dissatisfied actors act independently in separate disputes. If this is the case, there is no need for new theory. Current theory still applies. Assuming that the conditions needed to deter the most problematic case are met, these same requirements would suffice to deter the less problematic case

[2] The theory’s name reflects its reliance on Selten’s (1975) definition of rational strategic behavior. Strict adherence to his *perfectness* criterion assures logical consistency and sets it apart from Classical Deterrence Theory, which presumes the possibility of both rational and conditionally irrational decisions by the same player in the same game. No claim is made that the theory itself is perfect.

as well. The assumption of independence implies that it is highly unlikely that the two disputes would break out simultaneously.

2. Both actors operate as one in a tacit alliance. Again, current theory can handle this case, as it did during the Cold War.
3. The second (secondary) actor (Challenger 2) becomes a player if and only if the primary actor (Challenger 1) upsets the status quo. It is clear that it is this special situation that requires further scrutiny.

The purpose of this essay is to extend the logic of Perfect Deterrence Theory to the third case, which, for expository purposes, will be referred to as the three-body problem. To my knowledge, this case has not, as yet, been analyzed using game theory. Nonetheless, it is not a novel problem, as discussed below.

It is important to note that, unlike Classical Deterrence Theory, Perfect Deterrence Theory is not simply a divergent theory of nuclear war avoidance. Rather, it is a universal theory of conflict initiation, escalation, and resolution, applicable to both nuclear and nonnuclear interactions. In other words, it applies to both conventional challenges to the status quo that have the potential to escalate, and to direct deterrence confrontations between and among nuclear powers.

The collection of game-theoretic models that constitute the theory assumes that the players in the game prefer to win or, if necessary, to lose at the lowest level of conflict. Most other preference relationships are taken as strategic variables. For example, some players might prefer *Conflict* to losing. Players with such a preference are assumed to have *credible* threats, that is, threats that are rational to execute. Other players, with the opposite preference, have threats that lack credibility. The players also may or may not prefer the *Status Quo* to *Conflict*. A player whose opponent prefers the *Status Quo* to *Conflict* is said to have a capable threat, that is, a threat that hurts (Schelling, 1966: 7). Threats that do not hurt are considered incapable. Thus, there may be four types of threats: threats that are both credible and capable, threats that are neither, threats that are credible but not capable, and threats that are capable but lack credibility.[3]

In the analysis that follows, a simple three-person game model will be described and analyzed under a variety of (plausible) assumptions about the credibility of the players' threats. These assumptions will be made explicit and justified. As a first cut the game will be explored under the condition of complete information. Information is complete when the players are fully informed about each other's preferences (or goals). After that, the assumption is relaxed. A focused version of the game will be analyzed under incomplete information—that is, when the players are unsure about whether the other players prefer to execute their threats when challenged.

1. Game Form

Three-body deterrence games may arise in a variety of empirical circumstances. For example, at various times in the 19th century, Germany faced potential threats from both Austria and Russia, not to mention France. Not surprisingly, an important goal of Bismarck's diplomacy was to neutralize Austria in order to minimize the probability of a conflict with Russia. He was successful. In 1879 he negotiated an alliance with Austria that ended only when Germany was defeated after the First World War. Similarly, in 1939, following the invasion of Poland, the United States feared that it might be drawn into a war with both Germany and Japan. Ultimately, deterrence failed, first in the Pacific and, shortly thereafter, in Europe.

Regardless of the conditions that give rise to them, three-body deterrence situations, by definition, share a number of common characteristics. The Double Deterrence Game depicted in Figure 1 is a simple, yet

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[3] In Perfect Deterrence Theory capable threats constitute a necessary condition for deterrence success. In other words, deterrence of a dissatisfied actor is not possible when a defender of the status quo lacks a threat that is capable. Thus, for the purposes of this essay, all deterrent threats are assumed to be capable. By contrast, threat credibility will be treated as a variable.

plausible, model that reflects the most salient of these commonalities. For example, there is one player, called Defender, and two potential opponents, a primary opponent, here called Challenger 1, and a secondary opponent, here called Challenger 2[4]. The choices of the two Challengers are game-theoretically interconnected, but they are assumed to make independent strategic choices. In other words, the choice of the second Challenger will depend not only on the Defender's choice, but on the choice of Challenger 1. To put this in a slightly different way, the assumption will be that Challenger 1 presents the immediate threat to Defender, while Challenger 2's threat is both contingent and latent.

The Double Deterrence Game is a three-person noncooperative game that fully captures what Snyder and Diesing (1977) refer to as the "precipitant-challenge-confrontation scheme." As Figure 1 shows, in this game Challenger 1 begins play at node 1 by deciding whether to *Demand* a change in the *Status Quo*, or to *Concede* the issue by doing nothing. Of course, if Challenger does nothing, the game ends before it begins, and the *Status Quo* holds. But if Challenger 1 makes a demand, Defender (at node 2) is faced with a difficult decision—whether to *Comply* with the demand or *Defy* Challenger 1. What happens after Defender's choice will depend on the choice of one of the two Challengers.

Consider first the implications of Defender's choice to resist Challenger 1's demand at Node 2. In this case, at Node 4 Challenger 1 could *Back Down*. If and when this occurs, the game ends and the outcome is *Defender Wins*. But if Challenger 1 decides to *Press On*, a conflict occurs at some unspecified level. The type of conflict that breaks out, however, depends on Challenger 2's choice. If (at node 6) Challenger 2 decides to remain neutral and conciliate Defender, Defender's conflict is solely with Challenger 1. On the other hand, if Challenger 2 makes its own Demand, Defender's conflict is with both Challengers, its nightmare scenario.

Consider now the implications of Defender's choice to Comply with Challenger 1's demand at Node 2. Once Defender capitulates, *Challenger 1 Wins* regardless of Challenger 2's choice at Node 3. But Challenger 2's choice has implications for Defender. If at Node 3 Challenger 2 issues its own demand, Defender has another difficult choice to make. Complying with Challenger 2's demand at Node 5 implies a win for both Challengers (Challengers 1 and 2 Win). Defiance, by contrast, implies a more limited *Conflict* with the weaker Challenger 2 (but a win for Challenger 1 nonetheless).

To be sure, the Double Deterrence Game of Figure 1 is extremely austere. Specifically, the consequences of Defender's choice at Node 5, and of Challenger 2's choice at Node 6, have been truncated. These decision nodes could easily be extended to include a subsequent choice by Challenger in the first instance or a subsequent choice by Defender in the second, or both. Nonetheless the presumption is that these simplifications are useful. A "no-fat" modeling approach allows a firm focus on the critical role played by deterrent threats in a game in which there are two challengers. In a future study, if warranted, these simplifications could be modified or relaxed.

[4] There is nothing in the logic of the Double Deterrence Game that requires that the primary challenger to be stronger than the secondary challenger. Challenger 1 should be thought of as the immediate challenger and Challenger 2 as the *possibly* opportunistic challenger.

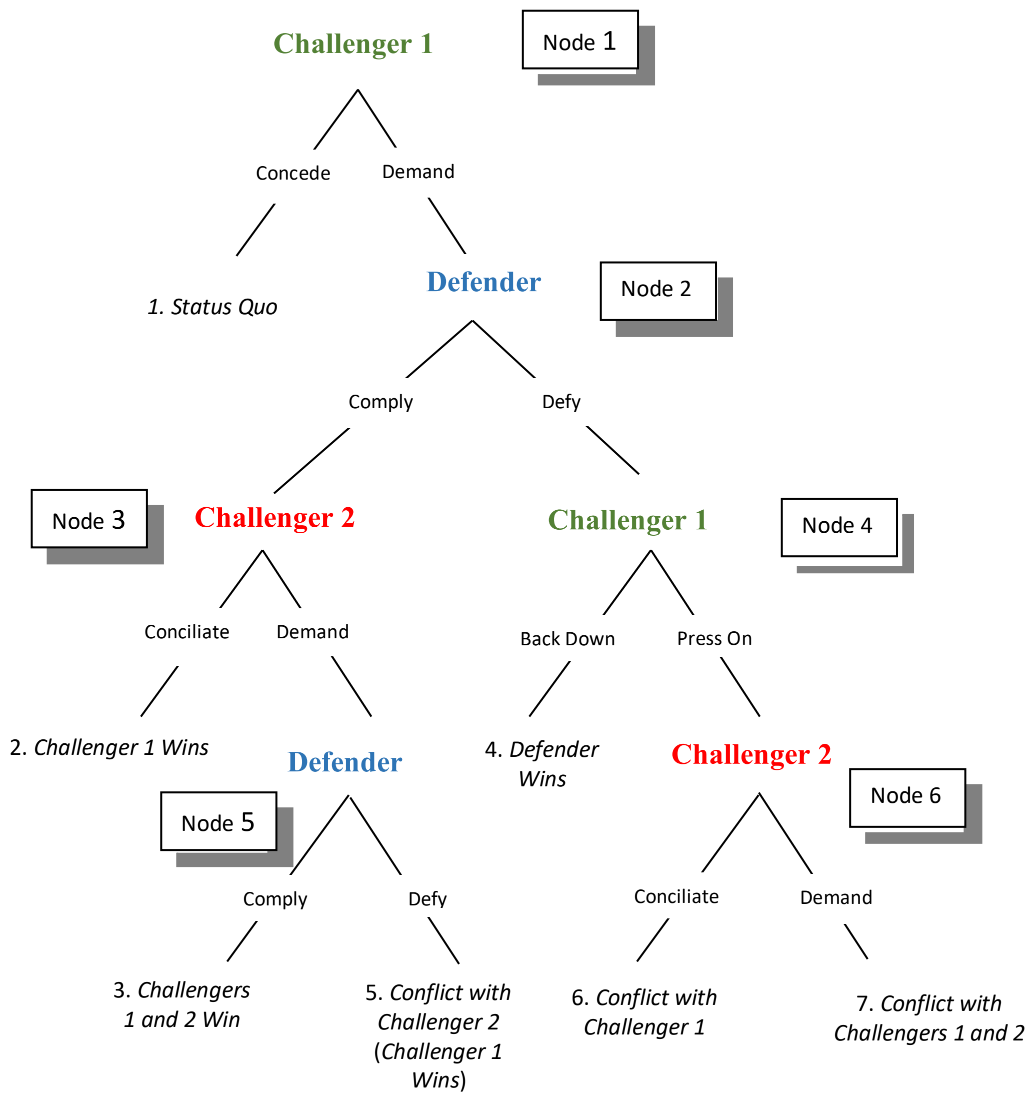


Figure 1: The Double Deterrence Game

2. Outcomes and Preferences

There are seven outcomes in the Double Deterrence Game. Of the seven, two involve a win for one or both Challengers (and a loss for Defender). Another is associated with a win for Defender. There are also three distinct types of conflicts. Of course, when deterrence succeeds, the Status Quo will hold. For convenience, the outcomes and their abbreviations are arrayed in Table 1.

Name	Abbreviation
1. *Status Quo*	*SQ*
2. *Challenger 1 Wins*	Ch_1W
3. *Challengers 1 and 2 Win*	$Ch_{1\text{–}2}W$
4. *Defender Wins*	*DefW*
5. *Conflict with Challenger 2 Challenger 1 Wins*	Con_2
6. *Conflict with Challenger 1*	Con_1
7. *Conflict with Challengers 1 and 2*	$Con_{1\text{–}2}$

Table 1: List of Possible Outcomes

A game is defined by both the rules that govern play—that is, the players, their choices, and the set of outcomes—and the preferences of the players over the set of outcomes. With three players (each with two moves) and seven outcomes, the Double Deterrence Game can have many variants. To gain tractability, not to mention theoretical relevance, some additional simplifying assumptions are needed. We begin with Defender's preferences.

2.1 Defender's Preferences and Types

A number of preference relationships are manifest. For the purpose of this study, the assumption will be that Defender most prefers the Status Quo, and next most prefers the outcome *Defender Wins*. Of the two outcomes associated with a loss for Defender, the assumption is that Defender prefers the outcome *Challenger 1 Wins* to the outcome *Challengers 1 and 2 Win*. Finally, it will be assumed that Defender most prefers a bilateral conflict with Challenger 1 to a concurrent conflict with both Challengers 1 and 2. Defender's preference among the remaining outcomes determines its type. There are four plausible types of Defenders: *Staunch*, *Semi-Staunch*, *Submissive*, and *Semi-submissive*.

Staunch and Semi-Staunch Defenders strictly prefer a *Conflict with Challenger 1* and a *Conflict with Challengers 1 and 2* (outcomes 6 and 7) to the outcome (2) *Challenger 1 Wins*. *Staunch* Defenders also prefer a unilateral *Conflict with Challenger 2* (outcome 5) to *Challengers 1 and 2 Win* (outcome 3). By contrast, Semi-Staunch Defenders prefer to conciliate both challengers rather than resist Challenger 2's demands. The columns of Table 2a list the postulated preferences of a Staunch and *Semi-Staunch* Defender, respectively, from best to worst. For example, both types of Defenders prefer the *Status Quo* to *Defender Wins*, and *Defender Wins* to *Conflict with Challenger 1*, and so on. Similarly, the columns of Table 2b list the postulated preferences of a *Submissive* and *Semi-Submissive* Defender, respectively, again from best to worst.

Staunch	Semi-Staunch
7. Status Quo	*7. Status Quo*
6. Defender Wins	*6. Defender Wins*
5. Conflict with Challenger 1	*5. Conflict with Challenger 1*
4. Conflict with Challengers 1 and 2	*4. Conflict with Challengers 1 and 2*
3. Challenger 1 Wins	*3. Challenger 1 Wins*
2. Conflict with Challenger 2—Challenger 1 Wins	*2. Challengers 1 and 2 Win*
1. Challengers 1 and 2 Win	*1. Conflict with Challenger 2—Challenger 1 Wins*

Table 2a. Preferences of Staunch and Semi-Staunch Defenders

As Table 2b suggests, both types of Submissive Defenders strictly prefer the outcome (2) *Challenger 1 Wins* to all other outcomes, least prefer a *Conflict with Challengers 1 and 2*, and next-least prefer a *Conflict with Challenger 1*. Defender's preference between *Challengers 1 and 2 Win* ($Ch_{1\text{–}2}W$) and *Conflict with Challenger 2/Challenger 1 Wins* (Con_2) determines it subtype. *Submissive* Defenders prefer $Ch_{1\text{–}2}W$. *Semi-Submissive* Challengers prefer not to accede to Challenger 2's demands at Node 5; that is, they prefer Con_2 to $Ch_{1\text{–}2}W$.

Submissive	Semi-Submissive
7. Status Quo	*7. Status Quo*
6. Defender Wins	*6. Defender Wins*
5. Challenger 1 Wins	*5. Challenger 1 Wins*
4. Challengers 1 and 2 Win	*4. Conflict with Challenger 2 (Challenger 1 Wins)*
3. Conflict with Challenger 2 (Challenger 1 Wins)	*3. Challengers 1 and 2 Win*
2. Conflict with Challenger 1	*2. Conflict with Challenger 1*
1. Conflict with Challengers 1 and 2	*1. Conflict with Challengers 1 and 2*

Table 2b. Preferences of Submissive and Semi-Submissive Defenders

2.2 Challenger 1's Preferences and Types

Consider now Challenger 1's preferences. Any challenger, by definition, prefers to upset the *Status Quo*. In Perfect Deterrence Theory, the assumption is that the players prefer to win, or if it comes to it, lose at the lowest conflict level. It follows therefore that Challenger 1 prefers the outcome *Challenger Wins* to the *Status Quo*. The further assumption will be that if and when Defender has fully complied with Challenger 1's demand at Node 2, Challenger 1's involvement in the game will be terminated. In other words, Challenger 1 is assumed to be indifferent with respect to what Challenger 2 does at Node 3 and what, if anything, Defender does at Node 5[5]. To put this in a slightly different way, the assumption is that Challenger 1 prefers *each* of the outcomes (2, 3, and 5) that result from Defender's choice to *Comply* at Node 2 to *any* of the three outcomes (4, 6, and 7) that are possible when Defender is defiant at Node 2.

[5] The assumption is without strategic import. It is made simply for convenience.

Challenger 1, however, may or may not be indifferent with respect to what Challenger 2 does at Node 6. If Challenger 1 is in fact indifferent, there are only two possibilities. Challenger 1 might prefer to *Back Down*, in which case the outcome is *Defender Wins*, or to *Press On* and induce a *Conflict* that may or may not involve Challenger 2 (outcomes 6 and 7). An indifferent Challenger 1 that prefers to *Back Down* is called *Hesitant*. *Determined* Challengers, by contrast, prefer to *Press On*.

On the other hand, Challenger 1 may be invested in what Challenger 2 does at Node 6. A *Cautious* Challenger 1 will *Press On* if and only if it anticipates that Challenger 2 will also confront Defender by demanding additional concessions from Defender. Symbolically, the preferences of a *Cautious* Challenger 1, therefore, are $Con_{1\text{-}2} > DefW > Con_1$.

To summarize briefly, Challenger 1 may be one of three types. A *Determined* Challenger 1 prefers to *Press on* at Node 2. A *Hesitant* Challenger 1 prefers to *Back Down* at Node 2. A *Cautious* Challenger 1 will *Press On* if and only if it expects Challenger 2 to issue its own Demand at Node 6. Table 3 contains the particulars.

Hesitant	Determined	Cautious
4. Challenger 1 Wins	4. Challenger 1 Wins	5. Challenger 1 Wins
4. Challengers 1 and 2 Win	4. Challengers 1 and 2 Win	5. Challengers 1 and 2 Win
4. Conflict Def-Ch2	4. Conflict Def-Ch2	5. Conflict Def-Ch2
3. Status Quo	3. Status Quo	4. Status Quo
3. Defender Wins	2. Conflict Def-Ch1 and 2	3. Conflict Def-Ch1 and 2
1. Conflict Def-Ch1 and 2	2. Conflict Def-Ch1	2. Defender Wins
1. Conflict Def-Ch1	1. Defender Wins	1. Conflict Def-Ch1

Table 3: Types of Challenger 1

2.3 Challenger 2's Preferences and Types

Unlike Challenger 1, Challenger 2's choices are strictly reactive. At node 3, it must decide to initiate a conflict with the Defender by itself. By contrast, at Node 6 it must decide whether or not to join an existing conflict. In the latter case, its choice is strictly determined by its type. *Opportunistic* Challenger 2s will issue its own demand bringing about outcome 7 (*Conflict with Challengers 1 and 2*). By contrast, A *Reluctant* Challenger 2 will stand aside. In this case, the outcome will be *Conflict with Challenger 1* (outcome 6).

As will be seen, Challenger 2's choice at Node 3 depends on both its and Defender's type. Clearly, of the three outcomes in the subgame that begins at Node 3, Challenger 2 most prefers that Defender accede to whatever is demanded, that is, the outcome (3) *Challengers 1 and 2 Win*. But to achieve this outcome, Challenger 2 must risk a conflict. A Challenger 2 that prefers to avoid the risk is called *Restrained*. A *Restrained* Challenger 2 strictly prefers the outcome *Challenger 1 Wins* to *Conflict with Challenger 2*. (Symbolically, $Ch_1W > Con_2$). Risk-taking Challenger 2s, with the opposite preference, are called *Persistent*.

All things being equal, a *Persistent* Challenger 2 is also likely to be *Opportunistic*. But a *Restrained* Challenger 2 may or may not be *Reluctant*. Thus, in this analysis we consider three types of Challenger 2s: *Persistent and Opportunistic*, *Restrained and Opportunistic*, and *Restrained and Reluctant*. The preferences that define these types are summarized in Table 4.

Persistent	Restrained	Reluctant	Opportunistic
3. Challengers 1 and 2 Win	3. Challengers 1 and 2 Win	3. Challengers 1 and 2 Win	3. Challengers 1 and 2 Win
2. Conflict (Defender-Challenger 2)	2. Challenger 1 Wins	2. Conflict (Defender-Challenger 1)	2. Conflict (Defender-Challengers 1 and 2)
1. Challenger 1 Wins	1. Conflict (Defender-Challenger 2)	1. Conflict (Defender-Challengers 1 and 2)	1. Conflict (Defender-Challenger 1)

Table 4: Types of Challenger 2

There are four distinct types of Defenders: *Staunch, Semi-Staunch, Submissive,* and *Semi-Submissive*; three types of Challenger 1s: *Hesitant*, *Determined*, and *Cautious*; and three types of Challenger 2s: *Persistent and Opportunistic*, *Restrained and Opportunistic*, and *Restrained and Reluctant*. Thus, there are 4 x 3 x 3 = 36 different combinations of player types. Clearly, the addition of a second challenger to the game adds a great amount of richness to what would otherwise be a very simple strategic relationship between one defender and one challenger. Were Challenger 2's choices at Nodes 3 and 6 eliminated, the *Double Deterrence Game* would reduce to a game-form that Zagare and Kilgour (2000, Chapter 5) call the *Unilateral Deterrence Game*. In this truncated game there are only two types of Defenders, only two types of Challengers, and therefore, only 2 x 2 = 4 games. In three of these games the status quo holds and deterrence succeeds. Significantly, deterrence fails in the fourth case: Challenger makes a demand, and Defender capitulates.

3. The Double Deterrence Game with Complete Information

In this section I consider the Double Deterrence Game with complete information. The standard measure of rational play in a dynamic (or extensive-form) game with complete information is subgame perfect equilibrium (Selten, 1975). A subgame perfect equilibrium requires that the players plan to choose rationally at every node of a game tree whether they expect to reach a particular node or not. The concept of a subgame perfect equilibrium is a refinement of Nash's well-known equilibrium concept, which is the accepted measure of rational behavior in static (or strategic-form) games. Nash equilibria, however, may be supported by irrational threats, this is, by threats that are not believable or credible. Selten's perfectness criterion eliminates that possibility.

In an extensive-form game of complete and perfect information in which the players know not only their place on the game tree at all times but are also fully informed about each other's preferences, a simple procedure known as *backwards induction* can be used to identify which outcomes are subgame perfect. As its name suggests, backwards induction involves working backwards up the game tree to determine, first, what a rational player would do at the last (or terminal) node (or nodes) of the game tree, what the player with the previous move would do given that the player with the last move is assumed to be rational, and so on until the first (or initial) node of the tree is reached. Outcomes that survive the backwards induction process are, by definition, subgame perfect.

To illustrate, consider for now the variant of the Double Deterrence Game depicted in Figure 2. In this representation the assumption is that Defender is *Submissive*. Recall that a *Submissive* Defender prefers the outcome *Challenger 1 Wins* to all three conflict outcomes (5, 6, and 7). In other words, whenever Defender is *Submissive*, both of its deterrent threats lack credibility. The game of Figure 2 also assumes that Challenger 2 is the *Persistent/Opportunistic* type. From Defender's point of view, the most problematic secondary challengers are of this type. Finally, this version of the Double Deterrence Game assumes that Challenger 1 is *Hesitant*. Like a *Submissive* Defender, a *Hesitant* Challenger's deterrent threat lacks credibility. These assumptions are reflected in the three-tuple of ordinal utilities beneath each of the outcomes in Figure 2. The outcomes, for Challenger 1 (marked in green). Defender (marked in blue), and Challenger 2 (marked in red) are ranked from highest to lowest, from best to worst. For example, the *s* is Challenger 1's fourth best outcome (i.e., 4), Defender's best (i.e., 7) and along with outcomes 2 and 4, Challenger 2's worst outcome (i.e., 1)[6].

We begin by considering the calculus of Challenger 1 at the first node of the tree. At node 1 Challenger 1 can either do nothing (i.e., Concede) which brings about its fourth-best outcome, *Status Quo*, or Demand an adjustment of it. Of course, the consequences of demanding a change in the *Status Quo* are uncertain since they depend, at least in part, on Defender's likely response at node 2. Defender's choice, in turn, depends on what Challenger 2 will do if it complies, and on the decisions of both challengers if it defies Challenger 1 at node 2.

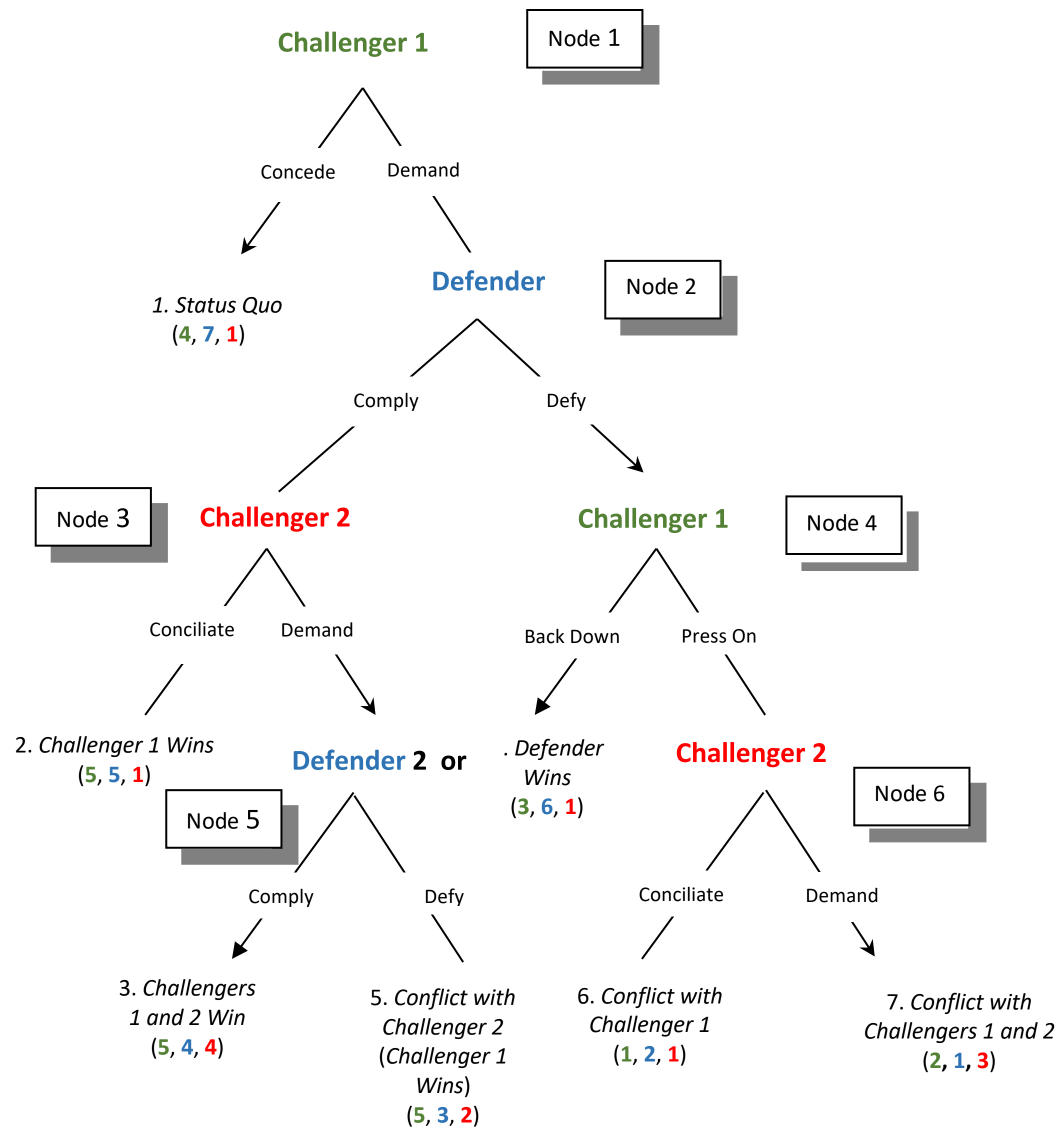
If Defender complies, Challenger 1 will win regardless of what Challenger 2 does at Node 3. But, given complete information, Defender will know that compliance at Node 2 will eventually lead to its fourth best outcome, *Challengers 1 and 2 Win*. The reason is manifest: As the arrows indicate, at Node 5, a *Submissive* Defender will rationally comply with Challenger 2's demand, in order to avoid its fifth best outcome, *Conflict with Challenger 2 (Challenger 1 Wins*). And given that Challenger 2 is *Persistent*, it will force that choice on Defender by rationally issuing its own demand at Node 3. By contrast, defiance at Node 2 will induce Defender's second-best outcome, *Defender Wins*. As the arrows indicate, a *Hesitant* Challenger 1 will back down at Node 4 since, by assumption, it prefers the outcome *Defender Wins* to either outcome that would come about if it pressed on.

Under the conditions that define the game in Figure 2, then, Defender's choice at Node 2 and Challenger 1's choice at Node 1 is straightforward. At Node 2, Defender rationally defies Challenger 1 in order to induce its second-best outcome, *Defender Wins*, and to avoid its fourth best-outcome, *Challengers 1 and 2 Win*. Similarly, at Node 1, Challenger 1 does nothing (i.e., concedes), to avoid its third-worst outcome, *Defender Wins*. Instead, deterrence succeeds when Challenger 1 rationally settles for its second-best outcome, the *Status Quo*.

As Table 4 shows, whenever Challenger 1 is *Hesitant* and lacks a credible threat to *Press On* at Node 4, deterrence will always succeed, and the *Status Quo* will always hold, even when Defender is *Submissive*—that is, when all of its threats lack credibility. A credible threat to retaliate, then, does not constitute a necessary condition for deterrence success in a game of complete information. For example, Defender's threat to defy Challenger 1 in the game depicted in Figure 2 lacks credibility (i.e., it prefers to submit to Challenger 1's demand *should Challenger 1 Press On at Node 4*). But since Challenger 1's threat to *Press On* also lacks credibility, it cannot deter Defender from resisting its demand at Node 2.

It is important to note that deterrence will also succeed whenever Defender is *Staunch* or *Semi-Staunch*, regardless of either challenger's type. Finally, if Challenger is *Cautious* and Challenger 2 is *Restrained and Reluctant*, Challenger 1 will refrain from contesting the status quo at Node 1 and deterrence will succeed.

[6] Since Challenger 2 never chooses among outcomes 1, 2, and 4, its relative ranking of these outcomes is of no strategic import. The assumption that Challenger 2 is indifferent between all three of these outcomes and its least preferred alternative, in this example outcome 6, is made strictly for convenience.



Key: (x,y,z) = payoff to Challenger 1, payoff to Defender, payoff to Challenger 2
→ = Rational choice

Figure 2: The Double Deterrence Game When Defender is Submissive, Challenger 1 is Hesitant, and Challenger 2 is Persistent and Opportunistic

Under most conditions, then, the status quo will hold in the Double Deterrence Game. But when is it likely to fail? *Determined* Challenger 1's will never be deterred if Defender is either *Submissive* or *Semi-Submissive*. And, unless Challenger 2 is both *Restrained* and *Reluctant* it will also fail even when Challenger 1 is *Cautious*.

Of course, Defender's type will determine the specific resolution of the game in the event of a deterrence failure. Both Challengers will win if Defender is *Submissive*; Challenger 1 alone will win if Defender is *Semi-Submissive* and Challenger 2 is *Restrained*. Challenger 1 will still win if Defender is *Semi-Submissive*, but an all-out conflict with Challenger 2 will result when Challenger 2 is *Persistent*.

Significantly, however, a rational conflict between a defender of the status quo and its primary challenger is precluded. There are three keys to deterrence success: The status quo will hold 1) if Defender's threat to retaliate is credible, 2) if the primary challenger's threat to press on lacks credibility, or 3) if the primary challenger's willingness to press on depends on support from the secondary challenger. Of course, a Defender of the status quo should always work to maintain a credible retaliatory threat. But there may be situations where the stakes are such that Defender's threat to resist a challenge is hardly believable. It follows, therefore, that another focus of policy for the Defender should aim to eliminate, or at least reduce, the primary challenger's willingness to risk a confrontation. Finally, a third policy objective could

aim to weaken the secondary challenger's propensity to exploit a crisis between Challenger 1 and a Defender. But this should not be the main thrust of Defender's policy, given the restricted set of circumstances in which the secondary challenger's participation in a crisis actually matters. Of the 36 games with complete information, there are only 4 games in which the secondary challenger's type makes a significant difference (see Table 5).

	Defender											
Challenger 2	Staunch			Semi-Staunch			Submissive			Semi-Submissive		
	Challenger 1											
	Hesitant	*Determined*	*Cautious*	*Hesitant*	*Determined*	*Cautious*	*Hesitant*	*Determined*	*Cautious*	*Hesitant*	*Determined*	*Cautious*
Persistent/ Opportunis	Status Quo	Status Quo	Status Quo	Status Quo	Status Quo	Status Quo	Status Quo	Challenger 1 and 2 Win	Challenger 1 and 2 Win	Status Quo	Conflict (Defender Challenger 2)	Conflict (Defender Challenger 2)
Restrained/ Opportunist	Status Quo	Status Quo	Status Quo	Status Quo	Status Quo	Status Quo	Status Quo	Challenger 1 and 2 Win	Challenger 1 and 2 Win	Status Quo	Challenger 1 Wins	Challenger 1 Wins
Restrained/ Reluctant	Status Quo	Status Quo	Status Quo	Status Quo	Status Quo	Status Quo	Status Quo	Challenger 1 and 2 Win	Status Quo	Status Quo	Challenger 1 Wins	Status Quo

Table 5. Subgame Perfect Equilibria in the Double Deterrence Game

3. The Double Deterrence Game with Incomplete Information

In the previous section we saw that the secondary challenger played a relatively minor role in the dénouement of the Double Deterrence Game with complete information, and we concluded that in a real-world situation that satisfied the model's assumptions, the Defender's focus should be on its relationship with its primary challenger. Notably, three outcomes never occur when information is complete: *Defender Wins* and the two conflict outcomes (6 and 7) that involve Challenger 1. Of course, we know, empirically, that sometimes faits accompli fail and all-out wars occur. To understand the conditions under which these and other outcomes may rationally occur, we next examine a simplified version of the Double Deterrence game with incomplete information. Since Challenger 2's choice at Node 3 is immaterial to Challenger 1, and its choice at Node 6 only matters when Challenger 1 is *Cautious* and Challenger 2 is *Reluctant*, its role will be suppressed, at least for now. Thus, only two types of Challengers, *Hesitant* and *Determined*, and two types of Defenders, *Staunch* and *Submissive*, are considered[7].

The standard measure of rational choice in a game with incomplete information is perfect Bayesian equilibrium. A perfect Bayesian equilibrium specifies an action choice for every type of every player at every decision node (or information set) belonging to the player; it must also indicate how each player updates its beliefs about other players' types in the light of new information obtained as the game is played out.[8]

As it turns out, there are five major types of perfect Bayesian equilibria in the simplified version of the Double Deterrence Game with incomplete information (See Table 5)[9]. Two are deterrence equilibria in which the status quo is never contested. The good news is that one of them always exists. The *Certain Deterrence Equilibrium* exists whenever the credibility of Defender's threat to resist Challenger 1's demand at Node 2 is sufficiently high—that is, when it is most likely *Staunch*, regardless of Challenger 1's type (see Figure 3). A *Steadfast Deterrence Equilibrium* exists only when the credibility of Defender's threat falls below the threshold (c_t) that sustains the Certain Deterrence Equilibrium. When it exists, the Certain Deterrence Equilibrium exists uniquely, as one might expect from an examination of the game under complete information. Unfortunately, the Steadfast Deterrence Equilibrium will always co-exist with one of the three remaining Perfect Bayesian equilibria under which an all-out conflict remains a distinct possibility[10]. That is the bad news.

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[7] As noted previously, Zagare and Kilgour (2000, Chapter 5) call this truncated game the *Unilateral Deterrence Game*.

[8] In an extensive-form game of incomplete information, the initial (or *a priori*) beliefs of the players are taken as givens. The assumption is that the players update their beliefs rationally (i.e., according to Bayes' rule) given the actions they observe during the play of the game. [See Morrow (1994, Chapters 6 – 8) for the technical details and instructive examples.] The definition of a perfect Bayesian equilibrium, however, places no restriction on the players' updated (or *a posteriori*) beliefs "off the equilibrium path"—that is, on beliefs at nodes that are never reached under rational play. It is sometimes the case that a perfect Bayesian equilibrium is supported by *a posteriori* beliefs that are inconsistent with a player's *a priori* beliefs. Perfect Bayesian equilibria that are based on internally inconsistent beliefs are implausible. In consequence, they are not considered as rational strategic possibilities for the purposes of this essay.

[9] For a proof and additional technical details, see Zagare and Kilgour (Appendix 5).

[10] At either deterrence equilibrium, the *Status Quo* is the only possible outcome. Although the *Status Quo* can sometimes result when another equilibrium is in play, all remaining equilibria carry with them the possibility of other outcomes, depending on the players' types, beliefs, and choices.

Strategic Variables

Equilibrium	Challenger x_{Det}	x_{Hes}	Defender y_{Sth}	y_{Sub}
Certain Deterrence	0	0	1	unrestricted
Steadfast Deterrence	0	0	1	*U*
Separating	1	0	1	0
Bluff	1	*V*	1	*U*
Attack	1	1	1	0

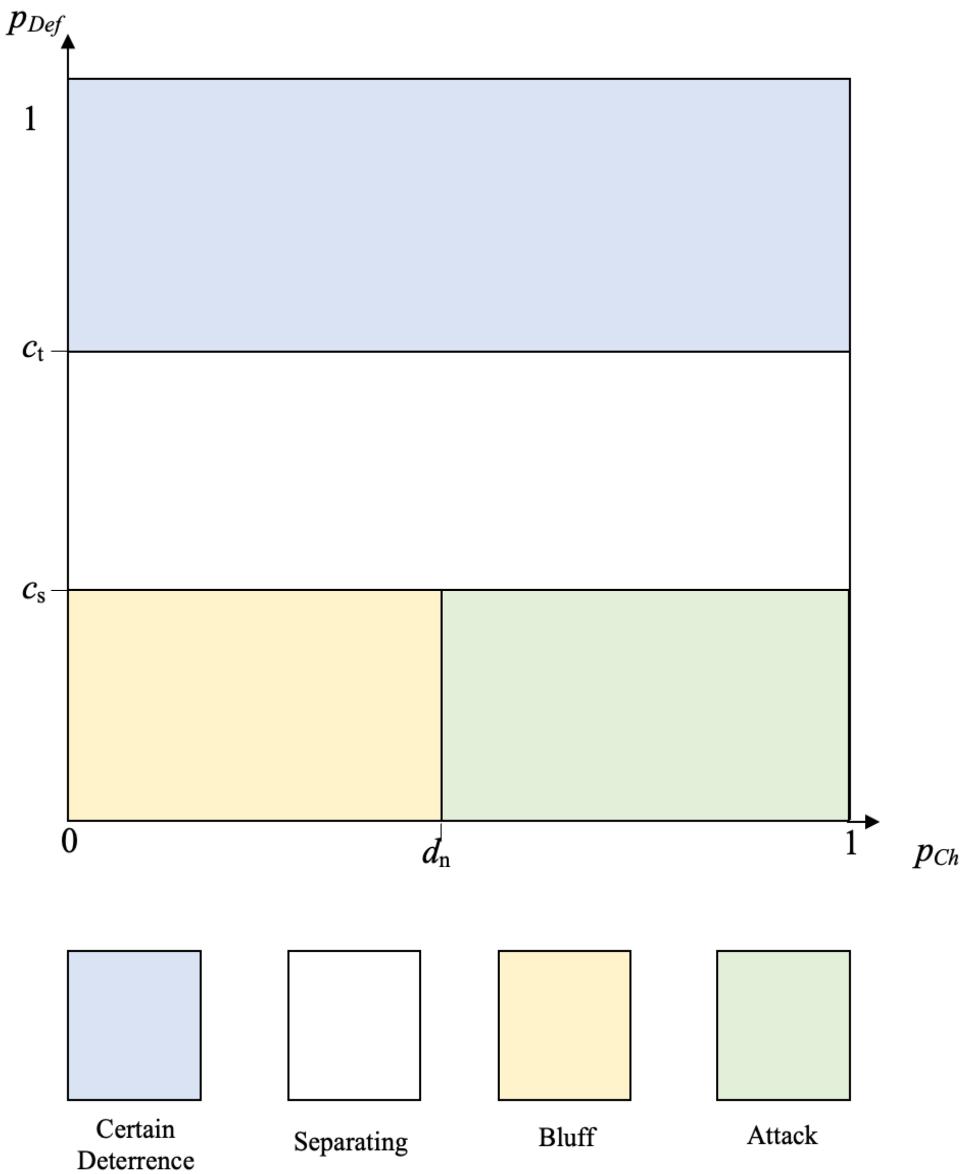
Key:

x_{Det} = the probability that a *Determined* Challenger will issue a demand at node 1
x_{Hes} = the probability that a *Hesitant* Challenger will issue a demand at node 1
y_{Sth} = the probability that a *Staunch* Defender will choose to defy Challenger 1 at node 2
y_{Sub} = the probability that a *Submissive* Defender will choose to defy Challenger 1 at node 2
"*u*" = fixed value between 0 and 1, "*v*" = fixed value between 0 and 1

Source: (Zagare and Kilgour, 2003, Chapter 5)

Table 6: Action Choices of Perfect Bayesian Equilibria for the Simplified Version of the Double Deterrence Game with Incomplete Information

The Certain Deterrence Equilibrium becomes more likely as 1) the value Challenger 1 places on the *Status Quo* increases, 2) the value a *Determined* Challenger 1 places on the *Conflict* outcome decreases, and 3) the value Challenger 1 places on winning is reduced. Significantly, when Challenger 1 is *Hesitant*, there is also a cutoff point at which further increases in the costs associated with *Conflict* are redundant and irrelevant.



Key:
p_{Def} = the probability that Defender is Staunch
p_{Ch} = the probability that Challenger is *Determined*
c_t, c_s, and d_n = constant threshold values that distinguish the existence regions of the Perfect Bayesian Equilibria

Figure 3. Location of Perfect Bayesian Equilibria for the Simplified Version of the Double Deterrence Game with Incomplete Information Subgame

A Steadfast Deterrence Equilibrium may come into play even when Challenger 1 places a relatively low value on the *Status Quo*, or a relatively high value on winning, or sees low costs at *Conflict*. Under the Certain Deterrence Equilibrium, the credibility of a *Staunch* Defender's threat is sufficient to deter both types of Challenger 1. But under a Steadfast Deterrence Equilibrium, a further commitment is necessary. Specifically, Challenger 1 must believe that there is a sufficiently high probability that even a *Submissive* Defender will resist its demand at Node 2. To support this intention rationally, Defender must believe that it is highly likely that Challenger 1 is *Hesitant* and will, therefore, back down at Node 4.[11]

By their very nature, actual examples of deterrence equilibria (Certain or Steadfast) are difficult to identify. Nevertheless, one indication that a Steadfast Deterrence Equilibrium may be in play, or that a Defender is trying to induce one, is a public denigration of the capability and, by extension, the credibility of Challenger's threat. For example, in the 1950s, when Mao repeatedly expressed reservations about US resolve, he might have been trying to deter a coercive move by the United States. From China's point of view, it was strategically immaterial whether the United States was, or was not, a "paper tiger." What was important to the Chinese was that US leaders believe that China thought the United States to be very likely *Submissive*. Under certain conditions, then, undermining an opponent's credibility may be as effective a tactic for stabilizing the status quo as is bolstering one's own.

There are two rational strategic possibilities when the credibility of Defender's threat is low (i.e., when $p_{Def} < c_s$), that is, when Defender is likely *Submissive*: the *Bluff Equilibrium* and the *Attack Equilibrium*. The Bluff Equilibrium exists when Challenger 1 is most likely *Hesitant* (i.e., when $p_{Ch} \leq d_n$). When Challenger 1 is more likely to be *Determined*, (i.e., when $p_{Ch} \geq d_n$), the Attack Equilibrium will govern play.

The *Status Quo* is the most likely outcome when play takes place under the conditions that support the existence of the Bluff Equilibrium. After all, Challenger 1 is most likely *Hesitant*. Nonetheless, since Defender is also most likely the *Submissive* type, even a *Hesitant* Challenger 1 *sometimes* issues a demand. If and when this happens, *sometimes* Defender will Defy Challenger 1, who most likely will Back Down and the outcome will be *Defender Wins*. But if Defender Complies with the demand, *Challenger 1 Wins*. *Conflict* is also a possibility under a Bluff Equilibrium, but this possibility is remote, at best.

With the benefit of hindsight, it is plausible to associate many of the events punctuating the US-Soviet relationship during the 1950s and 1960s with bluff conditions. Starting with the Berlin crisis of 1948, the Soviet Union and the China precipitated a number of confrontations designed to probe the limits of US resolve. When the United States stood firm, they backed down. While one cannot say for sure what actual US preferences were, the challengers' preferences for capitulation was revealed by their choices. In these cases, at least, they were simply bluffing.

The Status Quo is the only outcome that is precluded under the conditions associated with the existence of the Attack Equilibrium. Of the remaining outcome, *Challenger 1 Wins* is, by far, the most likely. Since Challenger 1 is more likely than not to be *Determined*, it is certain to issue a Demand at Node 1. But since Defender is likely to be *Submissive*, even a *Hesitant* Challenger 1 will contest the Status Quo with certainty. All of which is to say that deterrence is not even a remote possibility when an Attack Equilibrium is in play. Of course, if Defender is Staunch, it will always resist the Demand and the outcome will be *Conflict* unless Challenger 1 is actually *Hesitant*, in which case the outcome will be *Defender Wins*. Nonetheless, the possibility of either of these two rational strategic possibilities is relatively low.[12]

Typically, Defender has few options and little defense when an Attack Equilibrium is in play. Like the United States during the crises in Hungary in 1956 and Czechoslovakia in 1968, and the Soviets during the 1956 Suez crisis, a Defender unwilling to resist can only accept the inevitable; any other reaction would be contrary to its interests.

The final rational strategic possibility is the *Separating Equilibrium*[13]. Under a Separating Equilibrium, Defender's credibility is not high enough to support a Certain Deterrence Equilibrium, but not so low that

[11] This is not always a plausible belief. See footnote 5. For additional details, see Zagare and Kilgour (2000, p. 152).

[12] An Attack Equilibrium becomes more likely as the cost of conflict to a *Submissive* or *Semi-Submissive* Defender increases, *inter alia.*

[13] A separating equilibrium is the technical term used to describe a perfect Bayesian equilibrium that separates the players by type, that is when a player of one type acts differently than a player of another type. Thus, the player's

either a Bluff or an Attack Equilibrium can exist (i.e., when $c_s \leq p_{Def} \leq c_t$). At a Separating Equilibrium, the players' preferences are fully revealed by their strategy choices: A *Determined* Challenger 1 always issues a demand, and a *Hesitant* Challenger never does. Likewise, if challenged, a *Staunch* Defender always defies and a *Submissive* Defender always capitulates. The *Status Quo* may remain stable, therefore, when separating strategies are selected, but only when Challenger 1 is Hesitant. When Challenger is Determined, it gains an advantage if Defender is *Submissive* (i.e., *Challenger 1 Wins*) but precipitates *Conflict* if Defender is *Staunch*. Thus, three of the four possible outcomes of the game can arise under a Separating Equilibrium. As explained below, it is under the conditions that support the existence of a Separating Equilibrium that Challenger 2 may have a significant impact on whether deterrence succeeds or fails.

A stable *Status Quo* may indicate a Separating Equilibrium, or a Deterrence Equilibrium, or even a Bluff Equilibrium (see below). One empirical hint that a Separating Equilibrium might be in play, however, would be a simultaneous change in Challenger's regime and its policy orientation, but little else. The reason is that under a Separating Equilibrium strategy, choices depend on player types in the extreme. A possible example was the abrupt, albeit temporary shift of Soviet policy in 1953, away from Stalin's confrontational stance and toward the new collective leadership's policy of *détente* with the West. Similarly, during the 1967 crisis in the Middle East, Israel's attitude changed dramatically, from submission to confrontation, when Moshe Dayan, a hard-liner who was known to favor military action, replaced Prime Minister Levi Eshkol as Defense Minister (Zagare, 1981).

To summarize briefly: Under the Certain Deterrence Equilibrium, the *Status Quo* is the only possible outcome. The *Status Quo* is also a possible outcome when a Steadfast Deterrence Equilibrium exists. But since this equilibrium form will always co-exist with one of the three remaining Perfect Bayesian Equilibria, there will always be other possibilities. These possibilities, in turn, depend on which of the three Perfect Bayesian Equilibria also exist. Under the Separating Equilibrium, only the outcome *Defender Wins* is precluded. Under the Bluff Equilibrium, the *Status Quo* will most likely hold, whether play takes part under it or under the Steadfast Deterrence Equilibrium. And if and when the Attack Equilibrium comes into play, deterrence always fails, and Challenger 1 will most likely win.

Equilibrium Type	Likely Outcome
Bluff	*Status Quo*
Attack	*Challenger Wins*
Separating	All but *Defender Wins*

Table 7: Most Likely Outcomes Under the Separating, Bluff, and Attack Equilibria

4. Subgame Analysis

To this point we have examined the Double Deterrence game under complete information, and a focused version of it under incomplete information. In this section, two potentially significant subgames[14] of the Double Deterrence game will be examined—the Challenger 2 and Defender subgame that begins at Node 3, and the Challenger 1 and Challenger 2 subgame that begins at Node 4. Any perfect Bayesian Equilibrium in the truncated version of the Double Deterrence Game must be consistent with rational play in each of these subgames. We begin with the Challenger 2–Defender subgame (see Figure 3) that is reached in

action choice fully reveals its type. The names given to the remaining perfect Bayesian equilibria in the Double Deterrence game have been chosen to evoke their underlying strategic dynamic. Like most names, they are arbitrary.

[14] A subgame is that part of an extensive form game that can be considered a game unto itself.

rational play if and only if Defender complies with Challenger 1's demand at Node 2. As just noted, Defender may comply, rationally, under any of the three non-deterrence equilibria, but is most likely to do so under the conditions that support the existence of an Attack Equilibrium, that is, when Challenger 1 is most likely *Determined* and Defender is most likely *Submissive*.

The analysis of the Challenger 2-Defender subgame under incomplete information is straightforward. There are two perfect Bayesian equilibria in this subgame. The key to which one is likely to come into play is the probability that Defender is *Staunch*, that is, when the credibility of its threat to Defy Challenger 2's Demand is high. As one might very well expect, when this probability is high, a variant of the Certain Deterrence Equilibrium will dominate play. Under this variant, Challenger 2 will always Conciliate Defender and the outcome will always be *Challenger 1 Wins*.

Recall, however, that play is unlikely to reach Node 3 unless an Attack Equilibrium is in play. This Perfect Bayesian Equilibrium exists only when Defender is likely *Submissive* (or *Semi-Submissive*). Under these conditions, Challenger 2 always makes a Demand. In the off chance that Defender is actually *Staunch*, it will Defy Challenger 2 and the outcome will be a conflict with Challenger 2. Much more likely, however, a *Submissive* Defender will Comply and both Challengers will win.[15]

It is important to point out that what takes place in the Challenger 2-Defender subgame has no bearing (*under the assumptions of this study*)[16] on Challenger 1's Node 1 decision. In fact, the subgame can be considered as a completely different game whose dynamic would mirror that of the focused version of the Double Deterrence Game. Of course, Defender's main objective in this game, as it is in the larger game, would be to deter Challenger 2. In the context of the Double Deterrence Game the best way to do that would be to deter Challenger 1 from contesting the *Status Quo* in the first place.

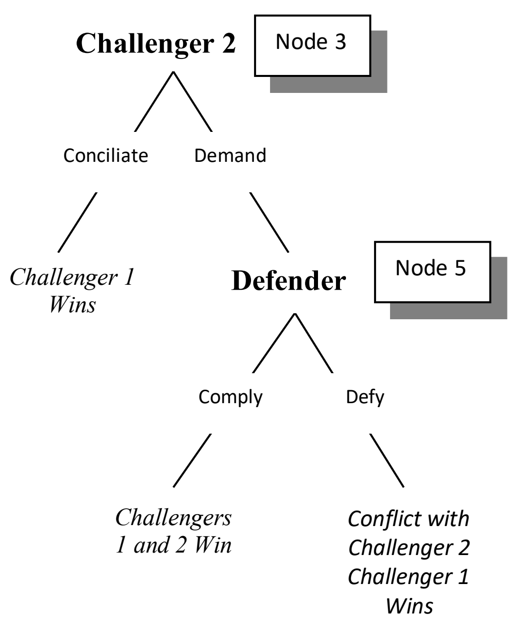


Figure 4: The Challenger 2-Defender Subgame

Consider now the Challenger 1 and Challenger 2 subgame that begins at Node 4. In this subgame, Challenger 2's choice at Node 6 is strictly determined by its type. A *Reluctant* Challenger 2 will always Conciliate Defender and the outcome will be a conflict between Defender and Challenger 1. But if Challenger 2 is *Opportunistic*, it will issue its own demand and join Challenger 1 in a separate conflict with Defender. We also know that, at Node 4, a *Determined* Challenger will Press On and the outcome will depend on Challenger 2's type, as just explained. Finally, if Challenger 1 is *Hesitant*, it will Back Down at Node 4 and the outcome will be *Defender Wins*. All of which is to say that the dynamics of this subgame are clear when Challenger 1 is either *Determined* or *Hesitant*.

When Challenger 1 is *Cautious*, however, things are different. Not surprisingly, the key here is the probability that Challenger 2 is *Reluctant*. When that probability is high enough, Challenger 1 will mimic the behavior of a *Hesitant* Challenger 1; when it is low, Challenger 1 will act as if it were *Determined*. All of which is to say that, given uncertainty and depending on Challenger 1's estimate of Challenger 2's type, actual play in the Challenger 1-Challenger 2 subgame when Challenger 1 is *Cautious* will be all-but indistinguishable from play when it is either *Determined* or *Hesitant*. How it plays out will have no effect on Defender's choice at Node 2 in the larger game. *Staunch* and *Semi-Staunch* Defenders will Defy Challenger 1 at Node 2 no matter how

[15] The assumption here is that Defender's credibility is constant throughout the entire game.
[16] This is an important qualification. The assumption is that Challenger 2's behavior is contingent on Challenger 1's.

the Challenger 1 and Challenger 2 subgame plays out, while *Submissive* and *Semi-Submissive* Defenders will always Comply with Challenger 1's demand should it make one. But it may have an impact on Challenger 1's Node 1 choice and whether or not deterrence succeeds.

In the Double Deterrence Game with incomplete information, *Determined* Challenger 1's are assumed to have highly credible threats, while *Hesitant* Challenger 1's have threats that are barely credible. It is natural, then, to interpret a *Cautious* Challenger 1's credibility as lying between these two types, that is at middling levels of credibility. Assuming this to be the case, there are two situations where Challenger 2's type, and Challenger 1's estimate of Challenger 2's type (credibility) are salient. The first is in the area that separates the Bluff Equilibrium from the Attack Equilibrium; the second is under the conditions that support the existence of the Separating Equilibrium.

As previously mentioned, the Bluff and Attack Equilibria exist only when Defender's credibility is very low. When the credibility of Challenger 1's threat is also low, the Bluff Equilibrium will exist, but when it is high, play will take place under the constraints of the Attack Equilibrium. If Challenger 1 is *Cautious* under these conditions, a big if, it is unlikely that Challenger 2's type will have a significant impact on Challenger 1's Node 1 decision. Recall that under the Bluff Equilibrium, even a *Hesitant* Challenger 1 may rationally contest the *Status Quo*, and under the Attack Equilibrium, a *Hesitant* Challenger 1 will do so with certainty. Thus, in the area around the threshold value (d_n) that separates these two equilibrium forms, Challenger 1's propensity to make a demand at node 1 will be slightly higher under Bluff conditions and slightly lower under Attack conditions. The cumulative impact of Challenger 2's type, therefore, is likely to be one marginal, at best.

Challenger 1 is much more likely to be *Cautious* when a Separating Equilibrium exists than when either a Bluff Equilibrium or an Attack equilibrium exists, that is, when Defender's credibility is at a middling level, too low to support the existence of a Certain Deterrence Equilibrium but high enough to avoid play under either the Bluff or the Attack Equilibrium. Under a Separating Equilibrium *Determined* Challengers always issue a demand at Node 1; *Hesitant* Challengers never do. *Cautious* Challengers can go either way. It is under these conditions that Challenger 2's type is most likely to play a major role in determining Challenger 1's Node 1 choice.

It is important to note, however, that a prior condition for this to be the case is that Challenger 1 is the *Cautious* type, suggesting once again that the relationship between a defender and its primary challenger will be the key to deterrence success, or failure. The danger zone, then, is at intermediate levels of Defender's *and* Challenger 1's credibility. Assuming a rising Challenger 1, or a declining Defender, or both, this zone will exist just prior to, or immediately after, Challenger 1 has achieved parity with the Defender, that is, when a balance of capabilities exists.

5. Summary and Conclusion

In the last section, two of the subgames of the Double Deterrence game were examined. It was determined that one of them, the Challenger 2-Defender subgame, was most relevant when Challenger 1 was likely *Determined* and Defender was most likely *Submissive*. But play in this subgame has no effect on Defender's Node 2 choice and, by extension, on Challenger 1's initial choice at Node 1.

Play in the Challenger 1-Challenger 2 subgame matters only when Challenger 1 is *Cautious*. Challenger 1 is most likely to be the *Cautious* type under the conditions that support the existence of the Separating Equilibrium. But even here, Challenger 2's influence on play in the Double Deterrence Game will be circumscribed.

The analysis of these two subgames, then, reinforces the main conclusion of this study: the principal aim of a defender of the status quo facing two challengers acting independently (a major qualification) should be on preventing a challenge by its primary opponent, that is, Challenger 1. This conclusion is robust no matter what configuration of player types one assumes.[17]

While this conclusion is limited to the special case under consideration—the three-body problem—it in no way is inconsistent with the major findings and the policy recommendations of Perfect Deterrence Theory which, for convenience, are summarized and contrasted with those of Classical Deterrence Theory in Table 7.

	Classical Deterrence Theory	Perfect Deterrence Theory
Policies:		
Overkill capability	Supports	opposes
Minimum deterrence	Opposes	supports
"Significant" arms reductions	Opposes	supports
Proliferation	Supports	opposes
Negotiating stances	coercive, based on increasing war costs and inflexible bargaining tactics	conditionally cooperative, based on reciprocity

Table 8: Classical Deterrence Theory and Perfect Deterrence Theory: Policy Prescriptions

A word of caution: the main conclusion and the policy prescriptions that are derived in this essay are highly contingent. They depend on the specific assumptions made about the sequence of play in the game, the players, their choices, and their preferences and beliefs. It does not automatically follow that the conclusions of this essay are impervious to disruption given a different set of underlying assumptions.[18]

Given the wide variety of strategic environments that may exist in the Double Deterrence Game, and the characteristics of the equilibria that are associated with each of them, there may be a strong temptation to manipulate those components of the game that rationally lead to an undesirable outcome. For example, a defender of the status quo might attempt to increase the cost of conflict to its primary opponent in order to avoid play under a Separating Equilibrium and to create the conditions that support the existence of the Certain Deterrence Equilibrium. There is a large body of literature that suggests multiple ways to change the game to one's advantage. Oran Young (1975) calls this body of work "manipulative bargaining theory." Unfortunately, scientific knowledge about the most efficacious mechanisms for altering a game's structural characteristics for one's benefit is virtually non-existent. The empirical literature strongly suggests that the proffered stratagems are rarely used by policy makers, and even when they are, they are generally not successful. One reason, perhaps the primary reason, is that a state's inherent credibility—as reflected in large part by its regional interests—is a far more important predictor of deterrence outcomes than are the coercive bargaining tactics recommended by some deterrence theorists (Danilovic, 2002). Huth's (1999)

[17] As mentioned previously, the primary challenger should be understood to mean the immediate challenger whose behavior will impact the secondary challenger's action choices. The primary challenger, then, acts first. The secondary challenger then reacts. There is no assumption made about the relative strength of the two challengers. It may sometimes be the case that a large state takes advantage of a crisis precipitated by a lesser power.

[18] For example, this analysis assumes that a *Staunch* and *Semi-Staunch* Defender prefers a confrontation with *both* challengers to complying with the demands of its primary opponent. It is unclear how robust the conclusion of this essay is to a weakening of this assumption. Further study is required.

earlier review of the literature reaches a similar conclusion.[19] Thus, another strong recommendation of this study is to avoid the temptation to change a game and its likely outcome. This applies most particularly to the short run, that is to an acute interstate crisis and other, related, high stakes interactions where the consequences of an ill-advised and less-than-well-understood tactical maneuver are heightened.

Personal Note

The main conclusion of this study surprised me, but in retrospect seems obvious. In a double deterrence game in which one challenger's behavior depends on another's, the focus should be on the challenger whose choice determines whether the secondary challenger actually makes a strategic choice. If and when the primary challenger is deterred, the secondary challenger, which may or may not be the more powerful player, never has an opportunity to contest the status quo. This result, however, only holds when the assumptions of the game model are satisfied. It is an empirical question whether it does or not. One of the advantages of a game-theoretic analysis is that it not only forces one to state one's assumptions explicitly, but also lays out their implications.

It is also an empirical question whether the primary challenger's behavior is contingent on that of the secondary challenger. In terms of the model, the question is whether the primary challenger is cautious. In the abstract, the assumption has been that cautious Challenger 1's are not necessarily more or less likely than other types. When this is not the case, greater attention to the secondary challenger is warranted.

All of which suggests that a fruitful avenue for further study is to consider the three-body problem from a variety of angles. Perhaps the underlying game form can be modified or adjusted to take account of more realistic scenarios, or some assumptions might be modified to reflect facts on the ground. For example, in analyzing Challenger 2's choice in the game depicted in Figure 3, the assumption was that the credibility of Defender's threat was the same as it had been when Challenger 1 made its choice at the beginning of the game (see footnote 14). During the 1950s and afterward, proponents of the so-called "domino theory" questioned that. There is, however, little evidence to support this theory.

[19] Rather than the coercive bargaining stances prescribed by the leading manipulative bargaining theorists, Perfect Deterrence Theory prescribes a conditionally cooperative diplomatic approach, such as tit-for-tat, based on reciprocity. See Table 7.

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