Multiple Paths to Knowledge in International Relations

Methodology in the Study of Conflict Management and Conflict Resolution

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Chapter Three

Prospects for Conflict Management: A Game-Theoretic Analysis

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When parties to a conflict seem totally irreconcilable, potential interveners may reduce their objectives from conflict resolution to conflict management. The idea is to prevent things from getting worse now, in hopes that they can be made better at some later time. Thus, this view of conflict management equates it to escalation prevention, or "holding the lid on."

For example, a proposal tabled at Rambouillet in February, 1999, aimed to manage the conflict in Kosovo by granting it autonomy for a three-year period during which a parliament, a judicial system, a police force, and other institutions would be developed—even though the crucial question of Kosovo’s independence would not be resolved until the end of the autonomy period (Perlez, 1999). But the Rambouillet talks broke down and, just as U.S. Secretary of State Madeleine Albrigt predicted, violence in Kosovo escalated rapidly.

Can such proposals ever work? Some conflict management initiatives have achieved a measure of success. For instance, UNFICYP, the United Nations peacekeeping force on Cyprus, has been in place since its creation in 1964, despite such challenges as the attempted coup d'état and invasion in 1974, and the subsequent partial occupation by Turkish forces (Beauvais 1998). In fact, some have argued that the longevity of UNFICYP signals conflict management that is too successful: as early as 1967, UN Secretary General U Thant warned that "excessive confidence" in UNFICYP had "reduced the parties’ willingness to negotiate a settlement" (Whit, 1990).
A justification for conflict management as a diplomatic objective takes as a premise that some conflicts cannot be resolved because the parties' interests are too divergent; in addition, hostile attitudes may reduce the productivity of bargaining. Nonetheless, managing such a conflict, in the sense of holding the level of hostilities below some threshold, may be useful if it makes later resolution possible, when objectives have changed, the context has evolved, or leaders have been replaced.\footnote{1} Moreover, escalation itself can harden attitudes, so failure to manage the conflict now might make resolving it later an even thornier problem. In this view, then, conflict management is not as good as conflict resolution, but it is much better than nothing.

Other rationales for conflict management reflect the perspective of potential interveners. The intervener may be the United Nations, a regional organization, or a powerful state with interests in the region. Sometimes, an intervener has the ability to force a settlement but declines to do so, in order to avoid military risks or military commitments. Conflict management may be a feasible alternative: separating the sides, monitoring their activities, and generally “contributing to the maintenance and restoration of law and order and a return to normal conditions”\footnote{2} (from United Nations Security Council Resolution 596, 186; see Higgins 1981, 129) may be possible with lower, hence more acceptable, levels of cost, commitment, and risk.

A natural question is whether, and by how much, an intervention commitment is reduced when its aims are scaled down—simply preventing escalation rather than forcing a resolution. It could be that some conflicts can be counted on to “self-manage,” in the sense that low levels of hostilities are stable because the parties themselves would choose not to escalate (even though they would not choose to resolve).\footnote{3} If so, holding the lid on would require only a low level of intervention effort. But if there is an inherent tendency for the parties to escalate, then it may turn out that a commitment to manage a conflict is very similar to a commitment to end it. Moreover, future obligations must be taken into account. If the objective of conflict management is (eventual) conflict resolution, then it is not worth intervening in a conflict unless the intervention can be continued until such time as resolution is feasible.

Thus, an intervener considering conflict management must carefully assess the parties’ motivations to escalate, stabilize, or reduce hostilities. If there is an inherent tendency to escalate, specific strategies or policies may be required to facilitate an eventual settlement. Moreover, resolution may be impossible until attitudes and interests have changed significantly—for example, the development or restoration of institutions and confidence were central elements of the doomed Rambouillet proposal. Thus, conflict management may require active intervention and may not lead to eventual resolution unless the intervener immediately implements programs to prepare the parties. The burden of intervention may be very heavy.

In this study, we elaborate some formal models of conflict management and analyze them game-theoretically to assess how the prospects for conflict management reflect the motives and capabilities of the conflicting parties. Our analysis is comparative and takes place within a conceptual framework that encompasses both conflict management and conflict resolution so as to highlight the differences between these two objectives. We ask when and how conflict management should be carried out and when it is likely to be successful. This preliminary study is based on simple models, and the analysis is not exhaustive. Nonetheless, some crucial questions about the success or failure of conflict management and other forms of intervention in international conflicts are addressed, and some tentative conclusions are drawn.

DEFINITION OF CONFLICT MANAGEMENT

Managing the conflict of two hostile states will be taken to mean preventing their hostilities from escalating out of control; resolving the conflict will be taken to mean reducing hostilities to a negligible level. To define these concepts more precisely, we assume that the aggregate level of hostilities in the dyad can be measured unambiguously and use that measure to define conflict management and conflict resolution. To simplify the problem, we assume that the context of the conflict defines two aggregate hostility thresholds, which we call the Upper Conflict Threshold and the Lower Conflict Threshold, and that initially the hostility level is between these two thresholds, as shown in figure 3.1.

As in figure 3.1, the hostility level of the focal dyad begins at middling values but changes over time. The arrow labeled Conflict Escalation shows the conflict escalating out of control, in the sense that the hostility level rises above the Upper Conflict Threshold. The arrow labeled Conflict Resolution shows the hostility level falling below the Lower Conflict Threshold.\footnote{4} Thus, the arrow labeled Conflict Management shows a conflict relationship in which hostilities neither escalate out of control nor attenuate toward zero.

The definitions of conflict management and conflict resolution shown in figure 3.1 are based only on the observed aggregate level of hostilities and not on other factors such as what the parties’ objectives are or whether intervention has occurred. An alternate view is that conflict management, like conflict resolution, is the objective of a third-party intervener. This investigation, however, will focus on intentions but effects. No assumptions about the intervener’s intentions are required; indeed the model requires no intervener.
Decision Point 1: Why focus on three levels of hostility for each side? After all, hostility, however it is measured, must be a continuous quantity (as suggested by the vertical axis of figure 3.1). There are two main reasons. First, conflict management has been defined as holding hostilities at some middling level (see figure 3.1 again); either the sides (collectively) do this, or hostilities increase significantly, or they decrease significantly. While “significant” has to be defined by the context, the fact that there are two distinct ways a conflict might not be managed seems unavoidable and implies that a model must account for at least three levels of hostility. The second reason is more practical: three levels is the minimum and the more levels, the more complex the model, and therefore the more difficult it is to analyze. The most complex case, of course, is a continuum of levels (i.e., infinitely many).

Thus, this study focuses on the parties’ decisions to increase, maintain, decrease hostilities and on how these decisions reflect their preferences and information. To ask under what circumstances the parties will exercise restraint is to ask when they will, in their own interests, choose less hostile actions (or at least avoid more hostile actions). In summary, our general objective is to identify conditions under which the conflicting parties will make choices that tend to wind down hostilities, sustain them, or escalate them. If conditions for escalation are absent, or are removed by an intervener, then the parties can be counted on to “self-manage” their dispute. And if conditions that may lead to escalation are present, then the third-party intervener can use this analysis as a guide in the development of its intervention programs and policies.

THE MID-LEVEL CONFLICT MODEL

The Mid-Level Conflict Model models the decision problem faced by two independent decision makers (players) who are already in conflict and have the options of increasing, maintaining, or reducing their current hostility levels. The Mid-Level Conflict Model is not itself a game, but it can be “fleshed out” into a (noncooperative) game in several different ways. Comparing the analyses of certain of these games will suggest conclusions about this fundamental structure and therefore about the real-world situations it represents.

The games developed from the Mid-Level Conflict Model have many features in common. There are always two players, called A and B. Each player chooses its level of hostility—Low, Medium, or High—but may sometimes have an opportunity to change its selection. Both players’ hostility levels de-
determine the state of the conflict. For the most part, our models begin at “Mid-
Level Conflict,” that is, both players initially at a medium hostility level. As
the players choose, independently, to change their hostility levels, the conflict
moves from state to state. Note that games built on this model structure im-
pose history on the players’ choices, so the past can influence the future: his-
tory matters, as Brams argues (1994, 24–26).

Figure 3.2 shows the Mid-Level Conflict Model. The nine states are la-
beled (x, y) or xy, where x is A’s level of hostility and y is B’s. States with
equal hostility levels have special labels: LL is called Res (for Resolution),
MM is called SQ (for Status Quo), and HH is called Esc (for Escalation). As
indicated on the arcs joining the states in figure 3.2, A can move only hori-
izontally and B can move only vertically. (For now, ignore the box enclosing
four states at the upper right of figure 3.2.) Specific games are constructed
by specifying rules, mostly to limit or otherwise sequence the players’ moves
or to specify a player’s information at the time it makes a choice.

In the Mid-Level Conflict Model, the equal-hostility states—Res, SQ, and
Esc—are interpreted in accordance with figure 3.1. The asymmetric states are
interpreted as victories for the more hostile side. Thus ML, LH, and HM are
wins for A and losses for B, while LM, LH, and MH are wins for B and losses
for A. Moreover, the “hostility gap” is interpreted as meaningful: ML and HM
are called minimal wins for A and minimal losses for B, and LH is a maximal
win for A and a maximal loss for B; similarly, LM and MH are minimal wins
(respectively, losses) for B {A}, and LH a maximal win {loss} for B {A}.

Geometrically, the equal-hostility states occur on the diagonal (lower-left to
upper-right) of figure 3.2, minimal wins and losses occur in the adjacent cells
(horizontally or vertically), and maximal wins and losses are in the nonadjac-
ent cells.

Because our objective is to study the decision-makers’ choices using a
game-theoretic methodology, preferences over outcomes play an important
role. Many assumptions about preferences over states can be incorporated
into the Mid-Level Conflict, and several were experimented with in the course
of this study; some generally realistic choices that produce interesting
results are the following:

(P1) Players prefer that the opponent’s hostility level be as low as possible.
(P2) Players prefer that the hostility gap be as large as possible, in favor of
themselves.
(P3) Players prefer to win rather than to lose or to match the opponent’s hos-
tility level. They prefer to win, or to lose, minimally rather than maxi-
mally.

These assumptions capture plausible features of players’ motivations in
typical conflicts, which is their primary justification. For instance, (P1) fo-
cuses on the opponent’s level of hostility, which determines the scope of
a player’s choices; is it possible to win at what cost? Note that (P2) and
(P3) are inconsistent: a player whose preferences obey (P2) is highly com-
petitive, preferring a maximal to a minimal win, whereas a player whose pre-
ferences obey (P3) prefers to win but is cost-conscious, preferring a minimal
to a maximal win. Thus, (P2) describes highly competitive actors, who mea-
sure their gains in terms of their opponent’s losses, while (P3) describes actors
who prefer that any outcome be accompanied by minimal costs and
risks. Thus a (P2) player and a (P3) player agree that wins are better than
equal-hostility states, which are better than losses, and that a minimal loss is
better than a maximal loss, but disagree about whether a minimal win is bet-
ter than a maximal win.
The combination of (P1) as first priority and (P2) as second priority produces, for player A, the following preference ranking over the nine states:

\[
HL_{A} > ML_{A} > Res_{A} > HM_{A} > SQ_{A} > LM_{A} > Esc_{A} > MH_{A} > LH_{A}
\]  

(1)

where "\(\succ\)" means "is preferred to by A." Reversing the priorities [i.e., taking (P2) as first priority and (P1) as second] gives A the following ranking:

\[
HL_{A} > ML_{A} > HM_{A} > Res_{A} > SQ_{A} > Esc_{A} > LM_{A} > MH_{A} > LH_{A}
\]  

(2)

The corresponding rankings for B can be obtained by replacing \((x, y)\) by \((y, x)\) for nonsymmetric states (i.e., all states other than Res, SQ, and Esc) and, of course, replacing \(\succ_{A}\) by \(\succ_{B}\). Below, the implications of various combinations of these rankings will be assessed.

**Decision Point 2: Why focus on preference rankings—why not proceed directly to utilities?** It must be important to know not just whether one outcome is preferred to another, but how much. In fact, (von Neumann-Morgenstern) utilities will be assumed later, but first we attempt to learn as much as we can from preference rankings. Preference rankings can usually be assessed with confidence, whereas utilities are difficult to evaluate credibly. In fact, a study based in preference rankings does highlight important conceptual issues, such as the inconsistency of (P2) and (P3).

These four rankings differ according to the focal player’s willingness to exceed a threshold when the opponent has already done so. In general, a player who prefers to match the opponent at a higher level of hostility is called Hard, and a player who prefers to accept defeat rather than match the opponent is called Soft. Whether a player is Hard or Soft at the Upper Conflict Threshold is independent of whether it is Hard or Soft at the Lower Conflict Threshold. For a detailed discussion of how these definitions relate to the “escalation ladder,” see Zagare and Kilgour (2000, Ch. 6).

For example, a player who prefers SQ to the state where its own hostility level is L and its opponent’s is M is called lower-threshold; a player who prefers Esc to the state where its own level of hostility is Hard and its opponent’s is H is called upper-threshold Hard. The four possibilities define the four player types: a player who is Hard at both thresholds is said to be of type HH; a type HS player is Hard at the lower threshold and Soft at the upper,

\[
\begin{array}{|c|c|c|}
\hline
\text{Type} & \text{HH} & \text{HS} \\
\hline
\text{P1} & \text{ML} \succ \text{Res} \succ \text{HM} \succ \text{SQ} \succ \text{LM} \succ \text{Esc} \succ \text{MH} \succ \text{LH} \\
\hline
\text{P2} & \text{ML} \succ \text{Res} \succ \text{HM} \succ \text{SQ} \succ \text{LM} \succ \text{Esc} \succ \text{MH} \succ \text{LH} \\
\hline
\end{array}
\]
A prefer to remain at M also, or to reduce its hostility to L, achieving state LM? An A who is Hard at the Lower Conflict Threshold would avoid this move, but a Soft A would gain, at least in the short term, by unilaterally reducing its level of hostility.

Applying specific preference assumptions the Mid-Level Conflict Model produces various simple two-person noncooperative games. Their analysis is reported and discussed next. What these games have in common is that they are in extensive form and (usually) begin with a (possible) move from the state SQ, with players alternating moves in an action-response sequence. But the games differ in players’ horizons of foresight and willingness to face strategic risk, as well as the specific preference orderings consistent with (P1)–(P3).

**GMCR II ANALYSIS**

GMCR II is a computer-based system for the analysis of strategic conflict. (Peng 1999; Fang et al. 2003a, 2003b). The underlying theory was developed for the Graph Model for Conflict Resolution. (Fang et al. 1993). GMCR II is designed to allow easy input and revision of models, flexible analysis procedures, and efficient communication of analysis results. It is ideal for this analysis because it facilitates the study of a wide range of related models, distinguished by different ordinal preferences.

GMCR II applies to graph models, an example of which is the Mid-Level Conflict Model shown in figure 3.2 (together with preference rankings—see below). The primary model components are the Decision Makers (DMs) and their Options. In the Mid-Level Conflict Model, both DMs, A and B, have two options, called High and Low, representing a high or a low level of hostility. These options are mutually exclusive, so at most one may be selected; choosing neither High nor Low means that a medium level of hostility is maintained. The remaining model component is a Preference Ranking over the states—one for each DM. Of the several ways to enter preferences into GMCR II, the most convenient for this study is the process called Option Prioritizing, which readily accepts preference statements like (P1)–(P3).

After entry of both decision-makers’ preference rankings, GMCR II can analyze the model under several different solution concepts, or stability definitions. This analysis is equivalent to the solution of certain simple extensive games defined in terms of the model. In any such game, a designated DM has the opportunity to move initially, after which moves alternate between the DMs. A move can be any legal unilateral move from the current state, as shown in figure 3.2. The initial state is said to be stable for the first-moving DM if not moving initially is consistent with subgame-perfect equilibrium. A state with a particular type of stability for all DMs is an equilibrium of that type.

<table>
<thead>
<tr>
<th>Table 3.1. Selected GMCR II Solution Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
</tr>
<tr>
<td>Nash (N)</td>
</tr>
<tr>
<td>Sequential (SEQ)</td>
</tr>
<tr>
<td>Nonmyopic (NM)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Different solution concepts correspond to different extensive games. After the initial move (providing the solution concept allows a response), the opponent may make any legal unilateral move. Then (again, if permitted by the solution concept) the original mover may counterrespond, etc. Different solution concepts have been argued to capture different decision styles, levels of information, attitudes to strategic risk, etc. (Fang et al. 1993). Summary descriptions of the three GMCR II stability definitions selected for this study appear in table 3.1.

A state that is Nash stable for both DMs is a Nash equilibrium of the model considered as a simultaneous game (i.e., played once). Under Sequential Stability, a state is stable if, for any unilateral improvement by the initial mover, there is a credible response (i.e., a countermove that is in the immediate interest of the responder) that leaves the initial mover no better off than initially. The concept of nonmyopic stability uses a limiting process to define the outcome, if any, of a “sufficiently long” sequence of moves and countermoves that is optimal in the sense of backward induction; it was originally proposed by Kilgour (1984) and is similar but not identical to Wilson’s (1998) proposal and Brams’s (1994) definition for 2 × 2 games.

The analysis of the graph model based on (P1) and (P2) produces the results displayed in table 3.2, which shows all stable states under each of the three stability definitions selected above. The first line of the table shows the equilibria when both players’ preferences are described by "(P1), then (P2)"; the second line when one player’s preferences are "(P2), then (P1)" and the other’s are "(P1), then (P2)"; and the third line when both players’ preferences are described by "(P2), then (P1)."

The analysis shown in table 3.2 suggests that SQ is stable provided the players take a long-term view. Moreover, Res is also long-run stable, which is consistent with the view that the strategy of first stabilizing the situation (at SQ), and then trying to jump from SQ to the adjacent basin of attraction of Res, will likely be successful. There is one ominous note, though: should hostilities escalate (i.e., reach Esc), the situation is stable according to both
**Decision Point 3:** What is a solution concept really, and how should an analyst select among them? A solution concept is a procedure that can be applied within a graph model (such as the graph shown in figure 3.2, together with preference rankings over states for both decision makers) to assess whether a particular decision maker would reasonably move away from a particular state. As such, it constitutes a model of the decision-maker's thinking about which move to make and may include the responses it anticipates the opponent might make to its move and perhaps even its own corresponding moves, etc.

As noted in table 3.1, the level of foresight (maximum number of moves foreseen) is one important variable that distinguishes solution concepts. Another aspect is attitude toward strategic risk: some decision makers may avoid any move that might plausibly draw a response that makes them worse off, whereas others will concern themselves only with the response that they calculate the opponent will identify as its best response. Relying on your calculations in this way is called "accepting strategic risk." There are other distinctions—see the citations for details.

It may be reasonable to suppose that a particular solution concept best describes a particular decision maker. (Of course, different solution concepts may be required for different decision makers.) This is why a full GMCR II analysis usually involves automatic comparison of a wide range of solution concepts for all decision makers; what we present here is just a reasonable sampling.

short- and long-term views, which presumably means that it would be extremely hard to shift to another equilibrium.

On the other hand, table 3.2 suggests no scope at all for conflict management. Under no conditions is the Mid-Level Conflict Model stable at the Status Quo state (i.e., at medium- level hostilities) but not at the Resolution state (i.e., at low-level hostilities). In other words, according to this model it is not possible for Conflict Management to be stable, except when Conflict Resolution is also stable.

<table>
<thead>
<tr>
<th>A's Preferences</th>
<th>B's Preferences</th>
<th>Nash (N)</th>
<th>Sequential (SEQ)</th>
<th>Nonmyopic (NM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(P1), then (P2)</td>
<td>(P1), then (P2)</td>
<td>Esc</td>
<td>SQ, LM, Esc, ML, Res</td>
<td>SQ, Esc, Res</td>
</tr>
<tr>
<td>(P1), then (P2)</td>
<td>(P2), then (P1)</td>
<td>Esc</td>
<td>SQ, LM, Esc, Res</td>
<td>SQ, Esc, Res</td>
</tr>
<tr>
<td>(P2), then (P1)</td>
<td>(P2), then (P1)</td>
<td>Esc</td>
<td>SQ, Esc, Res</td>
<td>SQ, Esc, Res</td>
</tr>
</tbody>
</table>

**Table 3.3. GMCR II Analysis Using Preference Assumptions (P1) and (P2)**

<table>
<thead>
<tr>
<th>B: HH</th>
<th>B: HS</th>
<th>B: SH</th>
<th>B: SS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: HH</td>
<td>N: Esc</td>
<td>N: HM</td>
<td>N: Esc</td>
</tr>
</tbody>
</table>

One conclusion about the implications of (P1) and (P2) is clear from table 3.2: If a conflict is to be managed successfully (let alone resolved), it is essential that the parties take a long-term view of the situation. If either party bases its choices on the pursuit of short-term objectives only, the analysis indicates that the situation can stabilize only at the highest level of hostilities.

The situation is somewhat different, however, if both players' preference rankings are determined by (P1) as first priority and (P3) as second. The GMCR II analysis of the sixteen possible preference ranking combinations (see above) is summarized in table 3.3. The circumstances under which the three diagonal outcomes, Res, SQ, and Esc, can be equilibria (stable for both players) are summarized in table 3.4.

Tables 3.3 and 3.4 suggest dim prospects for conflict management. When both players are farsighted, the status quo, SQ, is stable only if both players are of type HS—Hard at the Lower Conflict Threshold and Soft at the Upper; but in this case, the state Res is also stable for farsighted players. (Res is also stable for farsighted players who are both of type SS.) But if either player is

**Table 3.4. Preference Types for Symmetric Equilibria in Table 3**

<table>
<thead>
<tr>
<th>State</th>
<th>Equilibrium Definition (Foresight Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res</td>
<td>Never (SEQ (Medium)) Always (NM (Long))</td>
</tr>
<tr>
<td>SQ</td>
<td>Both HH (SEQ (Medium)) Both HS (NM (Long))</td>
</tr>
<tr>
<td>Esc</td>
<td>Both Upper (SEQ (Medium)) Both SS (NM (Long))</td>
</tr>
</tbody>
</table>

<table>
<thead>
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</tr>
<tr>
<td>Esc</td>
<td>Both Upper (SEQ (Medium)) Both SS (NM (Long))</td>
</tr>
</tbody>
</table>
Hard at the upper threshold, or Soft at the lower threshold, the analysis indicates that SQ is unstable. Thus these tables indicate limited scope for conflict management when players are farsighted, for two reasons: (1) the conditions under which a conflict can be stabilized at the status quo are quite restrictive, and (2) if a conflict can be stabilized at the status quo, then it can also be resolved directly.

Some other conclusions can be drawn from tables 3.3 and 3.4. Res is never an equilibrium at low foresight, always an equilibrium at medium foresight, and is an equilibrium at high foresight only if both players are of type HS or both are of type SS. SQ is never an equilibrium at low foresight, and only in special circumstances at medium foresight (both of type HH) and at high foresight (both of type HS). In all cases, when SQ is an equilibrium, so is Res. The pattern of circumstances under which state Esc is an equilibrium is quite different. At low or medium foresight, Esc is an equilibrium under moderate restrictions (both players are Hard at the upper threshold), but Esc is never an equilibrium at high foresight. (It should be noted that the representative medium foresight stability definition, SEQ, implies some avoidance of strategic risk, so it might be expected to produce more equilibria.)

Some puzzles in tables 3.3 and 3.4 merit further investigation. For example, SQ is stable at medium foresight if both players are of type HH and at high foresight if both players are of type HS. However, the latter case, Res is stable also, and it remains stable if the players (not one but both of them) become Soft at the lower threshold. Small inconsistencies like these sometimes mark a more complex underlying structure. For example, in the Asymmetric Deterrence Game, Zagare and Kilgour (1993, 2000, Ch. 5) found two kinds of equilibrium in the complete information case but uncovered two intermediate equilibria using incomplete information. In fact, all analysis carried out on the Mid-Level Conflict Model so far has assumed complete information; thus the conclusions above are justified only in this limited context.

To recapitulate, there seems to be little scope for conflict management, on the grounds that whenever conflicts can be stabilized at SQ they can also be resolved directly. But to obtain stronger theoretical evidence for this conclusion, we must address a broader class of models.

INCOMPLETE INFORMATION ANALYSIS

To deepen understanding of the Mid-Level Conflict Model and its implications for conflict management, the analysis of a game version including uncertainty over the opponent’s preferences would be useful. Ideally, players would be uncertain whether their opponents are Hard or Soft at the upper and lower threshold producing a symmetric game with two thresholds for each player and nine outcomes in total. By comparison, the model of Zagare and Kilgour (1998, 2000, Ch. 5) is asymmetric, with two thresholds for one player and one for the other, and seven outcomes. Among symmetric games, an analogue is the Simultaneous Deterrence Game of Kilgour and Zagare (1991) (see also Zagare and Kilgour [2000, Ch. 4]), but it features only one threshold per player and four states in total.

Thus, an incomplete-information analysis of a game version of the Mid-Level Conflict Model is a daunting task and exceeds the scope of this study. However, some insights into the stability of the mid-level conflict state, SQ, can be obtained from the analysis of the Simultaneous Deterrence Game. Shown in figure 3.4, the Simple Escalation Game was constructed to capture the move-countermove sequence that appears in the box at the upper right-hand corner of figure 3.2; at the same time, it can be analyzed simply by following Kilgour and Zagare (1991), with suitable changes in notation.

The Simultaneous Escalation Game begins at state SQ. Players A and B make simultaneous moves (the dashed line indicates B’s information set); if both maintain their hostility levels, the game ends at state SQ, whereas if both increase their hostility levels, the game ends at state Esc. Otherwise, one player increases and the other maintains, in which case the latter player has
one more opportunity to raise its hostility level prior to the end of the game. For example, the game can end at state MH only if B increases initially and A does not, and then A chooses subsequently not to increase.

**Decision Point 4:** Why not allow for longer sequences of moves and countermoves? This modeling choice may be interpreted as one further simplification of this analysis. Another way to justify it is to add some specifications to the model. For instance, “Increase” is interpreted as a one-way move; once chosen, it can never be rescinded. As well, an end-state cannot involve (exactly) one player exercising the increase option until the player who chooses not to exercise it is given a second chance, with complete information about what its opponent has already done.

The relevant type structure exists at the Upper Conflict Threshold only. Call a player Hard or Soft according to its preferences at the upper threshold. As is standard in incomplete information games, assume that the players know their own types and have common-knowledge probability distributions over their opponents’ types.

To specify this game in more detail, assume that A is Hard with probability $p_A$ (and Soft with probability $1 - p_A$), and that B is Hard with probability $p_B$ (and Soft with probability $1 - p_B$). Ordinal information about preferences is not enough when probabilities are included in a model, so represent A’s utilities for SQ, HM, and MH by $a_{SQ}$, $a_{AW}$, and $a_{BW}$ (AW stands for “A Wins; BW stands for “B Wins.” Note that, for consistency with previous assumptions, $a_{AW} > a_{SO} > a_{BW}$ is required.) Write A’s utility for Esc as $a_E$ if A is Hard, and $a_E$ if A is Soft. This discrete model of A’s preferences describes the upper right-hand corner of the Mid-Level Conflict Model providing

$$a_{AW} > a_{SO} > a_{E+} > a_{BW} > a_{E-}.$$  \hfill (4a)

Similarly, we describe B’s preferences by utilities satisfying

$$b_{BW} > b_{SO} > b_{E+} > b_{AW} > b_{E-}.$$ \hfill (4b)

Note that B’s utilities are analogous to A’s; in particular, B’s utility for Esc is $b_{E}$ if B is Hard and $b_{E}$ if B is Soft. The Simple Escalation Game thus developed is formally identical to the Symmetric Deterrence Game, so the conclusions drawn by Kilgour and Zagare (1991) can be applied in this new context.

Of course, the Simple Escalation Game differs from the games based on the Mid-Level Conflict Model described above but nonetheless gives a perspective on the same important issues. One useful point of comparison is stability of the status quo state, SQ. Since hostilities in the Simple Escalation Game can only rise relative to the Status Quo, it is appropriate to assume for comparison purposes that the players are both Hard at the lower threshold. Also, the Simple Escalation Game is a two-stage game, so the most natural comparison is with the medium-foresight stability definition, SEQ, in the complete-information case. According to tables 3.3 and 3.4, SEQ is stable under this definition if both players are Hard, and not otherwise.

Figure 3.5 summarizes the Perfect Bayesian Equilibria (PBE) of the Simple Escalation Game and the conditions under which they occur. (For definitions of the parameters and equilibria appearing in figure 3.5, see Kilgour and Zagare (1991).) Figures 3.5(a) and 3.5(b) are both drawn on the “credibility square.” Moving to the right within the square corresponds to A’s (implicit) threat to respond to escalation being more credible, that is A is more likely Hard; and moving upward corresponds to increasing the credibility of B’s threat.

Of the Perfect Bayesian Equilibria shown in figure 3.5(a), only the one called Deterrence is consistent with the survival, for certain, of SQ. The Deterrence PBE occurs only in the upper right-hand subregion of the credibility square, which includes the corner point where both players are Hard with probability one. This finding is consistent with the conclusion, from the complete-information game, that SQ is not an equilibrium unless both players are Hard.
Another point of view on why it is important to stabilize SQ is illustrated in figure 3.5(b), which indicates conditions for the game to move from SQ to Ese in each subregion of the credibility square. Where several equilibria coexist, conditions for each are given in the order defined in figure 3.5(a). As figure 3.5(b) makes clear, it is entirely possible for the players to raise their hostility levels to the maximum in responding rationally to the strategic situation. Even when one or both players are Soft (at the upper threshold), there is a tendency for hostility to escalate. There is little latitude here for the conflict to self-resolve.

Conclusions from this analysis are necessarily limited because the Simple Escalation Game captures only a part of the Mid-Level Conflict Model. But the incomplete-information results do suggest that many details and nuances disappear in the complete-information models, that is, when it is assumed that each side knows the other side’s preferences. But no direct contrary evidence to the negative picture developed earlier was uncovered.

Our two analyses are so different that comparisons are difficult. Nonetheless, the tentative conclusions drawn above, that a conflict management policy is unlikely to be useful in most conflicts, have been confirmed and even reinforced.

CONCLUSIONS

The main question addressed by this study is whether conflict management can ever be useful and, if so, when. Under what circumstances should one aim to limit hostilities, rather than to settle the underlying grievances? If a conflict would be difficult or impossible to end, is it worthwhile to intervene with a more achievable goal—preventing it from escalating further? The analysis is only preliminary, but the evidence points to the conclusion that conflict management of itself does not help very much in most situations; its only justification appears to be the opportunity it offers for preference change.

Our analysis was based on a simple model of two-sided conflict in which each side independently decides to increase, maintain, or decrease its level of hostility toward its opponent. The analysis was restricted to models that mostly represented complete-information games; an incomplete-information model addressed only decisions to increase or maintain hostilities and was limited to one move and one response.

Nonetheless, some tentative conclusions were reached. First, under reasonable assumptions about the two sides’ preferences, no circumstances were discovered in which a conflict could be maintained at a moderate level of hostilities but could not be resolved. In other words, whenever conflict manage-
A related issue not addressed here is the intervener’s motivation. An international organization usually takes a neutral approach by design: an intervening state simply pursues its own objectives. As Field Marshal Lord Carver, Deputy Commander of UNFICYP in 1964, put it,

It is important to remember that the UN Force was not concerned in finding a solution [to the conflict on Cyprus]. Not only was this the invidious task of the mediator, but we had no idea what the final solution was likely to be. At the same time it was important to do nothing which might prejudice it (Carver 1986).

It is very unlikely that an intervening state would have been so circumspect. The most general conclusion of this study, tentatively reached, is that conflict management is not a very promising strategy inasmuch as it relies on the view that, if prevented from increasing, hostilities must naturally decrease. Conflicts that can be managed but not resolved seem to be extremely unusual. The best hope for conflict management is as an intervention policy that includes efforts to change the situation on the ground and to change the motivations of the parties. Simply put, conflicts do not self-manage. Conflicts that are manageable are resolvable, and intervention should aim directly for resolution. Intervening in a conflict that is not resolvable is hopeless unless the underlying grievances, and the attitudes of the parties, can be changed.

In summary, conflict management can be a valuable intervention strategy only if it includes measures designed not just to prevent escalation but also to change the status quo and preferences about alternatives to it. In other words, an intervener should do more than hold the lid on the conflict; it should work proactively to cool it down.

NOTES

1. Brams (1999) argues that some interactions behavior may be different when a situation repeats, even if the context and the parties’ objectives (preferences) remain unchanged.

2. Brams and Kilgour (1988, Ch. 4) discuss how and when parties can rationally and prudently wind down a conflict.

3. A more sophisticated view is that the conflict is not resolved at the instant the Lower Conflict Threshold is crossed, but rather when it becomes clear that the hostility level has stabilized below this threshold.

4. As in note 3, a sophisticated approach would count conflicts as managed even if the hostility level briefly exceeds the Upper Conflict Threshold or briefly declines below the Lower Conflict Threshold, providing it returns quickly enough to the middle region—essentially, conflicts are managed if hostilities never stabilize above the Upper Conflict Threshold or below the Lower Conflict Threshold. But we shall not pursue such extensions here.

5. Players’ preferences are associated with states as final outcomes. Thus, motivations reflect only the endpoint of the interaction; states passed through on the way to the final outcome are assumed to make a negligible contribution.

6. This interpretation is also consistent with stability results under the GCMR II solution concepts not reported here.

7. Formally, the credibility square is the unit square in $(p_A, p_B)$-space.

8. One possibility is Drama Theory, a methodology that explicitly models preference change (Howard 1996).

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Part II

Simulation, Experimentation, and Artificial Intelligence

INTRODUCTION

Alex Mintz

The chapters in this section demonstrate the usefulness of studying the same topic (e.g., mediation) using multiple methods, as there are significant "within methods" and "between methods" variations. They also show that different methodological approaches (machine-coded events, experiments and computer simulations) can complement each other. With regard to the role of mediators in conflict resolution, the findings reported in these chapters produce some counterintuitive and interesting results such as: the effect of mediation on conflict reduction is not necessarily significant, at least not in the short term.

The chapters in this section focus on the role of mediation in the process of moving from conflict management to conflict resolution. They are innovative and versatile in offering three distinctive theoretical perspectives, models, and methodologies for the study of mediation as a tool for conflict management and resolution. They also introduce three software products for the study of mediation and conflict resolution: an artificial mediator (AMed) developed by Charles Taber, an automated event cata generator (KEDS) developed by Philip Schrodt, and a Generalized Decision Support System (GDSS) developed by Jonathan Wilkenfeld and his associates.

Substantively, the chapters in this section focus on two important aspects: (a) the impact of the mediation process on conflict resolution and (b) the effect of mediators' styles and cognitive complexity on conflict reduction. Contrary to conventional wisdom, they find that mediation does not necessarily increase the chances for an agreement or conflict resolution and that mediators' cognitive complexity and style do not contribute to conflict reduction.