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NEGOTIATION ANALYSIS: A CHARACTERIZATION AND REVIEW*

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"Negotiation analysis" seeks to develop prescriptive theory and useful advice for negotiators and third parties. It generally emphasizes the parties' underlying interests (as distinct from the issues on the table and the positions taken), alternatives to negotiated agreement, approaches to productively manage the inherent tension between competitive actions to "claim" value individually and cooperative ones to "create" value jointly, as well as efforts to change perceptions of the game itself. Since advice to one side does not necessarily presume the full game-theoretic rationality of the other side(s), negotiation analysts often draw on the findings of behavioral decision analysts and economists. Further, this approach does not generally assume that all the elements of the "game" are common knowledge. Thus, the negotiation analytic approach tends to de-emphasize the application of game-theoretic solution concepts or efforts to find unique equilibrium outcomes. Instead, to evaluate possible strategies and tactics, negotiation analysts generally focus on changes in perceptions of the "zone of possible agreement" and the (subjective) distribution of possible negotiated outcomes conditional on various actions. This approach is especially sensitive to potentially unrealized joint gains. It has been used to develop prescriptive advice for the simplest bilateral negotiations between monolithic parties, for negotiations through agents or with linked "internal" and "external" aspects, for negotiations in hierarchies and networks, as well as for more complex coalitional interactions.
(NEGOTIATION ANALYSIS; GAME THEORY: EQUILIBRIUM CONCEPTS; COMMON KNOWLEDGE; BEHAVIORAL DECISION ANALYSIS; NEGOTIATION; BARGAINING)

With its primary roots in decision analysis and game theory, "negotiation analysis" seeks to develop prescriptive theory and useful advice for negotiators and third parties. In this article, I will describe what seem to be distinctive characteristics of this emerging approach, discuss a number of representative works, sketch the elements of a typical negotiation analysis, and highlight some promising trends.

One might quite reasonably ask about the need for a new approach since the theory of games already provides a logically consistent framework for analyzing negotiating situations. Given standard rationality axioms, the interests of the involved parties can be abstracted into utility functions. The implied expected utility criterion ranks alternative courses of action both with and without negotiated agreement. Full descriptions of the courses of action that can be taken by each involved party are encapsulated into "strategies." Rigorous analysis of the interaction of strategies leads to a search for "equilibria," or plans of action such that each party, given the choices of the other parties, has no incentive to change its plans. And, "[f]or forty years, game theory has searched for the grand solution," that would achieve "a prediction regarding the outcome of interaction among human beings, using only data on the order of events, combined with a description of the players' preferences over the feasible outcomes of the situation."[1]

Game theory has been especially useful for understanding repeated negotiations in well-structured situations such as various financial markets. It has offered useful guidance for the design of negotiation and bidding mechanisms, has uncovered some powerful

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[1] Rubenstein (1991, p. 923). See the classic game-theoretic works of Von Neumann and Morgenstern (1944) and Luce and Raiffa (1957); for recent insightful assessments, with special regard to bargaining, see Roth (1985), Aumann (1989), Harsanyi (1989), and Rasmusen (1989).

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competitive dynamics, has usefully analyzed many "fairness" principles, has generated intriguing hypotheses, and now flourishes both on its own and in applications such as the economics of industrial organization. With nonspecialist audiences in mind, a number of analysts have recently described some of the most useful contributions of game theory for understanding negotiating behavior. (See, for example, Weber 1985, Myerson 1991, Siebe 1991, and Young 1991.)

Yet the dominant game-theoretic quest to predict equilibrium outcomes resulting from the strategic interactions of fully rational players often suffers from a lack of prescriptive usefulness. First, on standard assumptions, there are often numerous plausible equilibrium concepts, each with many associated equilibria—and no *a priori* compelling way to choose among them. Second, one's client, for example, may wish to act rationally, but the other side may not behave as a strategically sophisticated, utility-maximizer—thus rendering conventional equilibrium analyses inapplicable. Third, the elements, structures, and "rules" of many negotiating situations are not completely known to all the players, and even the character of what is known by one player may not be known by another. Despite some ingenious theorizing, the frequent lack of such "common knowledge" limits—from a prescriptive standpoint—much equilibrium-oriented game analysis. Even where it is possible to bend such a situation into the form of a well-posed game, and gain insights from it, the result may have lost considerable prescriptive relevance. Rather than the simplification that is almost always necessary for analytic tractability, the essential character of the problem may have been changed to fit the game theorist's exacting approach.

A spirited and informative interchange in the pages of *Management Science* a few years ago debated the explanatory, predictive, and prescriptive merits of the game-theoretic approach.[2] The principal analytic alternative for addressing negotiation situations was taken to be decision theory; one author sharpened the question in his title to "On Choosing Between Rev. Bayes and Prof. von Neumann" (Kahan 1983). A few commentators felt that to abandon the fully rational approach was to be cast into the murky realm of "psychology." Largely since the time of that discussion, and reflective of many of the tensions it illuminated, another analytic approach to negotiation has been emerging. It would be an unfortunate mistake to characterize this new approach as an "alternative" to game theory; indeed, it might be called "nonequilibrium game theory with bounded rationality and without common knowledge" (although other candidates might be "decision analysis with a strong interactive flavor," or "strategically sophisticated psychology from a prescriptive point of view"). Adopting the label "negotiation analysis" instead, this article first seeks to characterize this approach more precisely.

A. Distinctive Characteristics of a Negotiation Analytic Approach

At the cost of some game-theoretic precision and formal rigor, a body of work has emerged that offers prescriptive insights into negotiation. While Luce and Raiffa's (1957) *Games and Decisions* was primarily a brilliant synthesis and exposition of game theory's development since von Neumann and Morgenstern's (1944) classic work, Luce and Raiffa began to raise questions about the limits of this approach in analyzing actual interactive conflict situations. Perhaps the first work that could be said to be in the spirit of what I mean by "negotiation analysis" was *The Strategy of Conflict* (1960) by Thomas Schelling, followed by his *Arms and Influence* (1966). The point of departure of these works was game-theoretic but they proceeded with less formal argument and their analysis had far broader direct scope. Though nominally in the behavioral realm, Walton and

[2] See, e.g., Kadane and Larkey (1982a, b, 1983), Harsanyi (1982a, b), Kahan (1983), Roth and Schoumaker (1983), Rothkopf (1983), and Shubik (1983).

McKersie's *Behavioral Theory of Labor Negotiation* (1965) drew on Schelling's work as well as rudimentary decision and game theories in highlighting distinctions between so-called "integrative" and "distributive" bargaining as well as the "intraorganizational" negotiations that take place in tandem with the bargaining between labor and management.

The first overall synthesis of the emerging field of negotiation analysis appeared with the publication of Howard Raiffa's (1982) *The Art and Science of Negotiation*. An application and elaboration of some of these ideas in the context of the mammoth Law of the Sea negotiations, *Negotiating the Law of the Sea: Lessons in the Art and Science of Reaching Agreement*, was published by Sebenius (1984). A set of essays, structured simulations, and teaching notes commissioned by the National Institute for Dispute Resolution resulted in publication of *The Manager as Negotiator and Dispute Resolver*, by Lax, Samuelson, Sebenius, Weber, and Weeks (1985). This approach was systematized into an overall method in the first part of Lax and Sebenius' *The Manager as Negotiator* (1986); the second part specialized the method to managerial negotiations within and among organizations. More recently, *Negotiation Analysis* (forthcoming, 1991) edited by H. Peyton Young, furthers this evolving tradition.[3]

Though negotiation analysis is inspired by the categories, concepts, and techniques developed in the field of game theory, it is generally distinctive in a number of respects—that, as I will explain, bring it far closer in spirit to decision analysis (i.e., decomposing the problem: separating and subjectively assessing probabilities, values, attitudes toward risk, and time preference; structuring and sequencing the parties' choices and the chance events). Though not uniformly present, four features seem to capture much of the spirit of this emerging approach: an "asymmetrically prescriptive/descriptive" orientation, a radically subjective perspective, a sensitivity to potential "value left on the table," and a de-emphasis on game-theoretic solution concepts or equilibria supplanted by a focus on changes in perceptions of the "zone of possible agreement"—including analysis of moves to change the perceived "game" itself. I will discuss these before outlining the elements of a canonical negotiation analysis.

1. *An Asymmetrically Prescriptive/Descriptive Orientation*

Unlike the "symmetrically prescriptive" approach of game theory, wherein fully rational players are analyzed in terms of what each should optimally do given the other's optimal choices, a negotiation analyst typically seeks to generate *prescriptive* advice to one party given a (probabilistic) *description* of how others will behave; this is in line with the decision analytic approach (e.g., Raiffa 1968). In developing prescriptions for one side, negotiation analysts typically assume *intelligent, goal-seeking action* by the other parties, but not full game-theoretic (interactive) rationality. Such descriptive assessments of the others need not assume tactical naiveté; as contextually appropriate, the assessments can incorporate none, a few, or many, rounds of "interactive reasoning." An important additional perspective is what Raiffa calls "externally prescriptive/descriptive," a stance appropriate to advising third parties such as mediators and arbitrators about how best to act, given assessments of the protagonists.

Concern with the "other side" renders the insightful work of "behavioral decision analysis" and behavioral economists important to negotiation analysis.[4] Knowledge of systematic cognitive deviations from strict individual "rationality," poorly-calibrated and

[3] A number of other works—sometimes appearing in *The Journal of Conflict Resolution* and *The Negotiation Journal*—focusing on characteristic aspects of this emerging approach will be discussed below.

[4] See, e.g., Bazerman (forthcoming), Neale and Bazerman (1991), Einhorn and Hogarth (1988) along with the other excellent collections of papers in Kahneman, Slovic, and Tversky (1982), the review in Schoemaker (1983), and Bell, Raiffa, and Tversky (1988).

inconsistent probabilistic assessments, as well as other anomalies not only has direct tactical implications but also helps build up more structure on the "descriptive" side of the area's "asymmetrically prescriptive/descriptive" orientation. Of value in this regard are the works of Roth and his colleagues that blend game-theoretic and psychological considerations in rigorous experimental settings.[5]

2. *A Radically Subjective Perspective*

Negotiation analysis is radically subjective in three important senses. First, it is presumed up to the parties how they assess the probabilities of different events. (This is closer in spirit to Kadane and Larkey's 1982a, b views on subjective probability and game theory than the more classical view as expressed by Harsanyi 1982a, b.) Second, subjective perceptions of the parties' underlying interests are taken as sovereign (though not immutable). Less tangible concerns for self-image, fairness, process, precedents, or relationships can have the same analytic standing as the "harder" or "objective" interests such as cost, time, and quality that are common to traditional economic approaches. Third, one side is not bound to regard the "other side" as acting in accord with the precepts of game-theoretic rationality; the other side's likely behavior must be subjectively assessed in light of available evidence.

3. *Sensitivity to "Value Left on the Table"*

Much early game-theoretic and economic analysis of bargaining simply assumed that negotiated agreements would be "efficient," or would not leave joint gains on the table. For example, the so-called Nash solution (1950), along with other like approaches to cooperative games (i.e., in which binding commitments are possible), posited Pareto optimality as a reasonable feature of a negotiated outcome. Despite a world peppered with needless deadlocks, poor agreements, soured relationships, strikes, and wars, many classically trained economists (still) react with incredulity that "rational" bargainers might walk away from unrealized joint gains. By contrast, most negotiation analysts anticipate the likelihood of ex post Pareto-inefficient agreements, and devote considerable effort at helping the parties to "expand the pie."[6]

4. *A Focus Away from Equilibrium Analysis and Toward Perceptions of the Zone of Possible Agreement*

In contrast to a game-theoretic preoccupation with solution concepts and equilibrium analysis, negotiation analysts typically focus on subjective perceptions of the so-called "zone of possible agreement"—as well as how those perceptions change. They presume that each party can at least roughly assess and reassess the attractiveness of its no-agreement alternatives. The set of possible agreements that, from the standpoint of each involved party, is better in value or utility terms than no agreement, comprises the zone of possible agreement. Since each party would rather accept any settlement in the zone of possible agreement rather than no agreement (assuming the process does not generate spite, conflict

[5] See, e.g., Roth and Malouf (1979, 1981), Roth, Malouf, and Murnighan (1981), Roth and Murnighan (1982), and Roth and Schoumaker (1983).

[6] From the standpoint of economic logic, Schelling (1960) discusses common inefficiencies in quasi-constant sum bargains with complete information. Lax and Sebenius (1986) discuss the "Negotiator's Dilemma" and describe the frequent inefficiencies resulting from the tension between negotiators' desires to create value by cooperating and to claim value by behaving competitively. Further, a number of authors have shown that the negotiators' rational self-interested behavior when bargaining with incomplete information can lead to ex post Pareto-inefficient equilibria. For example, Chatterjee (1982, 1985) discusses the inefficiencies that can result when parties possess private information, and Myerson (1979) along with Myerson and Satterthwaite (1983) demonstrate the tradeoff between honest revelation of privately held information and ex post Pareto-efficiency in bargains with incomplete information.

escalation, or its equivalent), Schelling (1960) made the potent observation that the outcome of such a situation could only be unraveled by a "logic of indeterminate situations." In trying to develop such a logic, negotiation analysts tend to focus on actions that can change perceptions of the zone, typically, in ways subjectively expected to yield more favorable distributions of negotiated outcomes.

Let me offer four, somewhat related, reasons that many negotiation analysts may focus less attention on the solution concepts and equilibria that characterize the bulk of relevant game theory and mathematical economics—without abandoning or denying the validity and likely value of such work:

(a) *Many Solution Concepts; Many, Many Possible Equilibria.* Though there exist many solution concepts and criteria, with various appealing properties and different predictions, it is often neither *a priori* nor empirically clear which is the "best" or most applicable. For example, as central as the minimax criterion is to classical game theory in purely competitive situations, if Player One believes that Player Two is not employing a minimax strategy, perhaps on the basis of experience or empirical studies, there are often strategies superior to minimax for Player One (e.g., Kadane and Larkey 1982a). More generally, Shubik (1982) and Mas-Colell (1989), for example, describe an impressive number of candidate solution concepts for cooperative games.

Even with as powerful a concept as that of the Nash equilibrium in noncooperative games (see, e.g., Kreps 1989), it is often impossible, even with the imposition of increasingly stringent requirements or refinements, to limit a game's equilibrium outcomes to a unique or even small number of points.[7] Often there is an infinitude of such outcomes. As Tirole (1988, p. 446) noted when explaining why "we are now endowed with nearly a dozen refinements of perfect Bayesian equilibrium," the "leeway in specifying off-the-equilibrium-path beliefs usually creates some leeway in the choices of equilibrium actions; by ruling out some potential equilibrium actions, one transforms other actions into equilibrium actions. Hence it is not surprising that one often ends up with a continuum of perfect Bayesian equilibria."

Despite recent insights into how rational players might select from among multiple Nash equilibria (Harsanyi and Selten 1988), the rationale for a particular choice may ultimately seem arbitrary. As Kadane and Larkey (1982a, pp. 115–116) remark, "we do not understand the search for solution concepts that do not depend on the beliefs of each player about the others' likely actions, and yet are so compelling that they become the obvious standard of play for all those who encounter them." This seems especially apt in light of their observation that "solution concepts are a basis for particular prior distributions" and hence "the difficulty in non-zero sum, N-person game theory of finding an adequate solution concept: no single prior distribution is likely to be adequate to all players and all situations in such games."

These considerations might suggest that, rather than discovering multiple equilibria and imposing restrictions to winnow them down to a single predicted outcome, negotiation analysts should perhaps pause before winnowing and assess a (subjective) distribution over the plausible equilibria. If this issue of "multiple concepts, multiple equilibria" were the only question, however, equilibrium methods might still be the mainstay of those interested in prescriptive approaches to negotiation. Yet, as I will next argue, important premises for meaningful equilibrium analysis itself may not hold for prescriptive purposes.

(b) *Significant Departures from Full Game-Theoretic "Rationality."* As discussed (in the second reason) above, while people in mixed-motive situations normally exhibit intelligent, purposive behavior, there are important departures from the "imaginary, idealized, super-rational people without psyches" (to quote Bell, Raiffa, and Tversky

[7] See, e.g., sequential equilibrium (Kreps and Wilson 1982), perfection and subgame perfection (Selten 1975), stability (Kohlberg and Mertens 1986).

1988, p. 9) needed by von Neumann and Morgenstern expected utility maximizers, let alone as required by sophisticated concepts of sequential strategic interaction alluded to in 4(a). Of course, this need not detract from the utility of a fully rational "baseline" analysis—to understand the possible responses of a rational other side—nor the value of urging consistent, if not fully "rational," behavior on the subject of one's advice. After all, well-structured, repeated negotiations may penalize departures from rational behavior. Yet many negotiating situations are neither well-structured, repeated, nor embedded in a market context. And much behavior more than trivially departs from the canons of rationality. Recognizing this, researchers might hope that, after developing a better empirical understanding of negotiators' behavior, they might "redo" the game-theoretic program using a more behaviorally faithful theory (e.g., "prospect theory" of Kahneman and Tversky 1979). Unfortunately, an even more fundamental problem with game analysis would carry over to an impede such a new quest.

(c) *Often, the Game's Structure, Rules, and Possible Moves Are Not Common Knowledge.* Luce and Raiffa (1957, p. 49) noted that a fundamental requirement of game theory is that "each player . . . is fully aware of the rules of the game and the utility functions of the players . . ." and that "this is a serious idealization which only rarely is met in actual situations." While a great deal of theory, some of it ingenious, has been developed for such games of "incomplete information" (e.g., Harsanyi 1967–1968), most of it rests on the assumption that the rules of the game and the utility functions are "common knowledge" in the sense of Aumann (1976)—that each player knows this information, knows that the others know it, that the others know that he knows it, and so on.

Imagine that an analyst sought to give advice to one party in an extremely simple price negotiation—in which a potential buyer and seller negotiate over time about how to share the "surplus" over their reservation prices that would result from a sale. One might naturally model this situation as Rubinstein's (1982) simple bargaining game in which two players, who must share a pie of size 1, make sequential alternating offers, with a discounting factor, d, in operation. The result that there is a unique subgame perfect equilibrium to this game (in which the offering player offers $d/(1+d)$) is elegant and insightful, yet it depends absolutely on the full structure of this encounter being common knowledge. If the players did not have common priors on any number of what in practice would be tactically variable elements of the game as specified (e.g., the sequence of offers, on the length of time between offers, the mutually expected "rationality" involved in offer and acceptance decisions), Rubinstein's analysis would be inconclusive.

Moreover, while not a criticism of this spare model, one might expect a range of other frequently encountered factors to be potentially decisive—and the players may not plausibly have common knowledge of them. Take the role of expectations. One player might have just read Schelling's (1960) "Essay on Bargaining" and become convinced that she might shape the other player's expectations by making an unchanging sequence of offers within the zone of possible agreement. She might also use other contextually dependent ploys to attempt a credible commitment such that the other player would come to believe that he faced a "take it or leave it offer" that was better than no-agreement. Adding in these expectational and/or commitment considerations, the result might be impasse or acceptance of her fixed offer—even though these outcomes were not in equilibrium.[8] Further, the essence of many simple distributive bargains involves each player's uncertainty about the other's no-agreement alternatives, and hence, reservation price. Most equilibrium results require the probability distributions from which these reservation prices are drawn to be common knowledge of the players. In practice, that condition is

[8] In this connection, see the "thought experiment" and empirical results of Roth and Schoumaker (1983, pp. 1338–1339).

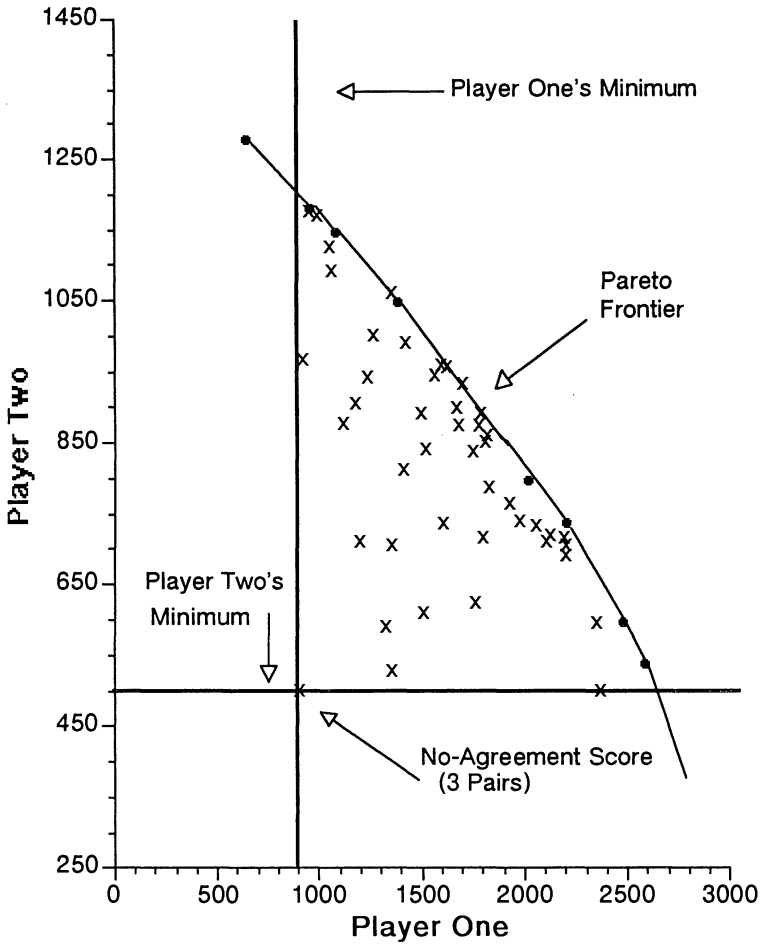

FIGURE 1. Multiple Issue Negotiation.

often unmet, with each party potentially engaging in strategic manipulation of the other side's perceptions of no-agreement alternatives (as well as the subjective valuation of those alternatives).

More generally, the full set of actual and potential players, interests, beliefs, issues, alternatives to agreement, rules, and agreements, are often only imperfectly known, and even the character of what is known by one party is not known by others. Indeed, purposive action by involved or excluded parties can often change the set of involved players, bring in or exclude issues, raise or lower the salience of different interests, alter the "rules" of the interaction, or take other actions to change the collective perception of the "game's" configuration.[9]

Even where information is "almost common knowledge," Rubenstein (1989) shows that equilibrium results may be sharply different from the fully common knowledge

[9] On a personal note, in my own negotiation experience—which, apart from academics and consulting, includes time in the U.S. Commerce and State Departments, membership for three years on the U.S. Delegation to the United Nations Law of the Sea Negotiations, and four years of full-time merger and acquisition work on Wall Street—relatively few negotiating situations have conformed even approximately to the exacting requirements of common knowledge (including the common prior distributions of negotiator "types"—arrayed by reservation prices, utility functions, etc.—required by Harsanyi's analysis). Some discussion of Harsanyi's doctrine of "common priors" can be found in Sebenius (1984, esp. Chapter 4) and Sebenius and Geanakoplos (1983).

situation. More generally, as Aumann (1989, p. 31) unequivocally concluded, "*The common knowledge assumption underlies all of game theory and much of economic theory. Whatever be the model under discussion, whether complete or incomplete information, consistent or inconsistent, repeated or one-shot, cooperative or non-cooperative, the model itself must be assumed common knowledge; otherwise the model is insufficiently specified, and the analysis incoherent.*" (emphasis supplied) By contrast, as will be discussed below, nongame-theoretic analyses can yield useful advice in situations that lack some degree of common knowledge.

(d) *Widely Scattered Negotiated Outcomes in Practice.* In line with the theoretical considerations described above, negotiated outcomes in practice are extremely varied—*even where the underlying negotiating situation is identical.* For example, Figure 1 plots the negotiated results of pairs of private managers (including the heads of some large corporations) and public officials (including a U.S. Senator) at two advanced executive programs held at Harvard. Each side was given a confidential description of a realistic situation with a private multiattribute value function explicitly embedded in the instructions. (The carefully structured exercise was originally constructed by John Hammond and modified by Richard Zeckhauser to include an oil-for-aircraft swap and several side issues.) After the participants enthusiastically carried out the simulation, the plotted results were widely scattered.[10] Despite the highly structured exercise, and the realism as reported by the participants, this encounter had many elements that were not common knowledge; and debriefings of the experienced participants suggest they were not acting fully in accord with (strategic) rationality assumptions. This typical experimental outcome suggests that, rather than further refine existing concepts in search of unique negotiated equilibria in games of common knowledge, useful insights may also come from other questions aimed at understanding the processes that lead to better and worse outcomes (jointly and individually).

These four considerations—the number of plausible solution and equilibrium concepts along with the multiplicity of equilibria in many games, the deviations from fully "rational" behavior, the frequent lack of common knowledge, and the widely scattered empirical results—cast doubt on the ease with which the structure and rules of a given situation can be reliably mapped onto a unique negotiated outcome. They do not invalidate the game-theoretic program; after all, the body of existing theory is anything but static and will certainly make significant progress on these and other challenges. (For example, Nau 1990 has recently reported some interesting results on how the "rules of the game" become common knowledge.) Yet these four considerations have led a number of negotiation analysts to de-emphasize equilibrium methods in favor of other approaches that seem to yield useful prescriptive theory and advice.

In particular, the negotiation analytic approach generally highlights elements, described below, that affect the parties' perceptions of the zone of possible agreement, and searches for moves that improve the subjective distribution of possible negotiated outcomes. By such an "improvement," I mean an increase in subjectively expected utility conditional on the action and subsequent reactions. (Such "improvement" has a subjective basis analogous to the Rothschild-Stiglitz 1970 characterization of a subjectively perceived "increase" in risk.)

In the skeptical view of Harsanyi (1982a), this approach might boil down to "the uninformative statement that every player should maximize expected utility in terms of his subjective probabilities without giving him the slightest hint of how to choose these subjective probabilities in a rational manner." Yet, as described below, distinct classes of factors have been isolated that appear to improve distributions of negotiated outcomes.

[10] A similar plot for another such exercise is reproduced in Raiffa (1982, p. 138).

Psychological considerations can help as can cultural observations, organizational constraints and patterns, historical similarity, knowledge of systematic decision-making biases, and contextual features. Less than full-blown game-theoretic reasoning can offer insight into strategic dynamics as can blends of psychological and game-theoretic analysis (e.g., models of "semirational" behavior; see Rothkopf 1983). When one relaxes the assumption of strict strategic sophistication, Raiffa's (1982, p. 359) conclusion is appealing: that some "analysis—mostly simple analysis—can help."

Measured against an "equilibrium" standard, a subjective assessment of the distribution of possible negotiated agreements that only implicitly embodies the interactive elements may seem analytically thin. Yet complementary standards—logical consistency, systematic insight into the negotiation process, or practical utility—may be more appropriate for evaluating the work of negotiation analysts and suggesting new directions for investigation.

In short, distinctive features of a negotiation analytic approach include an asymmetrically prescriptive/descriptive analytical orientation; a radically subjective presumption; the expectation of purposive action but not full, strategic rationality; sensitivity to Pareto-inferior outcomes; a focus on changes in perceptions of the bargaining set rather than on equilibrium and solution concepts; and a willingness to analyze situations that are not fully specified in advance. Depending on one's starting point, this might be "decision analysis plus" or "game theory minus." But to flesh out the characterization, it is useful to review the elements of a typical negotiation analysis.

B. Elements of a Negotiation Analytic Approach

Full negotiation analytic accounts generally consider the following basic elements with respect to the actual and potential parties: their perceived interests; alternatives to negotiated agreement; the linked processes of "creating" and "claiming" value; and efforts to "change the game" itself. These basic elements can be found and analyzed in the simplest bilateral negotiation between monolithic parties as well as in the most complex coalitional interactions.

1. *Interests, Issues and Positions*

It is often important to distinguish parties' underlying *interests* from the *issues* under negotiation, on which *positions* or stands are taken. The connection among positions on issues and interests is rarely a simple one. Sometimes a focus on deeper interests can unblock a stubborn impasse over incompatible positions that relate only partially to the parties' real concerns; in other cases, emphasizing interests will only generate hopeless conflict when mutually beneficial agreement on certain overt issues could be reached. And focusing on issues and positions (rather than interests) can be tactically advantageous.

In virtually all cases, an important first analytic step is to probe deeply for interests, distinguish them from issues and positions, and to carefully assess tradeoffs. Raiffa (1982) offers an extended discussion of assessing tradeoffs in negotiation, building on extensive work by Keeney and Raiffa (1976). (See also Keeney 1988 and Keeney and Raiffa forthcoming, 1991.) Barclay and Peterson (1976) demonstrate a methodology for assessing negotiating tradeoffs in the context of a base negotiation. Lax and Sebenius (1986) offer a simplified discussion of the principles behind such tradeoffs, while Wierzbicki (1983) critically surveys the methodologies of multiobjective analysis. (See also Saaty's 1980, 1990 analytic hierarchy method.) A book by Nagel and Mills (forthcoming), *Multicriteria Methods in Alternative Dispute Resolution*, develops technological and computer-based means for making such assessments in a variety of negotiating settings.

When individuals or groups with different concerns constitute a negotiating "side," it is no longer in general possible to specify overall tradeoffs; however, carefully tracing

which set of interests is ascendant according to the internal bargaining process of given factions may continue to provide insights. (Wilson's 1968 work on "syndicates" suggests formal conditions under which a "group utility function" exists.) One result of such analysis of interests may be the disaggregation of a side into factions whose interests are shared enough to justify treating the faction as another distinct party. For cases in which such disaggregation is not sensible, Keeney, Renn, and von Winterfeldt (1983) discuss "value tree" analysis, whereby effective preferences of larger groups can be assessed for decision-making purposes, including policy negotiations.

2. *Alternatives to Negotiated Agreement*

People negotiate in order to satisfy the totality of their interests better through some jointly decided action than they could otherwise. Thus, for each side the basic test of a proposed joint agreement is whether it offers higher subjective worth than that side's best course of action absent agreement. In examining a negotiation, one should analyze each party's perceptions of its own—and the others' evaluations of their—alternatives to negotiated agreement.

Alternatives to agreement may be certain, with a single attribute: an ironclad competing price quote for an identical new car. They may be contingent and multi-attributed: going to court rather than accepting a negotiated settlement can involve uncertainties, trial anxieties, costs, time, and precedents that contrast with the certain, solely monetary nature of a pretrial accord. Alternatives may change over time with new information, interpretations, competitive moves, or opportunities. Without agreement, the status quo ante may be superseded by something much worse for one side: a now-neutral island nation may intend to lease its naval base to one superpower if current negotiations fall through with the other. In multi-party negotiations, one side's alternatives to agreement may be the set of agreements that could be reached by potential opposing coalitions. Outright threats by one party to change the no-agreement alternatives of another are common. Or, the best alternative to negotiated agreement may be to keep negotiating: in arms control, for example, failure to agree may involve worse relations, foregone benefit and altered settlement possibilities, but in any case necessity may remain for continued dealings among the same parties.

Evidently, decision analysis (including multi-attribute value and utility theory) can often help assess alternatives to agreement. When there are many possible alternatives—for example, many potential purchasers, each with associated uncertainties and costs of discovery for the seller—optimal search theory can provide strategies for searching efficiently and valuing the expected findings from the search (Lax 1985). When the parties' alternatives to agreement are interdependent, concepts from game theory—including the dynamics of threats and counterthreats as well as the many variants of coalitional analysis—can help bargainers understand their alternatives (Luce and Raiffa 1957; Raiffa 1982).

While this evaluation provides a strict lower bound for the minimum worth (the "reservation price") required of any acceptable settlement, alternatives to agreement also play tactical roles. The more favorably that negotiators portray their best alternative course of action—whether this means a course that is less costly, more efficient, less risky, with earlier benefits, with more desirable linked attributes (such as reputation), or fewer undesirable ones (such as bad precedents)—the smaller is the ostensible need for the negotiation and the higher the standard of value that any proposed accord must reach. Moves "away from the table" that shape the parties' alternatives to agreement can strongly affect negotiated outcomes. Searching for a better price or another supplier, cultivating a friendly merger partner in response to hostile takeover negotiations, or preparing an invasion should talks fail to yield a preferable outcome may have greater influence on the negotiated outcome than sophisticated tactics employed "at the table"

such as clever opening offers or patterns of concession.[11] This poses an interesting problem of allocating scarce effort *at* the table versus *away* from the table (Lax and Sebenius 1985).

From Structure to Outcome: Favorable Changes in the Perceived Zone of Possible Agreement. With the elements of the negotiation in place, but without an explicit model or formal theory (equilibrium-based or other) adequate to map structure and tactics onto bargaining outcomes, how can an individual negotiator or interested third party decide what to do? In the (often implicit) view of many negotiation analysts, the negotiator's subjective distribution of beliefs about the negotiated outcome conditional on using the proposed tactics must be compared with his subjective distribution of beliefs about the outcome conditional on not using them. The tactic is attractive if the former distribution gives him higher expected utility than the latter.[12] Specifying these distributions may require an internalized and subjective model of the bargaining process since no such general model exists; where there is a well-developed and applicable game-theoretic model, of course, it can be used. Of course, the "better" the empirical and theoretical basis for the assessment, the "better" the subjective distributions of outcomes.

Thus far, the discussion has proceeded in a decision analytic spirit. Yet, negotiation problems have a special structure and dynamics that derive from the *joint decision-making* that is inherently involved. A clear understanding of this structure and its characteristic processes can improve the basis for assessing outcome distributions. While game theory emphasizes the fully rational, strategic character of the interaction, negotiation analysis systematically blends a sustained focus on what might be called the "technology of cooperation" with a more boundedly rational view of the strategic, adversarial elements, as described in the next sections.

3. *Creating and Claiming Value*

The lure of joint action lies in the prospect of each party's doing better than its alternatives to agreement. It is therefore crucial to understand the bases for joint gains and to envision possible agreements. In most negotiations, the potential value of joint action is *not* fully obvious at the outset.

Creating Value. "Creating value"—that is, reaching mutually beneficial agreements, improving them jointly, and preventing conflict escalation—requires an approach often associated with "win-win," "integrative," or "variable sum" encounters. To generate gainful options, it is normally helpful for information to be shared openly, communication enhanced, creativity spurred, joint problem-solving emphasized, and hostilities productively channeled. Many analysts offer insights into "creating value" by cooperative behavior.[13] Regardless of whether one adopts a cooperative *style* or not, it is useful to have an analytic guide as to the underlying bases for joint gains. Three distinct classes of factors

[11] In many settings, visibly improving one's no-agreement alternatives will improve one's outcomes; varied examples and laboratory experiments provide empirical support for this intuition. Yet, there are instances in which this will not be the case. For example, in a marriage, finding a potential replacement mate during a dispute might seriously damage how one's spouse values the marriage. Or, a disgruntled subordinate whose boss is known to value loyalty might be better off if he did not generate other offers before going to his boss to improve his job; the breach of loyalty could reduce the boss's sense of obligation to keep his employee happy. Because no general model exists of how such tactics affect the distribution of outcomes, assessment depends on experience, limited empirical evidence, equilibrium calculations, and logic.

[12] That the changed distribution of outcomes gives higher expected utility than the original still need not mean that the negotiator will get a better outcome than he would have by eschewing the tactics. A random draw from the changed distribution may, with some probability, be worse than a random draw from the original one.

[13] See, e.g., Walton and McKersie (1965); Fisher and Ury (1981); Raiffa (1982); and Pruitt and Rubin (1986).

are at the core of all possible mutual benefits from cooperation; these factors are the raw material from which negotiators can "create value."[14]

First, apart from pure shared interests, negotiators may want the same settlement on some issues, and their mere agreement may be able to produce it. Furthering their relationship, or acting in accord with an identical interest, such as a shared vision, ideology or norm of equity, may create value in an agreement. Interests, such as "good relationships," are analogous to the economist's "public goods" in that all sides can simultaneously "consume" them without diminution.

Second, where economies of scale, collective goods, alliances, or requirements for a minimum number of parties exist, agreement among similar bargainers can create value.

Third, though many people instinctively seek "common ground" and believe that "differences divide us," it is often precisely the *differences* among negotiators that constitute the raw material for creating value. Each class of difference has a characteristic type of agreement that makes possible its conversion into mutual benefit. For example, differences in relative valuation suggest joint gain from trades or from "unbundling" differently valued attributes. Differences in tax status, liquidity, or market access suggest arbitrage. Complementary technical capacities can be profitably combined. Probability and risk aversion differences suggest contingent agreements or bets. Differences in time preference suggest altering schedules of payments and other actions. Sebenius (1984) formally characterizes such optimal betting, risk sharing, and temporal reallocations; a general discussion of differences in probabilities and attitudes toward risk can be found in Pratt and Zeckhauser (1989). These observations point up value of a "differences orientation" with knowledge of the characteristic "technologies" for converting differences into mutual benefit.

In short, negotiated agreements may improve on the alternatives by: (1) cultivating shared interests, (2) exploiting scale economies, and (3) dovetailing differences. A number of studies have taken various differences and analyzed their implied joint gains. Barclay and Peterson (1976) carry out this analysis in the context of base rights negotiations; similarly, Brown, Peterson, and Ulvila (1975) analyze alternative Middle Eastern oil agreements. Ulvila and Snyder (1980) show how negotiation of international tanker standards followed this methodology. Howard Raiffa (1982) explains this analysis in the context of the Panama Canal negotiations and the talks over Philippine bases. Sebenius (1984) examines the sophisticated joint gains in a deep seabed mining agreement. Bueno de Mesquita and his colleagues (1985) carry out an elaborate analysis of the British negotiations with the Chinese over the fate of Hong Kong. Chen and Underwood (1988) describe a closely related methodology that they call "Integrative Analytical Assessment" and apply it nicely in a negotiation between two firms, Detroit Edison and Syndeco, Inc. Nagel and Mills (forthcoming) offer a number of examples in which joint gains may be analyzed and realized.

Claiming Value. Crucial aspects of most negotiations, however, are primarily "distributive," "win-lose," or constant-sum; that is, at some points in the process, increased value claimed by one party implies less for others. For example, in choosing a strategy for the highly restrictive class of negotiations involving "first and final offers," one must balance the value to be claimed against the chance and cost of impasse (Samuelson 1980). Although value can be created merely by reaching an accord in some cases, the parties' interests can conflict diametrically over the terms. And where value can be created by moves beyond the most obvious agreements that value must still be apportioned. Several broad classes of tactics used for "claiming value" in these kinds of bargains have been explored.[15] Such tactics include: shaping perceptions of alternatives to agreement,

[14] See Chapter 5 of Lax and Sebenius (1986).

[15] See, e.g., Schelling (1960), Walton and McKersie (1965), Raiffa (1982), and Lax and Sebenius (1986).

making commitments, influencing aspirations, taking strong positions, manipulating patterns of concessions, holding valued issues "hostage," linking issues and interests for leverage, misleading other parties, as well as exploiting cultural and other expectations. By means of these tactics, one party seeks advantage by influencing another's perceptions of the bargaining range.

Managing the Tension Between Creating and Claiming Value: The Negotiators' Dilemma. If the processes of creating and claiming value were separable, it would be possible to analyze and prescribe a separate approach to each task. Unfortunately, the fact that in general they are not undermines much otherwise useful advice (that, for example, presumes "win-win" situations to have no "win-lose" aspects, or "integrative" bargains to be unrelated to "distributive" ones). As Schelling sympathetically recounts in the preface to the 1980 edition of the *Strategy of Conflict* (pp. vi–vii) concerning an eminent scholar and public figure who had come late to this understanding: "he had known that conflict could coexist with common interest but had thought, or taken for granted, that they were essentially separable, not aspects of an integral structure."

This has potent consequences for negotiation analysis. In general, the benefits of cooperation are not fully known at the outset of a negotiation. Moreover, the manner by which parties try to create value, or press out toward the potential Pareto frontier, normally influences the allocation of that value. Approaches that tend to be effective in claiming value tend to be highly dysfunctional for creating it. Yet, openness and information revelation aimed at value creating can be exploited by a "value claimer." Colloquially, the parties often do not know how large a pie they can make. The way in which they attempt to expand the pie often affects its final division, while each side's efforts to get a larger share of the pie often prevent its expansion in the first place—and may lead to no pie at all, or even to a fight.

Each party tends to reason over the course of an encounter as follows: If the other parties are open and forthcoming, I can take advantage of them and claim a great deal of value; thus I should adopt a value-claiming stance. By contrast, if the other parties are tough and adopt value-claiming stances, I must also adopt such a stance in order to protect myself. Either way, a strong tendency operating on all parties often leads to the result that *competitive moves to claim value individually drive out cooperative moves to create it jointly*. Outcomes of this dynamic include poor agreements, deadlocks, and conflict spirals.[16] This tendency, closely related in structure to the famous prisoner's dilemma, was dubbed the "Negotiator's Dilemma."[17]

In analyzing the large number of tactics, approaches, and procedures offered to improve the effectiveness of negotiation, it is useful to focus on how a given suggestion manages the inherent tension between creating and claiming value. Many approaches naively ignore or deny the tension by simply advocating either a "win-win" or a "win-lose" philosophy. Yet, consider the successful characteristics of a tit-for-tat approach as analyzed by Robert Axelrod (1984). To be *forthcoming* permits the exchange of information essential to get the joint process of creating value underway; to be *provocable* prevents exploitation of this openness by a value-claimer; while being *forgiving* looks beyond a forceful response to attempted exploitation to getting the cooperative process back on track, rather then seeing it escalate. In short, this approach offers one coherent response to managing the creating/claiming tension.

Of course, there are many more. For example, Fisher and Ury in *Getting to Yes* (1981) offer a less analytical approach called "principled negotiation"—with rules of thumb to "separate the people from the problem," "focus on interests not positions," "invent options for mutual gain," and "insist on objective criteria." Various criteria and procedures

[16] Valuable social-psychological insights into factors leading to stalemate, conflict escalation and deescalation can be found in Pruitt and Rubin (1986).

[17] See Chapters 2 and 7 of Lax and Sebenius (1986).

for ensuring "fair division" (e.g., Raiffa 1982 and Young, forthcoming, 1991) offer analytic fairness rationales and methods for parties who accept them to escape negative consequences of excessive "claiming" behavior. Mediation by conventional means as well as procedures such as the "single negotiating text" and the "post-settlement settlement" represents another class of actions that seek to manage this tension between creating and claiming value. Antrim and Sebenius (1991) describe how Singapore's Ambassador T. T. B. Koh employed a combination of these approaches as a de facto mediator in the Law of the Sea negotiations. Many other devices and process innovations are aimed at the same goal.[18]

Sustaining Value. Finally, since value that is created and claimed can often endure only as long as the agreement is observed, the question of "sustaining value" assumes particular importance. For example, in negotiations between a developing country and a mining company, an agreement reached before the mine is constructed—that is relatively favorable to the company—may be subject to almost immediate renegotiation on terms more advantageous to the country once the mine is built and the risk is "sunk." The generic problem of securing "insecure contracts," defined in Lax and Sebenius (1981) and discussed in Raiffa (1982), involves possibilities of structuring contingent contracts, repetition, linkage, the institutionally plausible equivalents of performance bonds, compliance norms, and various enforcement mechanisms.

4. *Changing the Game*

Much existing theory proceeds from the assumption of a well-specified and fixed situation within which negotiation actions are taken and agreements determined. In effect, analysts posit a mapping between the structure of the known situation and the ultimate outcome. Yet purposive action on behalf of the parties can *change* the structure of the situation and hence the outcomes. Often actions can be understood as a tacit or explicit negotiation over what the game itself will be.

To proceed further down this line of analysis, we need to ask precisely what determines a game's perceived "configuration." One answer seems simple and compelling, yet it has deep implications for the analysis and practice of negotiation. *The game is simply that which the parties act as if it is*. There is no a priori reason why this or that issue or party should be included or why this or that interest should be excluded. If the parties deal with a particular set of issues, alternatives to agreement, and possible agreements, then those elements in fact make up part of that game.[19] This means that a perfectly legitimate, highly relevant, and potentially valuable form of analysis may involve a search for ways to change the perceived game—*even though the menu of possibilities may not be common knowledge*. Walton and McKersie (1965) focused on how negotiators seek to change perceptions of the game by what they called "attitudinal restructuring." More tangibly, a country may wish to enlist the aid or assistance of others in achieving a particular objective. The process of choosing, then approaching and persuading, others to go along may best be studied without the common assumption that the game is fully specified at the outset of analysis.

Conceptually, of course, one could argue that if the "supergame" of all possible issues and parties were specified at the outset, this phenomenon would not exist; this approach, however, would be to define a very real set of dynamics out of analytic bounds. As Kenneth Oye (1979) noted, many linkages have been forged that were unanticipated by analysts or practitioners (e.g., the Eisenhower link between the Suez affair and monetary

[18] See Raiffa (1982) and Lax and Sebenius (1986).

[19] Sebenius (1983, 1984) began to investigate this phenomenon, dubbing it "negotiation arithmetic," or "adding" and "subtracting" issues and parties. Rubenstein (1991, p. 919) argued that a "game theoretic model should only include those factors which are perceived *by the players* to be *relevant*," rather than a "rigid description of the physical rules of the world." (emphasis original)

policy, or the Third World link between development assistance and Special Drawing Rights). As such, "adding and subtracting" issues and parties, "attitudinal restructuring," and systematic investigation of how perceptions of the game can be changed comprise another analytic leg on which negotiation analysis rests.

Lest this sound like a conjuring trick, let me quickly offer a typical example as described by Smith and Wells (1975). In the early 1960s, Chilean appropriation of Kennecott Copper's El Teniente mine seemed increasingly likely. In preparing to negotiate the terms of expropriation, such as the timing, compensation, and any continued management involvement with the mine, Kennecott sought early on to involve a variety of other parties to change the nature of Chile's alternatives to agreement on Kennecott's preferred terms. Somewhat surprisingly, the company offered to sell a majority interest in the mine to Chile. Kennecott planned to use the proceeds of this sale of equity along with the money from the U.S. Export-Import Bank to finance the expansion of the mine. The Chilean government guaranteed this loan and made it subject to New York State law. The company then insured as much as possible of its assets under a U.S. guarantee against expropriation. The mine's output was to be sold under long-term contracts with Asian and European customers and the collection rights for these contracts were sold to a consortium of European banks and Japanese institutions.

The result of this elaborate maneuvering was that customers, governments, and creditors shared Kennecott's concerns about future changes in Chile. A potent coalition to worsen Chile's alternatives to agreement had been tacitly built. Moreover, the guarantees and insurance improved Kennecott's alternative if no deal could be worked out with the host country. When no agreement could be reached and Chile acted to expropriate the operation, Kennecott was able to call this host of parties in on its side. In effect, Kennecott engaged in a tacit process of coalition formation by adding parties to worsen the other sides' alternatives to negotiated agreement. Though the mine was ultimately nationalized, Chile's worsened unilateral alternative to Kennecott's preferred outcome seemed to give the firm a better position in the dealings than those of similar companies such as Anaconda that did not take such actions.

While the specific methods Kennecott employed were particular to the context, their intention was clear and a staple of negotiation analytic advice: to affect the bargaining range in a favorable manner by adding parties who altered the no-agreement alternatives. Parties may also be added in order to generate joint gains or to extract value from others. Though perhaps less commonly, parties can also be "subtracted"—meaning separated, ejected, or excluded—from larger potential coalitions. For example, the Soviets were excluded from an active Middle East negotiating role in the process leading up to the Camp David accords that only involved Israel, Egypt, and the United States. Similarly, the Eighteen National Disarmament Conference in the early 1960s proved unwieldy and gave way to largely bilateral U.S.-Soviet talks over a nuclear test ban. Whether adding or subtracting players, however, this class of coalitional tactics can have potent effects on negotiated outcomes.

At this writing, various governments are trying to decide on how best to structure upcoming negotiations to deal with global warming. For example, would the negotiations best be carried out in separate bilateral encounters, in small groups of like-minded or geographically proximate countries, in large blocs, or on a global basis? Who should be included and excluded? Should a sequential process be constructed? And should the issues be limited to targets for carbon emissions, for example, or should chlorofluorocarbons, and acid rain be linked? Should the negotiations also concern debt, financial transfers, population policy, and the like? To sort out these questions, a variety of negotiation analyses should prove useful. For example, for various possible configurations of the negotiations, which blocking coalitions will likely arise and how can they best be dealt with? How can the negotiations be organized such that there are sufficient potential joint gains to attract the key players? Which rules of procedure should be avoided since

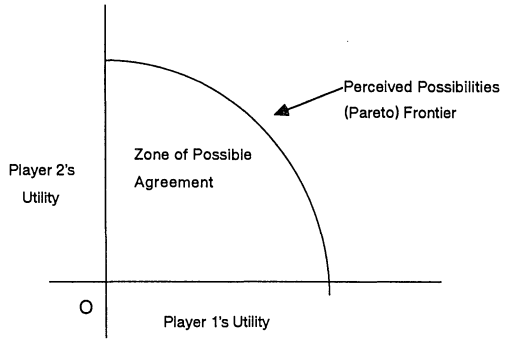

FIGURE 2. Perceived Zone of Possible Agreement.

they are most likely to keep the most painful conflicts salient and impede effective joint problem-solving? And so on.[20]

C. The Negotiation Analytic Approach as a Whole

Imagine that two negotiators involved in an encounter have thought hard about their underlying interests in different possible settlements of the apparent issues. Further, suppose that they have a relatively clear, if possibly changing, assessment of their tradeoffs and, taking into account contingenies and dynamic elements, have compared them to the value of their best no-agreement alternative. From the viewpoint of each party a set of possible agreements has been envisioned. Assume that an analyst were privy to the results of such evaluations by each side—even though these evaluations need not be common knowledge of the parties. The situation might be familiarly represented as in Figure 2. The origin represents the value of failing to reach agreement; each side's best alternative to agreement implies the location of this point. The familiar Pareto frontier in the northeast part of the graph represents the evaluations of the set of those possible agreements on the issues that could not be improved on from the standpoint of either party without harming the other. In general, neither side knows the location of the frontier, only theoretically that it is there. The entire shaded region—bounded by the two axes and the frontier—is the zone of possible agreement. In general, each party has its own perceptions of it. Since this representation is quite general, it can encompass the whole range of possible interests, alternatives and agreements.

Interests, Alternatives to Agreement, Creating and Claiming Value. The first negotiation analytic focus—on all parties' interests—furnishes basic data; interests are thus the *measure* or raw material of negotiation. The second—evaluating alternatives to agreement—implies the hurdle that any joint action must surmount to be acceptable; in locating the origin, alternatives set the *limits* of negotiation. The third focus—to envision potential agreements—highlights the potential for negotiated agreement to do better than (be northeast of) the noncooperative alternatives (the origin). Within this setup, the basic processes occur. Since the parties do not normally know what is jointly possible (where the frontier lies), their *joint* problem is to invent means for moving northeast to "get to the frontier" (create value). They may undertake this task directly or by an initial search for a broad "formula" within which a resolution is possible followed by detailed process (perhaps "concession/convergence;" see Zartman and Berman 1982). Yet *how* they move influences their *individual* problems of where they end up in relation to the frontier and to their best alternatives (how much value each claims). Cooperative moves to create value vie with and are sometimes driven out by competitive ones to claim it. A variety of approaches exist to manage this tension productively.

[20] An analysis of these questions may be found in Sebenius (1991).

Changing the Game. And the parties need not limit themselves to creating and claiming within this fixed configuration; they often move to change perceptions of the game itself. Indeed, each side typically seeks to *learn* about the other side's situation and what is jointly possible, to advantageously *influence* the other side's perceptions, and to favorably *change* the elements of the game. For example, by changing the alternatives to agreement, the perceived origin will shift. An improvement in Party One's alternative shifts the vertical axis to the right, leaving the bargaining set generally more favorable to that side. If Party Two's no-agreement alternative worsens, the horizontal axis shifts down, worsening its prospects. A successful commitment cuts off an undesired part of the bargaining set for the party who makes it. A new, mutually beneficial option (e.g., suggestion of a contingent, rather than an unconditional, contract) causes the frontier to bulge upward and to the right, reducing the parties' "conflict of interest." (See Axelrod 1970.) When issues change or other basic aspects of the game vary, each side's perceptions of the basic picture in Figure 2, the zone of possible agreement, will be transformed. These possibilities add evolutionary elements to the analysis.

Figure 2 summarizes the familiar extended negotiation analytic metaphor. The propositions we have laid out bear on each part of this "model" of possible joint action. Interests provide the raw material and the measure; alternatives to agreement imply the limits; agreements hold out the potential; within this configuration, the process consists of creating and claiming value; yet, the elements of the interaction may themselves evolve or be intentionally changed. In this sense, the elements of the approach form a logically consistent, complete whole.

Roger Myerson (1991, p. 114) argues that a decision analytic approach to conflict situations becomes impossible once one begins trying to think the interaction through from all parties' perspectives; one is inevitably led to a Nash equilibrium concept, and, by implication, to a game-theoretic analysis. Yet this implication need not follow. Full, mutually expected "rationality" is not necessary—or often, appropriate—for the analysis. By focusing on the subjective distribution of possible negotiated outcomes, the problem of "multiple concepts, multiple equilibria" is mitigated. While some degree of common knowledge is generally present (e.g., that the parties are negotiating), there may be insufficient common knowledge of all the elements of the game to "close" a fully interactive (game) model; nevertheless, useful prescription is possible conditional on one side's perceptions. "Fairness" principles developed by theorists of cooperative games can be quite helpful in pointing to mutually acceptable outcomes, although asymmetric advice might suggest strategic actions that lead to an outcome more favorable to one side. The question of external verifiability of this approach is no worse, or better, than for decision analysis in general.

D. The Basic Elements in More Complex Settings

These basic elements—interests, alternatives to agreement, creating and claiming value, and moves to change the game itself—are present in negotiations with very different structures and that operate according to very different procedures. For example, the analysis in Raiffa's *The Art and Science of Negotiation* starts with two monolithic parties negotiating over a single issue, expands to the multiple-issue case, and finally to full coalitional analysis with many issues, unrestricted alignments of the parties, internal divisions, and a process that continues over time. Where negotiation takes place through agents, whether lawyers or diplomats, or where a result must survive legislative ratification, the underlying structure of a "two-level game" is present.[21] Of course, negotiations also take place in more complex multilevel and coalitional structures.[22]

[21] These have been studied in a number of settings notably by Putnam (1988), Putnam and Bayne (1987), Lax and Meyer (1988), Mayer (1988, forthcoming), Raiffa (1982), as well as in Lax and Sebenius (1986).

[22] For analyses, see Weeks (1988), who deals with the development and negotiation of an international debtors' "alliance," as well as Raiffa (1982) and Lax and Sebenius (1986, 1991).

Naturally, there are many other related topics ranging from game-theoretic concepts of fairness for purposes of mediation and arbitration to various voting schemes. One of the most intriguing topics involves the tension between necessary joint learning about the problem at hand and the efforts by each party to prevail. This is especially important in negotiations over scientific disputes and where the substance of the issues is unclear or not well understood. (See Applbaum 1987 for an insightful, extended discussion.)

In another promising direction, computer models and decision support systems have been used as aids to the negotiation process. In significant early cases, models of the substantive issues under negotiation played important roles in the process; for example, models were employed with significant effects—both intended and unforeseen—in the Law of the Sea negotiations, the UNCTAD commodity stabilization talks, a land-use dispute, and a municipal fire dispatching problem.[23]

More recently, a number of researchers have begun to pull together the elements of "negotiation management." (In particular, see the work of Nyhart and Goeltner 1987, Nyhart and Samarasan 1987, and Samarasan 1987.) Computer models and decision support systems in some cases are focused on elements of the negotiating process itself (e.g., Goeltner 1987); in other cases, they are directly aimed at facilitating group processes (e.g., Stefik et al. 1987); and in still other instances, they are helpful simply to keep track of the many elements of complex negotiations (e.g., Jarke et al. 1985 and McGovern 1986). Antrim (1990) offers a particularly nice example for analyzing negotiations over financial terms of contracts for manganese nodule mining. Expert systems are being constructed to incorporate cultural factors into negotiation planning (e.g., Rangaswamy et al. 1989).

E. Conclusion

While game theorists will continue to make valuable progress in understanding problems with multiple decision-makers, a complementary prescriptive approach has been developing that conditions its prescriptions on the likely behavior of the other side, fully "rational" or not, and regardless of whether the "game" is fixed and entirely common knowledge. In describing the logic of negotiation analysis and the concepts and tools that can facilitate it, this discussion has not stressed the many useful ideas that arise from focusing on interpersonal and cultural styles, on atmosphere and logistics, on personality and psychoanalytic motivation, on communication, or on a host of other aspects. Yet because the logic is general, it can profitably accommodate insights from other approaches as well as from experience. They become the essential filters through which the basic elements—parties' perceptions of interests, alternatives, agreements, the processes of creating and claiming value, and changing the game—must be interpreted for a meaningful negotiation analysis to proceed.[24]

[23] See Sebenius (1981) as well as Raiffa (1982) and Antrim (1985).

[24] I would like to thank Howard Raiffa, Arthur Applbaum, and, especially, David Lax, for their ideas and close collaboration. Richard Zeckhauser, Peyton Young, Bernard Desgagné, and anonymous referees offered greatly helpful suggestions. I apologize in advance to those who may be surprised (or worse) to discover their work cited here at part of an emerging "negotiation analytic" approach.

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