The Impact of a Biased Starting Position in a Single Negotiation Text Type Mediation

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Abstract.

This article examines whether a biased starting position impacts the outcome of negotiations using a Single Negotiating Text (SNT) (Raiffa 1982) type, two-party mediation. Two separate experiments were conducted, one in Helsinki and one in New Mexico, that systematically tested this issue and related questions. The article argues that, if a biased starting point is not compensated for by the path taken in subsequent steps, the bias will have considerable impact on the final outcome of the negotiations. In both experiments, the mediator played a very insignificant role, since the bias was incorporated into the text prior to the initiation of the exercise. In actuality, the experimenter played the role of the mediator, but only facilitated an exchange of information between the parties. The results of our experiments strongly support the hypothesis that such bias has a significant impact on the outcome of the negotiations. The article concludes by presenting suggestions for developing starting SNTs.

Key Words:negotiation, mediation, single negotiating text, multiple criteria/issues

1. Introduction

Mediation is a dispute resolution alternative that involves the use of a third party to facilitate voluntary agreements between two adverse parties. As Wittmer, Carnevale, and Walker (1991) note, mediation is a common and important part of interpersonal, organizational, and international relationships. Mediation is used today to resolve domestic, labor, management, construction, and certain environmental disputes. One salient characteristic usually associated with successful mediation is that the facilitator maintains a neutral position relating to all aspects of the negotiation. As such, it is often assumed that mediators should act in a neutral manner in order to properly assist rather than impede the settlement process (Welton and Pruitt 1987). We accept the premise that neutrality contributes to successful mediation (Smith 1985; see also, Zartman and Touval 1985). However, we recognize that neutrality may not always be easy to achieve, and we question the impact that this has on the negotiated outcome.

Biased mediation implies that the mediator does not act in a neutral fashion. The mediator may display either overt support toward one of the negotiating parties or become more closely allied with one party than with another (Wittmer et al. 1991). The underlying reasons creating the bias may be historical, political, professional, or personal, among others. Whatever the reasons may be, we seek to demonstrate that biased mediation has significant implications for certain types of negotiations.

In pursuing our study of biased mediation, we consider Single Negotiating Text (SNT) type, two-party negotiations (Raiffa 1982). In SNT, a mediator, perhaps with the involvement of the parties, prepares and proposes an entire package for the consideration of the negotiating parties. The mediator clearly states that this first proposal is not intended as the final agreement—usually it is not even close. The parties are invited to "criticize" this proposal and/or improve it. The SNT is utilized as a method of focusing the parties' attention on the same composite text (Raiffa 1982, p. 211). Based upon the input the mediator prepares another proposal, which is not perfect, but which improves both parties' positions. Again, both parties provide input on improving the proposal, and this new proposal is "criticized" by the parties. In this fashion, the mediator attempts to prepare a series of "win-win" proposals that are discussed and criticized by the parties. Ideally, the last proposal (as well as the final agreement) should demonstrate that the parties have implemented all potential joint gains (Zubek, Pruitt, Peirce, McGillicuddy, Syna 1992), and reached a Pareto-optimal decision. Raiffa speculates that the manner in which SNTs are generated is important. He hypothesizes that the starting point has a considerable impact on where you end, i.e., the final agreement (Raiffa 1982, pp. 214–215).

The possibility (or impossibilty) of developing a neutral (unbiased) starting position is an important question and creates a dilemma. Arguably, from an outsider's point of view, a neutral starting position can be defined, using, for example, the concept of "fairness." However, in reality, since both parties involved in the negotiation have an interested stake in the outcome, defining and finding a starting position that both parties perceive as "fair" becomes troublesome. Due to the complexities raised when addressing the issue of neutrality, the starting positions in the experiments discussed in this article were generated using value points (Helsinki Experiment), and subjectively by the mediator (Las Cruces Experiment).

The purpose of this article is essentially to test Raiffa's hypothesis relating to the starting position in SNT-type negotiations. We argue that if a biased starting point is not compensated for by the path taken in subsequent steps, this bias will have considerable impact on the final outcome of the negotiations. In both of our experiments, the mediator played a very insignificant role, since the bias was incorporated into the actual text that was prepared and given to the participants. Using business school students as subjects, we conducted two experiments, one at the Helsinki School of Economics in Finland and one at New Mexico State University in Las Cruces. We systematically studied the impact of a biased starting position (in favor of either party) on the final agreement in simulated two-party, labor-management negotiations. Both experiments involved input on four issues. A major difference between the two experiments was that in the Helsinki experiment, subjects were given a set of underlying points to follow (value points), while in New Mexico, students used their own values in the negotiation. Implications for the design of Negotiation Support Systems are discussed. As such, we discuss a variety of analytical approaches for generating potential starting SNTs.

2. The experiments

Two experiments were conducted to study the impact of a biased starting position on the final outcome in SNT-type negotiation. In the experiments, the initial bias (or lack thereof) and the subsequent proposals were generated by the experimenter. There was no attempt to influence the parties beyond suggesting that the proposals could be used as starting positions. The proposed settlements, either neutral or overtly biased in favor of one party, were generated in advance by the experimenter. Hypothetically, the experimenter in this research played the role of a traditional mediator; however, this individual did not actually facilitate any dialogue between the parties other than to exchange proposals. The change(s) within the proposals that were exchanged initiated the dialogue. In the studies, our experimenters were graduate student assistants who neither knew the subjects nor had previous contact with them.

Definitions

Neutral (unbiased) proposal:

A proposal is neutral if an outside mediator perceives it to be equally fair (just, equitable) to both parties.

Pareto optimality:

A negotiation outcome is Pareto optimal if and only if there is no other outcome that is preferred by both parties (Figure 1).

Anti-Pareto optimality:

A negotiation outcome is anti-Pareto optimal if and only if there is no other outcome that is less *preferred by both parties* (Figure 1).

Hypotheses

The following hypotheses were tested:

1. A biased starting position will have an impact on the final settlement in the direction of the bias, if the bias is not compensated for in subsequent proposals.
2. The parties will not, in general, reach a Pareto-optimal settlement unless they accept the final proposal.
3. The parties that correctly perceive the bias in the proposals will compensate for the bias when negotiating the final settlement.
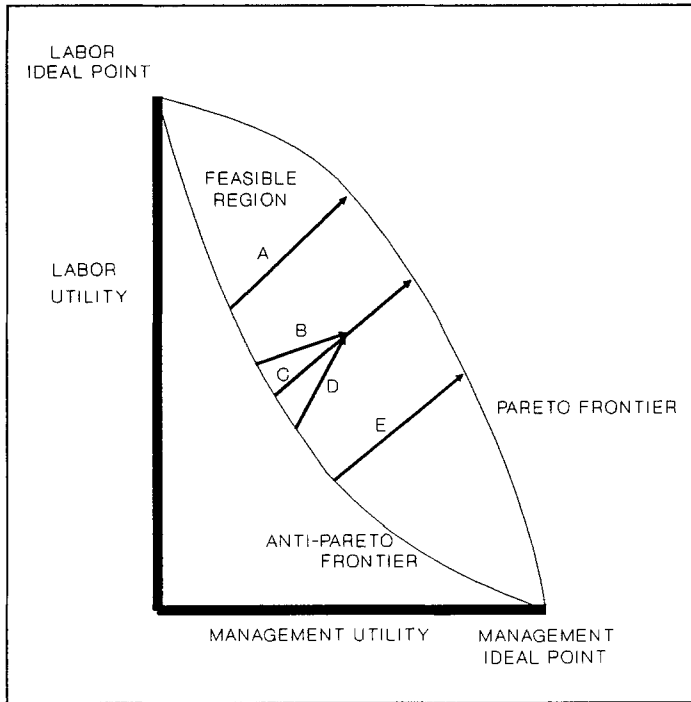
Figure 1. SNT strategies in Helsinki experiment.

3. Helsinki experiment

3.1. Subjects

Forty students at the Helsinki School of Economics were used as subjects in this experiment. Typically, the subjects were in their junior year. They negotiated in pairs (dyads), one person representing labor, the other management. The subjects themselves selected the pairs, and also decided among themselves which party would represent labor and which management. To enhance the motivation of the subjects, extra credit was awarded, depending on the individual's performance in the negotiations.

3.2. Task

The task was a simulated labor-management negotiation. The negotiators were furnished with a concise description of a specific labor-management problem. The negotiations focussed on four issues:

• hourly wage (ranging from 41 to 45 Finnish Marks (FIM));

- extra vacation days (0–4 days);
- level of job security (0–4 units, 4 best, but described using a verbal scale); and
- fringe benefits (0–8, 8 best).

The issues were each split into five levels, resulting in 5*5*5*5 = 625 possible combinations (packages). For example, an hourly wage of 45 FIM, an extra two days of vacation, 0 level of job security (no job security), and level eight fringe benefits would constitute one such package.

3.3. Procedure

All dyads were given four SNT proposals (packages), where the fourth proposal was Pareto optimal. The starting point and the path were systematically varied, as explained below. Each proposal after the first represented a "win-win" situation, where both parties would gain (but not necessarily in equal portions). If the parties were not satisfied with the proposals, they were encouraged to continue the negotiations on their own by providing offers and counter-offers. The negotiators were furnished with the value points (payoff schedules) and were instructed to maximize their total score in the negotiations (Table 1). Naturally, one party had no knowledge of the other party's underlying value points.

Figure 1 describes in the utility (value point) space the SNT strategies (A–E) that were tested:

A: starting position biased in favor of labor; the path consisting of the proposals does not compensate for this bias;
B: starting position biased in favor of labor; the path compensates for this bias;
C: starting position neutral, path neutral;
D: starting position biased in favor of management; the path compensates for this bias;
E: starting position biased in favor of management; the path does not compensate for this bias.

All starting positions were determined prior to the session, and were based on the underlying value point structure. The use of value points enables us to test the situation in which the mediator has full knowledge of the negotiators' value structures. Each starting position was located on the anti-Pareto frontier. There were five distinct starting positions used by the experimenters (Figure 1).

3.4. Results

Table 2 presents the labor (L) and management (M) total value points (summation across issues) of the subjects' final negotiated outcomes. It also presents the total value points for the fourth proposal in terms of each SNT strategy. Briefly, strategies B or D generated outcomes close to C (the neutral strategy), and we were unable to detect "outcome bias"

Table 1. Value points for labor and management.

Hourly Wage (FIM)			Additional Vacation Days (DAY)			Job Security Level (4 highest) (JS)			Fringe Benefits Level (8 best) (FB)		
LV	FIM	MV	LV	DAY	MV	LV	JS	MV	LV	FB	MV
42	45	1	36	4	1	34	4	1	31	8	1
41	44	17	28	3	16	30	3	14	28	6	13
30	43	32	23	2	29	27	2	18	20	4	28
19	42	37	16	1	33	15	1	24	12	2	32
1	41	40	1	0	38	1	0	27	1	0	34

LV = Labor Value Points
MV = Management Value Points

Table 2. Value points of final settlements and the fourth proposals.

Strategy:		A	B	C	D	E
4th Proposal	M:	64	103	103	103	126
	L:	124	103	103	103	62
Value points associated with final settlements	M:	**100**	107	111	**63**	**111**
	L:	**96**	100	93	**118**	92
	M:	**96**	103	107	103	107
	L:	**99**	103	100	103	100
	M:	75	103	**42**	103	**108**
	L:	**119**	103	**116**	103	92
	M:	77		103		**116**
	L:	**115**		103		77
	M:			103		
	L:			103		
	M:			103		
	L:			103		

Note: Bolded outcomes are dominated; the others nondominated.

in any direction. This is understandable, since the bias in the starting position was compensated for by the path of the proposals. The fourth proposal was the same in strategies B, C, and D.

In strategies A and E, the initial bias was not compensated for by the path presented. They resulted in outcomes that are rather different from those generated by the neutral strategy (C). In fact, in seven (7) out of eight (8) cases, the final outcome was biased in the direction of the initial bias. To test the statistical significance of this finding, we formulate the following hypotheses:

$$H_0: \pi \leq 0.5$$

$$H_1: \pi > 0.5,$$

where π is the probability that the final outcome is biased in the direction of the bias in the starting position. We perform the test by controlling the α risk at 0.05 when $\pi = 0.5$. Since the p-value $0.0351 < 0.05$, we conclude H_1.

Interestingly, 17 of the 20 pairs continued the negotiations from the fourth proposal; three immediately settled using the fourth (last) proposal. In the case of strategies A and E, all dyads moved in the direction decreasing the bias. Only one dyad moved so far that it passed the "neutral position" and settled with an outcome somewhat "biased" in the other direction. The average number of offers and counteroffers after the fourth proposal was about five. Thirteen (13) dyads did not choose the fourth proposal as their final settlement. Nine (9) of them settled with a dominated outcome. To verify whether the dyads have at least a "fifty-fifty" chance of generating a nondominated final outcome, we formulate the following hypotheses:

$$H_0: \pi \leq 0.5$$
$$H_1: \pi > 0.5,$$

where π is the probability that the final outcome is dominated. Again, we control the α risk at 0.05 when $\pi = 0.5$. Since the p-value $0.0461 < 0.05$, we conclude H_1. This means that the dyads do not even have a "fifty-fifty" chance to settle with a nondominated outcome in this problem, if unsupported.

Several pairs perceived a bias in the proposals—interestingly even when it was not present. However, we were unable to observe whether these perceptions had any impact on the final outcome. We will discuss this issue at greater length after presenting the results from the New Mexico State University experiment.

To further confirm our results, we decided to conduct a second experiment at New Mexico State University in Las Cruces. We were concerned about the subjects' ability to use the value points furnished in the Helsinki experiment. Therefore, in the Las Cruces experiment we decided to allow the subjects to use their own values.

4. Las Cruces experiment

4.1. Subjects

Forty-two students, juniors and seniors at New Mexico State University, College of Business Administration and Economics, were used as subjects in this experiment. Again, the subjects negotiated in pairs (dyads), one person representing labor (L) (candidate), the other management (M) (company). The subjects formed the pairs themselves, but were randomly assigned to their role. The subjects were awarded extra credit for their participation. Half of the subjects were also provided nominal compensation for their participation. There was no significant difference between the performance of these two groups.

4.2. Task

The negotiation concerned a temporary job in Europe. The issues and their ranges were:

- base salary (ranging from 20–28, in 1000's of dollars);
- commission on sales (1–5%);
- weeks per year vacation (2–6); and
- percentage of travel expenses covered (0–100%).

In the Helsinki experiment, the issues were explicitly split into discrete levels, so that value points could be assigned to each line item.[1] In this experiment, such discretization was not necessary, since subjects relied on their own values in the negotiations. It meant that we relaxed the assumption that the mediator had full knowledge of the negotiators' value structure. On the other hand, the specifying of neutral proposals by the mediator became more difficult. The specifying of biased proposals did not constitute such difficulty, since biased proposals had been defined as "clearly biased."

4.3. Procedure

The negotiators were provided with a concise description of the problem. No value points were furnished with this description. Instead, the Nadir Ordinal Ranking Approach (NORA)[2] was used to approximate the Pareto-optimal frontier (Teich 1991). (See the Appendix for a detailed explanation of NORA.) After reading the case, the subjects answered 16 simple multiple-choice questions on IBM Personal Computers, generated by NORA, regarding their preferences among the four issues. For example, the first question to the candidate read: "Which jump is most important:

1. salary jump from 20 to 22 (1000's of dollars)
2. commission jump from 1 to 2%
3. vacation jump from 2 to 3 weeks
4. travel expense jump from 0 to 25%?"

The candidate answered the above question and 15 subsequent questions, while, simultaneously, the company answered similar questions on another computer. Utilizing the responses to the questions, the experimenter, aided by the computer and NORA, generated both the starting point (either biased or neutral), and, on average, three "win-win" proposals. Specifically, NORA generated the neutral starting points. With respect to the biased starting point, the experimenter interacted with the NORA program to produce the starting point. After the final proposal was presented, the subjects were encouraged either to use the proposals as a guide in their subsequent negotiations, or negotiate on their own.

Only SNT strategies A (biased towards candidate), C (neutral), and E (biased towards company) were tested, since strategies B and D appeared not to be significant in the Helsinki experiment (Figure 1). In other words, we concentrated on the impact on the final outcome

of a biased starting position which is not compensated for by the path of proposals. Strategy C (the neutral strategy) corresponded to a starting position where the summation of levels above or below the middle levels (see Table 3) across issues was always zero. (This position is called a *neutral outcome*.) For example, the middle levels (24,3,4,50) of the issues would qualify as a neutral starting position, because the summation across levels is zero $(0+0+0+0=0)$; as would (20,5,2,100), since the summation is also zero $(-2+2-2+2=0)$. In other words, 20 base salary is two levels below 24; commission of 5 is two levels above 3, etc. Strategy A (biased towards candidate) corresponded to a starting point where the summation of levels across issues equalled +3. For example, (24,5,3,100) would qualify, since $0+2-1+2=3$. For strategy E (biased towards company), the summation corresponding to the starting position equalled -3. There are many possible starting positions for each strategy; we used the NORA method to choose "unattractive" outcomes (close to the anti-Pareto frontier), as shown in Figure 1. We wanted the starting SNT to be as "unattractive" as possible, so that subsequent proposals could improve upon it for both parties.

4.4. Results

Table 4 shows the number of dyads who reached a settlement with biased outcomes. Consistent with the Helsinki Experiment, in strategies A and E, a great majority (14 out of 15) selected an outcome that was biased in the direction of the input bias. This result is obviously statistically significant, as can be seen by repeating the corresponding test from the Helsinki experiment.

Furthermore, out of 15 biased (A and E) cases, 13 reduced the effect of the bias to some extent. Table 5 reports the number of dyads who correctly perceived the bias in the fourth proposal. We can see that, in total, 21 out of 30 individuals correctly observed the bias in the fourth proposal. Interestingly, 10 of 12 subjects in the neutral case (strategy C) incorrectly perceived a bias—even though it was not assumed to be present.

To statistically test the impact of the starting position on the final outcome, we performed a series of Regression Analyses. In each case, the dependent variable (outcome of the negotiations) was again measured as the number of levels above or below the middle levels for each issue added across issues. For example, an outcome of (26, 2, 6, 50) would have a value equal to $1-1+2+0=2$, since 26 base salary is one level above 24, commission of 2 is one level below 3, etc. In the main-effects model, we had one independent variable, namely, the bias, measured as +1, 0, -1, representing strategies A, C, and E, respectively.

Table 3. Issues and levels in Las Cruces experiment.

Base Salary	Commission	Vacation Weeks	Travel Exp. %
28	5	6	100
26	4	5	75
24	3	4	50
22	2	3	25
20	1	2	0

Table 4. Number of dyads settling with biased outcomes.

	Final Settlements	
Strategy	Biased	Total
A	6	7
C	2	6
E	8	8

Table 5. Number of dyads correctly perceiving the bias in the fourth proposal.

Strategy		Correctly Perceived Bias	Total
A	L:	3^F	7
	M:	6^U	7
E	L:	6^U	8
	M:	6^F	8

^{F} denotes favorable bias.
^{U} denotes unfavorable bias.

The t-value corresponding to the slope of the regression model was significant at $\alpha = 0.1\%$ ($t = 5.11$, with 19 df), the $R^2 = 0.58$.

Four of 21 dyads ended with an outcome that was clearly not Pareto optimal. The remaining dyads were undetermined.

5. Hypotheses concluded

Next, we state to what degree our hypotheses are supported by the results from both experiments.

Hypothesis 1. The results from both experiments clearly support our hypothesis. A biased starting position, if not compensated for by the path of proposals, will have an impact on the final outcome, in the direction of the bias.

Hypothesis 2. The results from the Helsinki experiment support our hypothesis. The dyads do not even have a "fifty-fifty" chance to settle with a nondominated outcome if they do not accept the mediator's fourth proposal as a final outcome. In the Las Cruces experiment, due to the difficulty of precisely measuring the Pareto-optimal set, the results are not conclusive.

Hypothesis 3. The results from neither experiment support our hypothesis. Many subjects perceived a bias—even though it was not assumed to be present. However, this perception did not seem to have any significant impact on the negotiated outcome. In fact, there may be other reasons besides perceived bias to explain the partial compensation from the

mediator's last proposal. For example, in any negotiation, there may exist implicit pressure to converge to an agreement towards the center of issues.

6. Implications for the design of negotiation support systems

In this section, we discuss a number of ideas to assist others in generating neutral starting positions for the design of NSSs. Initially, we discuss Pareto optimality and then the development of the Single Negotiating Text. Although the results of our two experiments were obtained through the use of student subjects, it is our belief that the implications gleaned from the study are useful in real-world negotiations.

6.1. Pareto optimality

Negotiators, if not aided by a third party (person or computer system), have difficulty in conducting negotiations in a manner that would result in a Pareto-optimal outcome. A prime motive for developing and using Negotiation Support Systems (NSS)[3] should be to ensure the approximate Pareto optimality of the settlement.

6.2. Single Negotiating Text Development

Based on our results concerning the relationship between starting position and final outcome in a Single Negotiation Text (SNT) type mediation, the starting position should be given serious thought. Our criteria (some of these criteria are also discussed by Raiffa 1982) for a good starting SNT are:

- neutrality (NEUTRAL);
- relative closeness to the "center" of the anti-Pareto set (NADIR);
- ease of calculation (EASE);
- robust to information provided to mediator (e.g., extreme positions of the parties) (ROBUST);
- encourages cooperation between the parties (COOP).

Next, we review some of Raiffa's suggestions (1–4 below) for generating starting SNTs (Raiffa 1982, pp. 214–217), make some suggestions of our own (5–10), and discuss their relative merits based on the above criteria. In each method, it is assumed that the parties have agreed upon the bounds of the issues.

1. Joint Tentative Package (JTP):

   The parties engage in a tentative negotiation dance involving successive concession-making until convergence to a temporary starting SNT is reached (Raiffa 1985).

2. Settlement of each issue separately (ISSUES):

   The parties engage in a tentative negotiation dance in which each issue is temporarily settled separately. No packages are discussed.

3. Random Process (COIN):

   The parties flip a coin to decide each issue sequentially. Whoever wins the toss chooses the level of that issue.

4. Take Turns (TURNS):

   The parties take turns, each resolving the issue of his/her choice, in his/her favor. The parties continue this process until all issues are addressed.

5. Minimize the Maximum Utility (MIN–MAX):

   An analyst/system elicits the parties' overall value functions. Select the SNT that minimizes the maximum value of the two.

6. Anti-Nash Bargaining Solution (NASH-NOT):

   Elicit the parties' overall value functions. Select the SNT that maximizes the product of the differences in value between the no-agreement alternative and all other alternatives for the two parties, and is located on the anti-Pareto set.

7. Middle of All Issues (MIDDLE):

   Select as an SNT the midpoint between the agreed-upon bounds of the issues.

8. UP-DOWN:

   Select as an SNT an outcome that has half of the issues tentatively set in favor of one party and the other half in favor of the other party. Typically, the tentative points will be located at the agreed-upon bounds of the issues.

9. Nadir Ordinal Ranking Approach (NORA):

   The details of this approach are presented in the Appendix. In essence, the starting SNT is selected to maximize the minimum of the summation of cumulative ranks for the two parties.

10. Best Alternative to a Negotiated Agreement (BATNA) (Fisher and Ury 1981):

   The parties evaluate their BATNAs and select as an SNT an outcome that provides both parties with utility exactly equal to the utility of their BATNAs.

Table 6. Evaluation of methods for generating starting SNTs.

Method:	Neutral	Nadir	Ease	Robust	Coop
JTP	++	−	−	++	+(?)
ISSUES	++	−	−	++	+(?)
COIN	+	−	++	− −	?
TURNS	++	−	++	− −	+(?)
MIN-MAX	++	++	− −	+	NA
NASH-NOT	++	++	− −	+	NA
MIDDLE	++	−	++	− −	NA
U—-DOWN	++	−(?)	++	− −	NA
NORA	++	++	+	−	?
BATNA	++	?	− −	++	?

++ Very good
+ Good
− Poor
− − Very poor
NA Not applicable
? Uncertain

In Table 6, we summarize our subjective evaluation of the ten methods. Raiffa's methods (1–4) all have in common an interaction element between the parties. Whether this interaction encourages cooperation depends on the circumstances of the negotiation, reflecting many of the question marks in the COOP-column for those methods. For example, in the COIN method, a streak of bad luck may generate an SNT very unfavorable to one of the parties and discourage further cooperation. In fact, all four of Raiffa's methods, as well as the other six methods, are neutral. Raiffa's methods, however, do not guarantee an SNT close to the anti-Pareto set.

Methods 5–10 do not involve a negotiation or much interaction between the parties. Whether this is advantageous or not, is difficult to judge. MIN-MAX, NASH-NOT, and BATNA are theoretically appealing methods, but are not practical to implement. MIN-MAX is not practical, because it involves comparisons of interpersonal utilities. NASH-NOT avoids these comparisons by utilizing the utility of the no-agreement alternative (BATNA). However, both MIN-MAX and NASH-NOT methods assume the existence of utility (value) functions for the parties. It is not a trivial task to accurately elicit utility (value) functions from the parties. The MIDDLE and UP-DOWN methods are simple, easy-to-use heuristics, but are lacking in performance. By developing simple variations of the UP-DOWN method, performance can be significantly enhanced. For example, if the parties were to simply rank the overall importance of the issues, then, a logical starting position for each issue would be at the bound in favor of the party who ranked the issue lower in importance. An additional constraint requires that half of the issues should be resolved in favor of one party and half the other. This would place the starting position close to the anti-Pareto frontier, assuming that the parties were honest in their elicited ranks. NORA provides SNTs that are located near the anti-Pareto frontier. Its questions are relatively easy to answer, but it is not robust to the information provided to the mediator.

To sum up, the evaluation and choice of a method for generating starting SNTs is a Multiple Criteria Decision Problem, including tradeoffs between conflicting criteria. We hesitate to make a specific recommendation as to which method to use, but nevertheless hope that the guidelines provided prove helpful.

7. Value points versus no-value points in experimental design

In the design of any negotiation experiment where results are measured in terms of value/utility and Pareto optimality of outcomes, tradeoffs are involved in using or not using a value-point system to represent the parties' preference structure. In one of the experiments, we chose to use a point system, and, in the other, we did not. The benefit of a point system is fairly obvious. The Pareto-optimal set can easily be calculated, and the distance of the subjects' final settlement from the set can accurately be measured. Also, it is easy for the experimenters to calculate intermediate proposals in the SNT spirit so as to guarantee that both parties benefit at each iteration. A drawback of using points in an experiment is that there is no guarantee that subjects will actually use those value points, because the preferences expressed via the value-point system will most likely differ from a subject's actual underlying values. Therefore, there may be a tendency for a subject to use his/her own value structure, while ignoring the point system. In fact, a subject is assumed to act as a sort of agent for the person who supplied the points, instead of being an actual participant in the negotiation. When acting as an agent, a person's behavior may be different from what it would be when acting on his/her own behalf (Rubin and Sander 1991; Smith 1987). In addition, a subject could try logrolling, by comparing points and reducing the negotiation to a manipulation of figures, stating for example, "I will give you this, if you give me that, OK?," and doing this for many possible combinations of issues.

The benefits of not using points are just the opposite of those for using points. The subject can use his/her own underlying values instead of acting as an agent for someone else, hence he/she may get more involved in the negotiation. The drawback is that the Pareto set cannot be accurately measured. Our results of the Las Cruces experiment indicate the problem. The subjects either had problems with the questions at the very beginning, or their value structures changed over time. Whatever the reason, it is difficult to measure the distance of the settlement from the Pareto set.

8. Conclusions

Our studies have empirically investigated the impact of bias in the starting Single Negotiating Text (SNT) mediation on the final outcome. We have clearly shown a relationship between the starting SNT and the outcome of the negotiations. In other words, the negotiators were unable to fully compensate for the impact of the biased starting position, even though they frequently correctly perceived the bias. We offer two possible explanations for this phenomenon. First, the mediator by virtue of his/her position appears to occupy a position that is vested with authority. Presumably, most mediators are perceived to be neutral and thus equally trusted by both sides. Accordingly, it is difficult for either of the negotiators

to dramatically change the mediator's final proposal. Secondly, and somewhat related to the first explanation, the negotiators anchor on the mediator's final proposal which lies on the Pareto frontier. Moving away from the mediator's final proposal along the Pareto frontier implies that one of the parties will lose and the other will gain—and the negotiations become distributive at this point. The losing party is unlikely to make large concessions. This ties together with the Kahneman and Tversky research on framing, prospect theory, reference points, and anchoring (Kahneman and Tversky 1979; Tversky and Kahneman 1981; see also Bazerman 1983).

Clearly there are limitations to a laboratory study which uses students as subjects. Whether the same effect will be observed in actual negotiations remains to be seen. However, we believe the results would be as significant in actual negotiations as in the laboratory.

Our research has generated additional questions. Future research on SNT mediations could test whether:

1. besides the starting position, the biased direction (path) of proposals would have an impact on the final outcome;
2. correctly or incorrectly perceived bias has an impact on the desire to compensate for this bias;
3. it is beneficial to actively involve the parties in generating the SNTs;
4. cultural differences have an impact on the questions stated above;
5. better performing starting SNTs can be developed; and whether
6. it is possible to assist negotiators to reach a Pareto-optimal solution.

The answers to these and other questions should contribute to the use of the Single Negotiating Text approach and its implementation in Negotiation Support Systems.

Appendix: Nadir Ordinal Ranking Approach

The Nadir Ordinal Ranking Approach (NORA) to negotiations is a simple scheme that allows users to identify potential joint gains. A joint gain occurs when tradeoffs among the multiple issues increase the utility for both parties. This approach is useful when the dispute involves multiple issues, there is a large (or infinite) number of alternatives, and a fair amount of conflict is present.

The method starts off by having each party rank order the most important jumps from their nadir (worst) point for issues that are "discretized," comparing jumps (from one level to the next) among all issues. The ranking process continues until all levels of each issue have an associated rank.

Assuming that the parties' marginal value functions are concave in terms of the issues and that the issues are preferentially independent for both parties, we can find joint gains from any point by using the rule that if *a rank that a person gains in a trade is less than the rank that a person gives up in the trade, and that is true for both parties, we will have a joint gain* (Teich 1991). This will always be true, because a lower rank is attached to a higher increase in utility.

As an example of NORA, consider a management-labor negotiation with two issues: wage and vacation. The ranges and values for the discretized issues are shown in Table A–1.

Table A-1. Two-issue example of NORA.

Rank L	Wage	Rank M	Rank L	Vacation	Rank M
5	7	0	6	3	0
3	6	3	4	2	1
1	5	5	2	1	2
0	4	6	0	0	4

Rank L   = Labor's ordinal ranks
Rank M   = Management's ordinal ranks
Wage   = Hourly wage ($)
Vacation = Additional days

Starting from labor's nadir point (the lowest point in each issue), the wage jump from 4 to 5 is most important (indicated by labor's rank of 1), the jump from 0 to 1 in vacation is next in importance, 5 to 6 in wage is next, then 1 to 2 in vacation, and so on, until all jumps have a labor rank (Rank L) associated with them. Management does the same starting at their nadir point, which is at the highest point of every issue. Their most important jump is from 3 to 2 in vacation, next important is 2 to 1 in vacation, and so on, until all jumps have a management rank (Rank M) associated with them.

To select a neutral strategy beginning position, we use a cumulative summation of ranks from each party's worst point, and choose the point that maximizes the minimum summation for both parties. From this point, there could exist many possible trades, because the outcome will be at or near the anti-Pareto set. If we calculate the cumulative ranks for all 16 possible starting positions, we find that the point, wage = 4, and vacation = 3, maximizes the minimum cumulative rank summation. The summations for this point are (12,14) for the two parties, respectively. They are calculated by summing the ranks for labor (0 + 0 + 2 + 4 + 6 = 12) and for management (0 + 3 + 5 + 6 + 0 = 14).

In the two-dimensional graph of issue space (see Figure A-1), if we plot the paths provided by the ranks, we have two discrete approximations of "preference paths" for the two parties. In the example, if we start at point (4,3) and move towards (5,2), both parties will benefit, since Rank L = 1 is less than Rank L = 6, and Rank M = 1 is less than Rank M = 6, similarly for point (6,1).
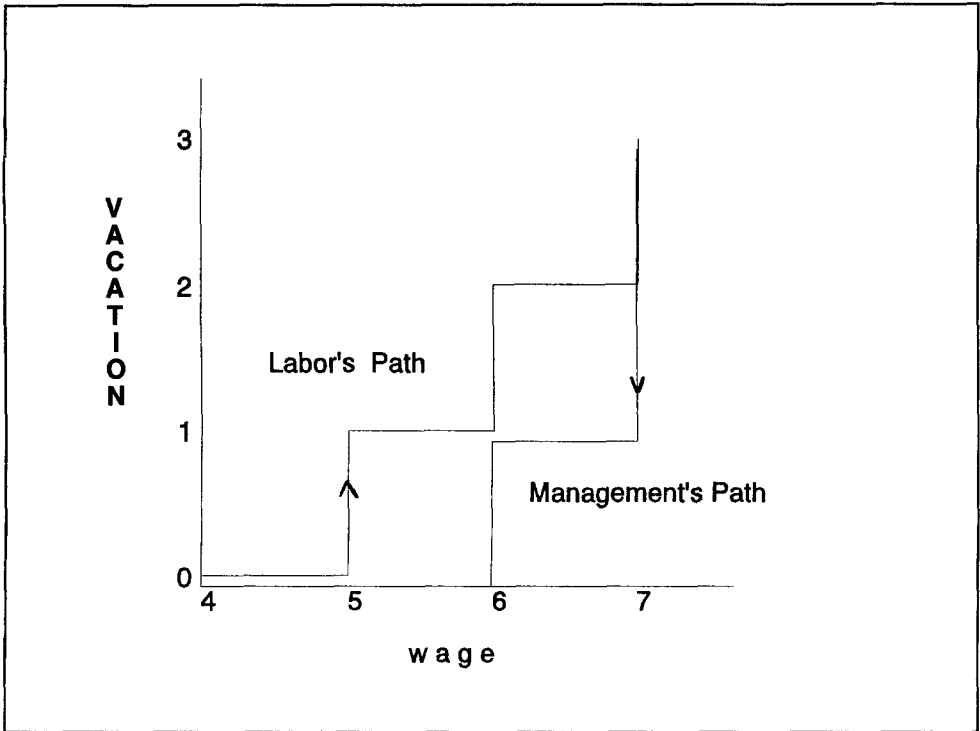
Acknowledgments

Figure A-1. NORA Ranks plotted in issue space.

Notes

1. In Table 3, split levels are given for illustrative purposes only.
2. NORA was programmed for the personal computer by Mr. Markku Kuula, Helsinki School of Economics.
3. A Negotiation Support System is a type of interactive, computer-based system designed to aid in conflict resolution (Kersten, Michalowski, Szpakowicz, and Koperczak 1991; Shakun 1988).

REFERENCES

Bazerman, M. (1983). "Negotiator Judgment: A Critical Look at the Rationality Assumption." *American Behavioral Scientist* 27, 211–228.

Fisher, R., and W. Ury. (1981). *Getting to Yes: Negotiating Agreement Without Giving In.* Boston, MA: Houghton Mifflin Co.

Kahneman, D., and A. Tversky. (1979). "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica* 47, 263–291.

Kersten, G., W. Michalowski, S. Szpakowicz, and Z. Koperczak. (1991). "Restructurable Representations of Negotiation," *Management Science* 37, 1267–1290.

Raiffa, H. (1982). *The Art and Science of Negotiation.* Cambridge, MA: Harvard University Press.

Raiffa, H. (1985). "Post-Settlement Settlements." *Negotiation Journal* 1, 9–12.

Rubin, J., and F. Sander. (1991). "When Should We Use Agents? Direct Vs. Representative Negotiation." In J. Breslin and J. Rubin (eds.), *Negotiation Theory and Practice*. Cambridge, MA: Harvard Law School, Program on Negotiation Books.

Shakun. M. (1988). *Evolutionary Systems Design*. Oakland, CA: Holden Day

Smith, W.P. (1985). "Effectiveness of the Biased Mediator." *Negotiation Journal* 1, 363–372.

Smith, W.P. (1987). "Conflict and Negotiation: Trends and Emerging Issues," *Journal of Applied Social Psychology* 17, 641–677.

Teich, J. (1991). "Decision Support for Negotiation." Ph.D. dissertation, State University of New York at Buffalo, Department of Management Science and Systems.

Tversky, A., and D. Kahneman. (1981). "The Framing of Decisions and the Psychology of Choice." *Science* 211, 453–458.

Welton, G.L., and D.G. Pruitt. (1987). "The Mediation Process: The Effects of Mediator Bias and Disputant Power," *Personality and Social Psychology Bulletin* 13, 123–133.

Wittmer. J.M., P. Carnevale, and M. Walker. (1991). "General Alignment and Overt Support in Biased Mediation," *Journal of Conflict Resolution* 35, 594–610.

Zartman, I.W., and S.Touval. (1985). "International Mediation: Conflict Resolution and Power Politics," *Journal of Social Issues* 4, 27–45.

Zubek, J. M., D.G. Pruitt, R.S. Peirce, N.B. McGillicuddy, and H. Syna, (1992). "Disputant and Mediator Behaviors Affecting Short-term Success in Mediation, *Journal of Conflict Resolution* 36, 547–572.