Standardized interpolated path analysis of offer processes in e-negotiations

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ABSTRACT

We describe a new approach to analyze offer processes in electronic negotiations. Utility values associated with offers are interpolated to standardized points in time during the negotiation, thus enabling a comparison and aggregation of different negotiations. We illustrate the usefulness of this approach in an exemplary empirical study. Empirical results indicate that negotiators frequently make offers that destroy total value, and that concessions across a broad range of issues are needed for successful negotiations.

Categories and Subject Descriptors

H.5.3 [**Information Interfaces and Presentation**]: Group and Organization Interfaces—*Asynchronous interaction, Evaluation/methodology*

General Terms

Economics, Experimentation

1. INTRODUCTION

The analysis of negotiation processes is an important topic in negotiation research. Negotiation processes involve different levels of interaction between parties. On one hand, there is the *substantive* level concerning the issues being negotiated. Parties exchange offers concerning one or several issues, support their offers by substantial information about their preferences towards these issues, factual arguments for their positions, and so on. On the other hand, negotiations also affect building a *relationship* between parties. Communication between parties thus not only serves to exchange offers and factual information, but also emotions, attitudes and empathy, or negotiation tactics like threats.

In the present paper, we focus on the substantive part of negotiations, and in particular on the exchange of offers. Offers are often considered the most important part of communication in negotiations [10], therefore, modeling offer processes is important for understanding negotiation processes.

Negotiation processes can be analyzed at different levels of (dis-) aggregation. Koeszegi and Vetschera [6] distinguish between a macro level of the entire negotiation, a meso level, which considers distinct parts of a negotiation, and the micro level of single interactions. In our view, a meso level analysis of negotiation processes is particularly useful, as this level of granularity allows insights into interaction patterns like phases or episodes [6]. In contrast, considering the entire negotiation as a homogeneous entity does not allow an explicit modeling of the dynamics taking place within the negotiation process, and individual offers would make it difficult to distinguish larger trends.

Most existing models of the negotiation process at the meso level are phase models, e.g. [1]. These models separate the negotiation into distinct phases, in which different communication patterns are assumed to prevail. Existing phase models, therefore, typically address both the substantive and the relationship aspect of negotiations and consider a rich set of possible communication acts. They are, therefore, not suitable to analyze the offer process, which focuses on a single dimension of the entire negotiation.

In the present paper, we introduce a new approach to model offer processes in negotiations, the standardized interpolated path analysis (SIPA). We provide a detailed description of this approach in Section two, Section three illustrates the use and potential benefits of SIPA analysis in an exemplary empirical study. Section four concludes the paper by summarizing its main results and providing an outlook onto future research.

2. THE SIPA METHOD

SIPA models offer processes in utility space. Many important characteristics of negotiations like concessions or efficiency of outcomes can best be described by taking into account utilities of both parties. Existing negotiation support systems, e.g. `Negoisst` [8], represent utilities in multi-issue negotiations by a linear multi-attribute utility function

$$u(\mathbf{x}) = \sum_{k=1}^{K} w_k u_k(x_k) \tag{1}$$

where $u(\mathbf{x})$ is the utility of a multi-issue offer $\mathbf{x}$, K is the number of issues under consideration, $u_k(.)$ is the partial utility function for issue k, and w_k is the weight representing the importance of that issue to the negotiator. Utility

ICEC '12 August 07 - 08 2012, Singapore, Singapore

function (1) allows for the decomposition of the total utility of an offer into components referring to single issues. SIPA can also be applied to these partial utilities to study for example concession patterns in each issue separately. This enables a more detailed analysis of negotiation processes, that also goes beyond other approaches to model processes at the issue level like e.g. [4]. For simplicity, we will generally refer to utility values in this exposition of the approach, where utility might refer to either the total utility of an offer (which can be calculated using an additive model as in (1), or some other model), or to the partial utility of an issue within an offer.

The negotiation protocol [5] might impose certain limitations on how and when parties are allowed to make offers (e.g. in the strict alternation protocol, two offers of one party must be separated by exactly one offer from the opponent). Apart from these restrictions, the timing of offers is usually at the parties' discretion. Therefore, offers can be heterogeneously distributed over time in different negotiations. This makes the aggregation and comparison of offer processes an important as well as challenging endeavor in the analyses of negotiations.

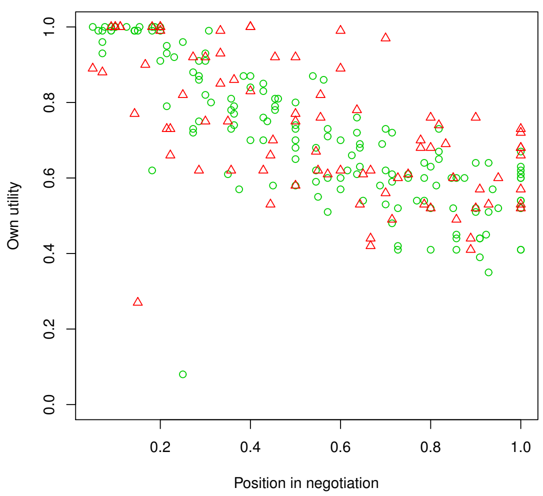

Figure 1: Illustration of different offer processes

Figure 1 illustrates this problem. It shows the utility each offer provides to the focal party making the offer of just 20 negotiations selected randomly from the 113 analyzed in the empirical study in Section 3. All utility values of the offers are plotted against time on the x-axis. Offers made during successful negotiations (which reached an agreement) are represented by green circles, offers made during failed negotiations by red triangles. Even for this small subset of the data, it is very difficult to identify any patterns.

Therefore, it is necessary to provide a standardized representation of offer processes, which can be aggregated and compared across negotiations. To generate such a standardized representation, we assume that at any point in time, each party has an opinion about the utility it is willing to grant to the opponent, and the utility it claims for itself.

Different assumptions can be made about how these opinions change over time. One can view the change of opinion as a continuous process, in which parties constantly make concessions, or as a discrete event system, in which parties only change their opinion when they actually make an offer. Figure 2 illustrates the two possible patterns. The dark dots represent actual offers, the light circles represent the estimated positions of the party at certain fixed points in time (indicated by the dashed vertical lines).

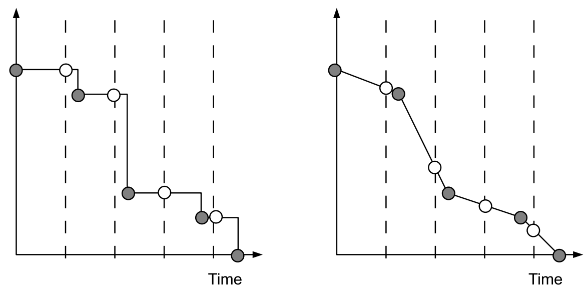

Figure 2: Possible interpolation patterns

In accordance with other scholars, like e.g. [2], we consider the continuous process pattern (shown in the right part of Figure 2) to be the more realistic representation of the process. While the assumption of a linear interpolation between offers is certainly questionable, viewing the offer process as a discrete event process would introduce large discontinuities into the process. If, for example, the third offer in Figure 2 would be made a little bit earlier, the estimate at the second time interval in the discrete event model would change considerably. The interpolation model is much more robust against small changes in the timing of offers.

Formally, we proceed as follows: Each offer a party makes to the other party implies both a utility level to the focal party making the offer, and to the opponent. We label the two parties of the negotiation as A and B, and denote B's utility of an offer which party A proposes to party B at time t by $u^t_{B,A}$. The utility of the same offer to party A itself is $u^t_{A,A}$. Let $S = \{s_1, ..., s_n\}$ be a set of given points in time (e.g., the first, second etc. quarter of each negotiation). Denote by ${s_i}^+$ the time of the first offer a party makes after time s_i and by ${s_i}^-$ the time of the last offer the party made before time s_i. We perform a linear interpolation of utility values between the two offers made at ${s_i}^-$ and ${s_i}^+$ as

$$u^{s_i}_{B,A} = \frac{{s_i}^+ - s_i}{{s_i}^+ - {s_i}^-} u^{{s_i}^-}_{B,A} + \frac{s_i - {s_i}^-}{{s_i}^+ - {s_i}^-} u^{{s_i}^+}_{B,A} \qquad (2)$$

The other three utility values involved in the offer process ($u^{s_i}_{A,A}, u^{s_i}_{A,B}, u^{s_i}_{B,B}$) are interpolated in the same way. Together, these four values describe a standardized offer process at fixed points in time.

Given the positions of both parties in utility space at times s_i, we can define several measures that represent the process dynamics involved in the offer patterns of both parties. Such measures can be defined by linking utility values either across time, or across the two parties.

Comparing utility values across time leads to two measures, depending on whose utility value is considered. The *Concession* of party A at time s_i is

$$C^{s_i}_A = u^{s_{i-1}}_{A,A} - u^{s_i}_{A,A} \qquad (3)$$

and the *Gain*, which the offer process of party A provides to party B is

$$G_A^{s_i} = u_{B,A}^{s_i} - u_{B,A}^{s_{i-1}} \quad (4)$$

By combining utility values of both parties at a given point in time, we can define two additional measures: The *Joint Utility*:

$$JU_A^{s_i} = u_{A,A}^{s_i} + u_{B,A}^{s_i} \quad (5)$$

and the *Utility Imbalance*:

$$UI_A^{s_i} = |u_{A,A}^{s_i} - u_{B,A}^{s_i}| \quad (6)$$

Joint utility is an indicator of efficiency of the solution being offered, and utility imbalance is an indicator of its fairness. It should be noted that both measures refer to an offer made by one party, and represent the impact of that offer on the utility values of both sides.

3. AN EXEMPLARY EMPIRICAL STUDY

To illustrate the results that can be obtained with this approach, we apply it to data from an existing negotiation experiment. The experimental data we are using here was obtained during a set of negotiation experiments using variants of the e-negotiation system `Negoisst` [8]. The main purpose of that study was to analyze the impact of differently configured negotiation support systems (NSS) on the process and outcomes of electronic negotiations. For brevity, we will only focus on the impact of process characteristics on negotiation outcomes in this paper, and will not discuss the different levels of support used. In particular, we will consider just one outcome dimension, i.e. whether the negotiators reached an agreement at all, and focus on differences in process characteristics between successful and failed negotiations.

The experiment was performed simultaneously at four universities in three European countries in November 2010. In total, 234 students participated in 117 negotiation dyads. All dyads were composed of students from different universities, so all communication had to take place via the NSS. The experiment was a compulsory course requirement in negotiation courses the students attended at their universities. All students received basic training in negotiation and the use of NSS. They were rewarded by course credits for participating in the experiment, independently of the outcome they reached.

The negotiation problem used was a business negotiation between two fictitious companies ("Mihalits" and "Metallurg") about the creation of a joint venture to manufacture innovative engines for airplanes. The two parties had to agree on seven issues. Each party was provided with a table indicating preference values for each option in each issue. The entire case was constructed to feature a rather small zone of potential agreement (and consequently a high level of conflict), because one of the interventions used was a mediation system that provided general advice to negotiators on how to avoid stalemates in high-conflict negotiations. Participants had three weeks to conclude the negotiation. If that deadline was exceeded, the negotiation was considered to have failed. Parties could reach an agreement, or indicate that they were not able to reach an agreement, before that deadline.

Out of the 117 dyads, four exhibited highly implausible patterns of offers like immediate agreement on the first offer, or one side making an offer close to the ideal point of the other side (which was of course gladly accepted). Data from these four dyads was excluded from the analysis, leaving a total of 113 usable dyads. Out of these 113 dyads, 72 (63.7%) reached an agreement.

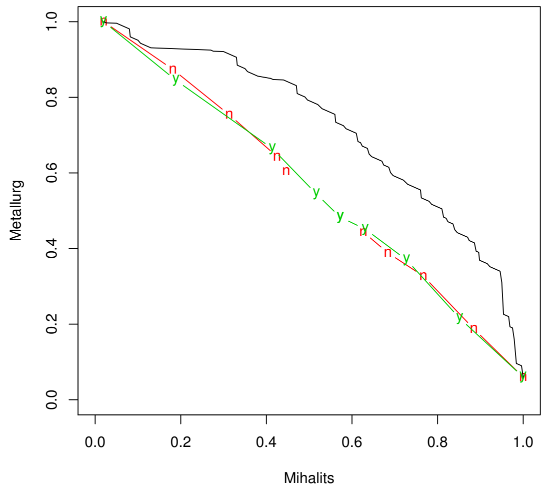

Figure 3: Average negotiation path

Figure 3 shows the average negotiation path in utility space of the two parties for successful (marked by "y") and failed (marked by "n") negotiations, as well as the Pareto-efficient frontier of the problem. It is quite obvious from this graph that on average subjects were strongly influenced by a fixed pie assumption [3] and failed to identify possibilities for mutual benefit.

On average, negotiators made 5.4 offers. We therefore split the negotiation process into quarters (allowing for one offer at the beginning and one offer at the end of the negotiation and three in between), and calculated interpolated utility values at the end of each quarter of the negotiation for both sides according to the approach presented in Section 2. From these interpolated utility values, we then calculated concessions, gains, joint utility and utility imbalance for the negotiation process (averaging across both sides) at each quarter of the process.

Figure 4 shows the distribution of concession values in each quarter of the process for failed and successful negotiations (indicated by "N" and "Y" and the percentage of completion of the negotiation, respectively). To further analyze this data, we performed two sets of statistical tests: On one hand, we compared concessions of successful and failed negotiations for each quarter. On the other hand, we compared the concessions made in each quarter to those of the previous quarter to test for significant changes over time. Since our data does not always fulfill the assumption of normality required for a t-test, we used the more robust nonparametric Wilcoxon test for this purpose. Furthermore, we applied a Bonferroni-Holmes correction to the p-values in order to correct for possible cumulation of α errors. Results of both tests are shown in Table 1.

Although successful negotiations typically exhibit a larger level of concessions than failed ones, this difference is significant only in the second quarter of the process. Both failed

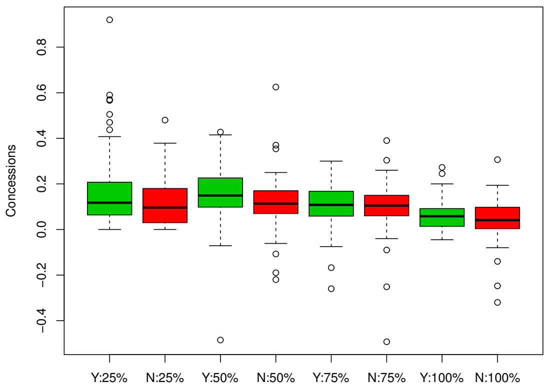

Figure 4: Concessions over time

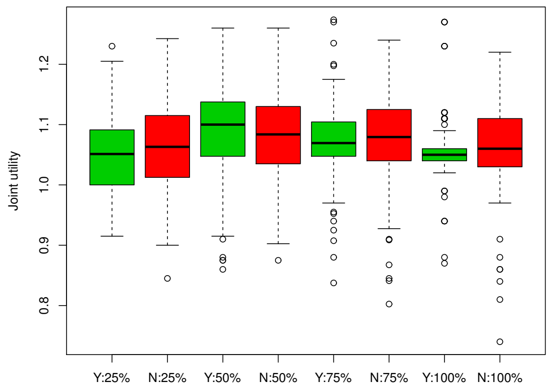

Figure 5: Joint utility values over time

Table 1: Statistical tests for concessions

Time	25%	50%	75%	100%
Median all	0.1100	0.1375	0.1075	0.0494
Median no agree,	0.0969	0.1137	0.1050	0.0413
Median agree	0.1175	0.1494	0.1081	0.0581
W agreement	5091.0	*4492.5*	5621.5	5513.0
p	0.2566	*0.0113*	0.8166	0.8166
W path		10815.0	**16171.0**	**19143.0**
p		0.0523	**0.0002**	**0.0000**

italics: $p < 5\%$, **bold**: $p < 1\%$, underline: $p < 0.1\%$

and successful negotiations start out with a higher level of concessions, which remains quite similar throughout the first half of the negotiation. The difference between first and second quarter is only weakly significant at a p level of slightly more than 5 %. In the second half of the negotiation, concessions drop significantly, both between second and third and between third and fourth quarter, in which concessions typically are less than half of what they were in earlier phases of the negotiation. Gains exhibit a very similar pattern, on which we do not report here for the sake of brevity. This close relationship between concessions and gains might be a particular effect of the problem used in the experiments, which was characterized by a high level of conflict and thus a high negative correlation of the utility levels of both parties. For other problems, a separate analysis of gains and concessions could lead to additional insights.

Table 2: Statistical tests for joint utility values

Time	25%	50%	75%	100%
Median all	1.0562	1.1000	1.0700	1.0500
Median no agree.	1.0631	1.0837	1.0794	1.0600
Median agree	1.0513	1.1000	1.0694	1.0500
W agree	6581.0	5460.5	6272.5	6731.5
p	0.6091	1.0000	1.0000	0.3866
W path		**6849.0**	**15776.5**	**13422.5**
p		**0.0000**	**0.0004**	**0.0000**

italics: $p < 5\%$, **bold**: $p < 1\%$, underline: $p < 0.1\%$

Figure 5 and Table 2 present a similar analysis for joint utility values. On average, failed and successful negotiations perform almost equally in terms of efficiency throughout the entire process. However, failed negotiations exhibit a considerably larger variance than successful negotiations, in particular during the later phases of the process. On average, failed negotiations are even slightly ahead of successful negotiations in these stages, although this difference is not significant. This is not surprising, but provides an example for the classical negotiator's dilemma [9]: In order to achieve high outcomes (and consequently, efficiency), one has to use hard bargaining tactics. These tactics, however, increase the likelihood that negotiations will end in an impasse if no party gives in.

The development of joint utility over time reveals a surprising pattern. From first to second quarter of the negotiation, there is a significant increase in joint utility, as could be expected. However, starting in the third quarter, joint utility significantly decreases and at the end of the negotiation falls back to about the same level as at the end of the first quarter. During the second half of the negotiation, parties therefore are actually destroying value, not creating it. This pattern is also visible in Figure 3. In the later stages of the negotiation, the average path falls below the 45 degree line, which would correspond to a constant joint utility. Comparing the average path shown in Figure 3 to the efficient frontier also makes it clear that the gain in efficiency, which negotiators typically achieve in the first half of the negotiations, is considerably lower than what would be possible. Especially in regions close to the extreme positions, the efficient frontier moves away from the 45 degree line at a much steeper angle than the average path of the negotiations. Thus, the distance between what negotiators achieve (or propose in their offers), and what would be possible by exploiting the integrative potential of the negotiation problem, is constantly increasing throughout the negotiation.

The time path of utility imbalance shown in Figure 6 exhibits the expected development: Utility imbalance decreases over time, i.e. negotiators move closer to each other's position, and in successful negotiations, this tendency is stronger than in failed negotiations. These results are confirmed by the statistical analysis shown in Table 3. The detailed analysis of differences over time shows that while in the first quarter, the difference between failed and successful

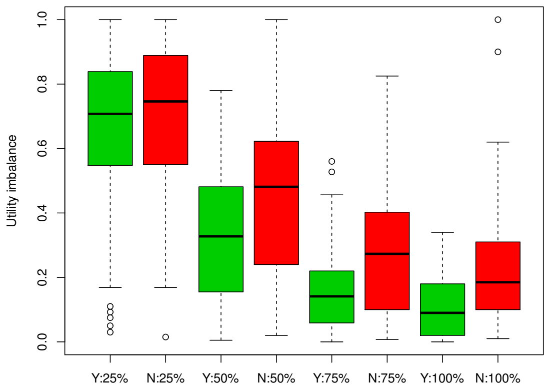

Figure 6: Utility imbalance over time

Table 3: Statistical tests for utility imbalance

Time	25%	50%	75%	100%
Median all	0.7194	0.3500	0.1637	0.1500
Median no agree	0.7462	0.4813	0.2731	0.1850
Median agree	0.7075	0.3275	0.1412	0.0900
W agree	6319.5	**7645.5**	**8103.0**	**8358.0**
p	0.7598	**0.0007**	**0.0000**	**0.0000**
W path		**24236.0**	**23038.5**	**15789.0**
p		**0.0000**	**0.0000**	**0.0000**

italics: $p < 5\%$, **bold**: $p < 1\%$, **underline**: $p < 0.1\%$

negotiations is insignificant, it already becomes highly significant in the second quarter. Thus it seems that the foundation of an agreement is already laid during quite early phases of a negotiation. This does not necessarily mean that a negotiation in which large differences still exists in the middle of the negotiation is automatically doomed to fail. The distribution shown in Figure 6 indicates that there were some successful negotiations where the difference in utilities was still at 80% of the total range at the middle of the negotiation, which is more than the average of failed negotiations at that time. But on average, it was much lower, and also lower than in failed negotiations.

For an analysis at the level of single issues, we use the partial utilities $u_k(x_k)$. To allow for a comparison between issues, we only consider the unweighted partial utilities, which are scaled between zero and one for each issue. The weights w_k are already taken into account in the analysis at the aggregate level just presented.

Figure 7 shows the development of partial utilities for each of the seven issues from the perspective of the focal negotiator formulating the offer, and from the opponent's perspective. The figure quite clearly shows how differently the issues are treated over time, and how the characteristics of issues shape the negotiation process. Issue number one, which is on the top in both graphs, had a high integrative potential. In fact, this was the only issue in which preferences of the two parties were not directly opposed. Clearly, the subjects were on average able to exploit this integrative potential by not giving up too much of their own utility, and at the same time considerably increasing the utility of their opponent

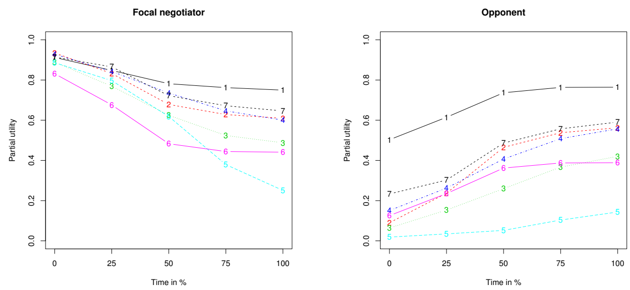

Figure 7: Partial utilities of issues over time

from this issue over time. In contrast, issue number 5 was a highly distributive issue. This issue dealt with the distribution of profits from the joint venture to be created by the two parties. Negotiators typically made only small concessions in this issue in the first half of the negotiation, but then had to concede significantly in order to reach an agreement. However, these concessions on average were inefficient and created little value for the opponent. This was also the only issue in which a significant difference between successful and failed negotiations exist throughout the entire process: All negotiations which eventually led to an agreement exhibited lower utility to the focal negotiator (and thus higher concessions) in this issue throughout the process. Apart from this issue, statistical tests indicated only one more significant difference in partial utilities, and that occurred in the very last time period of the negotiations (in issue number 3).

However, an analysis like the one shown in Figure 7, which considers only average values, can not represent important characteristics of a multi-issue negotiation process. An important feature of such negotiation processes is whether parties tend to make concessions in just one issue, or whether they are able to exploit different preferences for issues and perform log-rolling and adapt their concessions to the preferences of the opponent, which typically requires concessions in several different issues. In the first case, some negotiators might make large concessions in one particular issue, other negotiators might make most of their concessions in another issue. The basic pattern of both is the same (concessions being made mainly in one issue), but an analysis which aggregates values across negotiations in each issue will fail to point out this similarity.

We therefore complement the analysis of individual issues by an analysis which identifies issues by their role in the strategies of each negotiator rather than by their label. For each standardized point in time, we identify the issue in which each negotiator has so far made most concessions, and so on up to the issue in which the negotiator has made least concessions so far. This approach allows for example to determine whether negotiations in which parties tend to make concessions only in one single issue, and remain firm in all the other issues, are more likely to fail than negotiation in which parties give in across the entire range of issues (but perhaps by smaller amounts in each issue).

Figure 8 shows the time paths of partial utility values to the focal negotiator obtained in this way. Most negotiators almost completely held out on at least one issue. On average, the issue with the least concessions was kept at around 96%

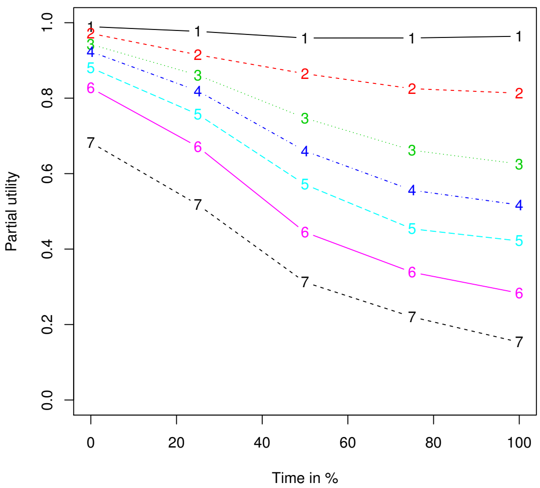

Figure 8: Utility paths of issues, sorted by concessions

Table 4: Analysis of issues ranked by concessions

Time	25%	50%	75%	100%
Least concessions				
Median no agree	1.0000	1.0000	1.0000	1.0000
Median agree	1.0000	1.0000	1.0000	1.0000
W	5544	6595	6563.5	7104
p	1.0000	0.5803	0.8931	0.1006
Median no agree	1.0000	0.9800	0.8800	0.9800
Median agree	1.0000	0.9250	0.7750	0.7000
W	4950.5	6910.5	*7355.5*	**7751**
p	0.9444	0.0627	*0.0285*	**0.0037**
Median no agree	0.9700	0.7850	0.7375	0.6650
Median agree	0.9400	0.7125	0.6325	0.5200
W	4464	6764.5	**7861.5**	**8305.5**
p	0.7185	0.0710	**0.0004**	**0.0000**
Median no agree	0.9263	0.7000	0.6000	0.5800
Median agree	0.8500	0.6450	0.5000	0.5000
W	4238	6202	**7559**	**8403.5**
p	0.0787	0.0684	**0.0010**	**0.0000**
Median no agree	0.8500	0.5900	0.5000	0.4000
Median agree	0.7750	0.5500	0.4000	0.4000
W	3821.0	5455.0	*6944.5*	**7849.0**
p	0.0451	0.4122	*0.0118*	**0.0000**
Median no agree	0.7000	0.4000	0.4000	0.4000
Median agree	0.6975	0.4000	0.4000	0.2500
W	3035.0	4727.5	6185.5	**7961.5**
p	0.4107	0.4157	0.3332	**0.0001**
Median no agree	0.4875	0.3300	0.2500	0.1500
Median agree	0.4875	0.2500	0.1500	0.1500
W	2708.5	4335.0	6011.5	*7097.5*
p	1.0000	1.0000	0.1625	*0.0202*
Highest concessions				

italics: $p < 5\%$, **bold**: $p < 1\%$, **underline**: $p < 0.1\%$

of the possible partial utility. On the other hand, the issue in which negotiators conceded most at the end was reduced to about 15% of possible utility.

A comparison of these patterns between successful and failed negotiations (Table 4) yields some interesting results. In both cases, more than half of the negotiators did not make any concession at all in one issue, and there is no statistically significant difference in behavior concerning the least concession issue between failed and successful negotiations. Likewise, for most of the process, there is also no significant difference in behavior with respect to the issue in which most concessions are made. Only at the very end, negotiators in successful negotiations have conceded even more in that issue than in failed negotiations. However, there are significant differences concerning the issues in between these two extremes, and in particular concerning the issues which lie in the middle in terms of concession making. It seems that in successful negotiations, negotiators make concessions on a broader range of issues than in failed negotiations, although they still do not concede on all issues.

4. CONCLUSIONS AND FUTURE RESEARCH

In this paper, we have presented a new method for analyzing offer processes in (electronic) negotiations. Our standardized interpolated path analysis makes negotiation paths comparable across negotiations in which offers are made at different points in time, and thus also enables aggregation of such data for statistical analysis. The method is quite general and thus can be applied both to single issues and to overall utility values.

This paper has introduced the concept of the SIPA method, but it is obvious that the method has not reached the final stage of its development and several opportunities for further development do exist. Table 5 illustrates the advantage of the linear interpolation approach used in SIPA over the alternative discrete event approach illustrated in Figure 2. This table presents the same analysis as Table 2, but based on a discrete event model. Using that model, the significant decrease in joint utility during the third quarter would have been missed. The exemplary study presented in this paper has shown an example in which linear interpolation between offers helps to uncover phenomena which would be missed when using alternative approaches like a discrete event model. However, this is only one example, and further comparative studies of different model formulations are necessary in order to study the possible advantages (and perhaps disadvantages) of our approach more comprehensively.

Another open issue is the number of points to be used for interpolation, In the presents study, we used a pragmatic approach and based the number of intervals on the number of data points available in order to avoid both a loss or a duplication of information. However, a more systematic approach would be useful. Sensitivity analysis using a different number of interpolation points could be a first step in this direction. Although we do not assume that behavior is necessarily different in the different parts of the negotiation, both theoretical phase models [1], and empirical models to separate phases [7] could also be useful to guide the choice of the number of interpolation points.

The exemplary study by which we have illustrated our method has provided some interesting results, which clearly show the potential of the method for analyzing offer processes in negotiations. Two of these results seem to be par-

Table 5: Joint utility values using discrete event model

Time	25%	50%	75%	100%
Median all	1.0300	1.1000	1.0900	1.0500
Median no agree.	1.0400	1.0800	1.0800	1.0600
Median agree	1.0200	1.1050	1.0950	1.0500
W agreement	6751.0	5498.5	5563.5	6731.5
p	0.3614	1.0000	1.0000	0.3614
W path		**4958.0**	10497.5	**13362.5**
p		**0.0000**	0.5012	**0.0000**

italics: $p < 5\%$, **bold**: $p < 1\%$, **underline**: $p < 0.1\%$

ticularly noteworthy. At the level of aggregate utilities, we have shown that negotiators (at least in our experiments) often fail to make value-creating offers, and in later stages of the negotiation even destroy value. This result is not only interesting from a theoretical point of view, but also has direct implications for the practice of negotiations. It alerts practical negotiators to the fact that concessions made during the late stages of the negotiation should be particularly well elaborated. There is the danger that the opponent, who is already doing quite well in some issues, will not gain much value from further concessions in these issues, which at the same time are quite costly for the negotiator making the concession. This phenomenon also creates opportunities for new methods in negotiation support to help negotiators to avoid this undesirable effect.

Applying our method to single issues, we have shown that the main difference between successful and failed negotiations does not lie in the issues on which negotiators concede most, nor in the issues where they concede least, but in the middle ground of other issues. It is those issues where parties make some (and sometimes too little) concessions which make the difference between success or failure of a negotiation. This again is an interesting result for the practice of negotiations, holding out in one issue (while conceding in a sufficient number of other issues) seems to be a sensible strategy, which does not harm the prospects of reaching an agreement.

Of course, one empirical study using one particular experiment is not enough for far-reaching conclusions on the structure of negotiation process. This was not the goal of this paper, but it indicates that the SIPA method can generate results which are useful for both the theory and the practice of negotiations.

5. ACKNOWLEDGMENTS

This research was partly funded by the Austrian Science Fund (FWF) under grant No. P21062.

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