ELECTRONIC NEGOTIATION SYSTEMS

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Negotiations are a particular form of communication and collective decision-making. Like all forms of collective action, negotiations involve different parties, which can be individuals, groups, or organizations. Three characteristics distinguish negotiations from other forms of collective decision-making as group decisions or social choice (voting) procedures:

- There is some conflict of interest between the parties involved.
- An agreement can be reached only by consent of all parties. If parties are not able to reach consensus, one particular outcome (usually the status quo) will take place.
- An agreement is not reached immediately but involves an interactive process in which offers are exchanged until a mutually acceptable solution is found.

Research on electronic systems to support negotiations began in the 1980s as an extension to the concept of decision support systems. Early research on negotiation support systems (NSS), for example, Ref. [1], focused on the multiperson aspect of negotiations and the possibilities of information technology to connect parties across time and space. The latter aspect gained importance with the rise of the internet and the development of web-based NSS [2]. Nowadays, we can distinguish between communication-, decision-, and document-oriented approaches [3]. Surprisingly, e-mail is often used for business negotiations although it does not offer decision support or advanced communication support [4].

Connecting parties is only one function of NSS. As NSS were often seen as an extension to individual DSS, the potential of NSS to improve decision-making is an important concern. Lim and Benbasat [5] distinguished two main components in the architecture of an NSS, a decision support component and a communication support component, and postulated that these two components would have different impacts on negotiations.

The concept of decision support in negotiations draws attention to another important difference between individual and collective decision problems: in individual decision support, a support system assists a decision-maker to better achieve his or her objectives. Decision support in negotiations can have two different goals: supporting one party to better achieve its own goals vis-à-vis others or to support all parties to achieve higher level goals such as efficiency or fairness. In the latter case, the systems take the role of a neutral third party, and in the former case, they serve as advisors to one party. Modern negotiation theory, in particular negotiation analysis developed by Raiffa [6] and Sebenius [7], emphasizes the fact that these two goals are not necessarily in conflict and that finding win–win solutions that benefit all parties is important. However, most negotiations contain distributive elements in which the interests of parties are in conflict. Therefore, already early concepts of NSS [8] distinguished between support components for individual parties and decision support for a mediator. As negotiations by definition require consensus to reach an agreement, supporting parties to find a mutually acceptable solution, and breaking deadlocks in negotiations, is also an important goal of negotiation support at the collective level.

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This decision support is also different from decision support for groups. Negotiations are more competitive than group decisions; support in group decisions aims at guiding group members to a consensus decision, which considers all (or a majority of) opinions present in the group. Thus, feedback and aggregation of preferences are a key concern. In negotiations, there are no "aggregated group preferences"; an agreement needs to satisfy individual interests to the extent that all parties can accept it.

Communication in negotiation follows a double goal [9]. On the one hand, the overall goal is mutual understanding. Without that, no interaction is possible. Thus, the negotiators aim to clarify their statements and to prepare a common ground for their interactions. On the other hand, the negotiators want to achieve their individual goals. To this end, they try to convince the partner to accept the current offer using information, threats, compliments, promises, and so on.

NSS are based on a prescriptive–descriptive perspective. Negotiators aim to make rational choices themselves, for which they need support. They also need to be aware of the fact that the other parties might not always act rationally but could be influenced by decision biases. Thus, game theoretic models that assume perfectly rational opponents are only of limited use for negotiation support. It should also be kept in mind that rational behavior in negotiations does not imply a focus on economic outcomes but has to consider that outcomes of negotiations involve several dimensions.

The process dimension is another characteristic of negotiations. NSS can intervene in different ways into these processes. Vetschera [10] distinguished three levels of process support: (i) *facilitation*, which does not guide the process into a particular direction; (ii) *interactive guidance*, which implements a specific interaction structure; and (iii) *normative guidance*, which provides solutions fulfilling normatively desirable criteria such as efficiency or fairness. Kersten and Lai [11] further differentiated NSS into (i) *passive systems*, (ii) *active facilitation–mediation systems*, and (iii) *proactive intervention–mediation systems.* Passive systems only facilitate communication of geographically distributed negotiators and do not intervene into their behavior. Active facilitation–mediation systems provide advice (e.g., on offers a negotiator could make) only at the user's request, whereas proactive systems monitor the process and interfere without explicit requests.

Support of negotiation processes serves different goals, individual goals of the parties, and collective goals characterizing the success of the entire negotiation. Collective goals can be of different nature. One obvious goal is to reach an agreement. If an agreement is reached, its quality can be evaluated on several dimensions. On the one hand, the agreement has to specify solutions for all issues of the negotiation, and these solutions can be evaluated in terms of efficiency and fairness. On the other hand, concluding an agreement is often not the end of the interaction between parties, the agreement has to be implemented via joint activities. The subjective evaluation and satisfaction of parties with the agreement, the behavior of their opponent(s), and the bargaining process have a considerable impact on their future relationship and their willingness to actually implement the agreement once they have left the bargaining table.

These different goals require different types of interventions. Reaching an agreement can be supported by improving the quality of communication between parties; thus, communication support (which can go far beyond providing communication channels) is an important topic in NSS. Methods from individual decision support can be applied and extended to enable negotiators to reach efficient and fair outcomes, whereas behavioral interventions can help parties to overcome deadlocks and improve their relationship in order to better cooperate in the implementation of an agreement.

COMMUNICATION SUPPORT IN NEGOTIATIONS

As mentioned earlier, the first perspective on negotiation support has been a decision-oriented one. However, communication is the

essence of negotiation. Without communication, no negotiation is possible as it is impossible not to communicate [12].

To understand an utterance, its contents and its mode need to be understood. According to the communication theories of Searle [13] and Habermas [14], the propositional content represents the factual level of an utterance, that is, what it is about. The illocutionary force represents the mode or the speaker's intention, that is, how it is to be interpreted, for example, as a promise, as a request, as a statement, or as an apology. Taken together, propositional content and illocutionary force provide the meaning of the utterance.

Understanding needs to take place on all levels of semiotics, that is, the syntactic, the semantic, and the pragmatic levels. On the syntactic level, the messages need to be transferred correctly; on the semantic level, their meaning must be unambiguous; and on the pragmatic level, the sender's intention must be explicit.

Tutzauer [15] argues that we can distinguish between offer communication and non-offer communication. The former consists of all the (mostly quantitative) details of the offers, whereas the latter complements offer communication and is equally important for negotiations. Non-offer communication has a factual function that aims at creating a mutual understanding about facts and positions. Furthermore, it has a procedural function to achieve mutual understanding about negotiation protocols, procedures, correlations between issues, and so on. Finally, its relational function focuses on achieving mutual understanding about the underlying norms, values, rules, and guidelines.

The duality of cooperation and competition is a distinctive characteristic of negotiation communication [9, 16]. Although understanding is a constant goal in negotiation, misunderstandings can be used strategically. To remain vague about a conflict issue can help to test out possibilities. Negotiation communication follows structured approaches that are efficient. However, there are also strategies such as time pressure that explicitly delay responses to the last moment in the hope of achieving better deals. Finally, no negotiation will succeed without compromises and cooperation by all partners. However, negotiations can also be conducted in a situation where power is unevenly distributed, limiting the freedom of one party.

The medium in electronic negotiations has an effect on the communication processes. It can lead to a de-escalation of conflicts because of the asynchronous manner of interaction, thus generating more trust. As the utterances are made in writing, every utterance is documented and thus traceable, again leading to more trust.

Communication support of electronic negotiations is a complex topic. The Negoisst system [3, 17] is the only NSS offering sophisticated communication support. It is based on the theories of Searle and Habermas and implements a language–action approach [18]. On the syntactic level, a negotiation protocol guides the interaction. No deletion of messages is allowed so that every message is documented and traceable. On the semantic level, Negoisst employs a semistructured communication approach. Every part of the natural text message can be linked to a structured vocabulary so that the meaning (i.e., the semantics) of text is explicated and shared between the negotiators. On the pragmatic level, the mode of utterance (i.e., the illocutionary force) is made explicit using message types. Negotiators are thus supported in transparent and open exchanges that would lead to higher communication quality [9].

Compared to simple e-mail exchanges, such communication-oriented NSS approaches provide the benefit of combining structure and flexibility. The communication support allows for natural language messages and thus a high level of flexibility. At the same time, the controlled vocabulary, the messages types, and the interaction protocol provide the structure necessary to allow for traceability, explicit deductions of commitments, and easy search for (parts of) utterances.

DECISION SUPPORT IN NEGOTIATIONS

Decision-oriented tools in NSS focus on the economic dimension of negotiations and are

based on concepts from economics, decision analysis, and game theory. From an economic perspective, efficiency or *Pareto optimality* of the agreement is the main goal. An agreement is called *efficient* if no other possible agreement exists, in which at least one party would better off, and no party worse off. If two parties negotiate about one single issue (such as buyer and seller about price), then all possible outcomes are Pareto optimal, because one party can only gain if the other party makes a concession. In negotiations about multiple issues, possibilities for Pareto improvements do exist. If each party makes a concession in an issue that is of less importance to itself and obtains a concession in a more important issue, both parties can benefit. Decision support in negotiations is therefore closely linked to multiattribute decision-making.

Efficiency is not the only dimension along which outcomes of negotiations can be evaluated. Assuming that negotiators evaluate outcomes according to a given utility function, it is also possible to measure the fairness of outcomes via the (im)balance of utilities it provides to parties or by comparing it to normative solutions such as the Nash bargaining solution [19]. However, most existing NSS do not provide these calculations.

During a negotiation, offers and counteroffers are exchanged. After receiving an offer, a negotiator has to decide among three alternatives:

1. accept the offer;
2. reject the offer and terminate the negotiation;
3. reject the offer and make a counteroffer.

Decision support in negotiations thus should support negotiators in evaluating offers from the opponent, as well as candidates for own offers, and in the preparation of offers. Therefore, a multiattribute preference model is the basis of the decision support component of an NSS. Most of the widely used NSS such as Inspire [2], Negoisst [17], or SmartSettle [20] use an additive value function for this purpose, but there are also systems employing other preference models such as outranking relations [21]. For a comprehensive review of these different methods, see, for example, Refs 22 and 23. Most systems elicit a negotiator's preferences in a preparation phase before the actual negotiation and then employ the calibrated model to evaluate offers during the negotiation process.

For a negotiator, it is not only important to know the value of the most recent offer but also the history of the entire negotiation. An offer often implies a concession, and many negotiators tend to follow the principle of reciprocity and make concessions of a similar size as they received from the opponent. Therefore, they need to keep track of the opponent's as well as their own previous offers and concessions. Many NSS support this behavior by providing a graphical representation of the negotiation process, in which utility values of offers from both parties are plotted over time. Although the system has information about the utility functions of both parties, most systems only refer to a negotiator's own utility, because preferences are considered private information.

Economic theory and utility-based decision analysis usually assume that preferences are stable over time. This assumption is also required for the approach outlined earlier. However, several problems can arise in actual negotiations. Negotiators might change their preferences in view of arguments made by the other party. In this case, the utility function needs to be elicited again. Furthermore, offers might be incomplete and not specify values for all issues. Some systems (e.g., Negoisst [17]) therefore provide lower and upper bounds for utilities, which allow for the fact that issues not specified in the offer might take on their worst or best values. Finally, negotiators might be insecure about their preferences or reluctant to specify exact values. To overcome this problem, decision models under incomplete information can be incorporated in NSS [24].

Providing utility values of offers and counteroffers enables negotiators to solve the first decision problem outlined earlier: an offer made by the opponent should be accepted if it provides a higher utility than the counteroffer the negotiator is ready to make. Similarly, to decide about terminating

a negotiation, offers are compared to the disagreement outcome. However, calculating utility values provides only limited support for the preparation of a counteroffer. By reviewing the previous concession patterns, a negotiator might determine a target utility level for concessions. Some NSS [25] provide models to determine offers that lead to the desired utility levels. A more comprehensive approach [26] calculates a target utility level using desirable properties of the bargaining process such as concession making, reciprocity, and value creation. Multi-issue offers leading to this target utility level are selected based on their similarity to previous offers from the focal negotiator and the opponent. Given the complexity of these problems, the use of methods from artificial intelligence was also proposed for supporting mediators [27] and to advise individual negotiators via intelligent agents [25, 28].

Decision support methods in NSS deal with the exchange of offers as the substantive dimension of the negotiation process. However, they do not consider the relationship dimension of the negotiation process and the outcome dimensions related to it.

BEHAVIORAL SUPPORT IN NEGOTIATIONS

The interaction of negotiators also affects and determines their relationship to each other. Negotiations therefore can also be framed as a process of establishing, defining, or redefining the relationship between parties. A mere focus on the substantive dimension on negotiations would neglect the "human" (behavioral) dimension of these encounters.

Raiffa [6] has already pointed out the synergy of both, in what he called the art and science of negotiations. While decision analytic approaches constitute the science part, the art of negotiation comprises socioemotional skills, the knowledge about various bargaining and negotiation tactics, and how and when to employ them. This aspect is also closely related to the descriptive side of negotiation analysis.

There are two basic orientations toward conflict resolution. (i) Negotiators who have a *cooperative orientation* view negotiations as a process of joint problem solving. They believe that a conflict can best be resolved when information about the problem and about one's own needs and motivations are shared. Furthermore, a cooperative orientation includes the willingness to understand the counterpart's motivations and needs and the effort to achieve the objectives of all parties. (ii) Negotiators having a *distributive orientation* view negotiations as a process in which one side wins and the other side looses. They attempt to achieve their own objectives at any cost and take everything that is possible from the negotiation table.

These orientations are reflected in a negotiator's strategy and tactics. The negotiation strategy determines the overall set of activities a negotiator implements, and tactics are the elements of this strategy. Integrative behaviors include information sharing, establishing a positive relationship and trust, concession making, and the like. Distributive behaviors include tactics such as making commitments, using power-related tactics, time pressure, and similar behaviors.

Empirical research has shown that negotiators with competitive orientation reach better own outcomes but at the same time reduce the prospects of reaching an agreement [29]. Integrative behavior such as cooperation and joint problem solving facilitates mutually beneficial solutions and helps the participants to "create joint value" [6] and to "invent options for mutual gain" [30]. However, individual outcomes tend to be lower [31]. It therefore depends on the situation, the conflict, and the dynamics of the process, which approach, strategies and tactics, is best suited to reach the negotiators' objectives.

Objectives are not always tangible and go beyond the substantive level. In some situations, the parties are forced to jointly resolve their conflicting interests. For example, in labor negotiations, law could impose deadlines for settlements. In such cases, a (well-) functioning relationship between the parties is an important outcome per se. However, even when parties have outside options, establishing a positive relationship during negotiations creates a solid basis to implement the agreement [32].

Trust is an important aspect of relationship building in negotiations. There is ample empirical evidence that a trusting relationship between negotiators has positive effects on negotiation processes and outcomes: mutual trust facilitates a problem-solving approach [33], the use of integrative strategies [30], and information sharing [34].

Behavioral negotiation support aims at providing negotiators with the knowledge when to use which strategy and how to build up a trusting relationship. However, providing behavioral advice is challenging, as ideas of "good" negotiation behaviors are disputed. Experienced negotiators have accumulated narrative knowledge, that is, "wisdom" about the art of negotiation, which is difficult to generalize and formalize. As there is no general criterion to guide behavioral support, the challenge is to provide guidance and orientation toward "good" agreements. Therefore, behavioral negotiation support has taken a process perspective and focuses primarily on increasing the prospects of an agreement [35]. Nowadays, only a few systems provide behavioral negotiation support. The first system, negotiator assistant (NA), was designed in the late 1990s as an electronic mediation support system to be used either by a human mediator or as an e-mediator in face-to-face negotiations [26]. Its successor, VienNA [36], was developed as a behavioral advice tool in e-negotiations [37]. Both systems are process focused and designed to direct the behavior of negotiators toward relationship and trust building, flexibility, and fairness [35]. The systems provide their users on request with diagnosis and analysis as well as appropriate advice.

The diagnosis function consists of a forced choice questionnaire to analyze the progress and actual status of the negotiation. The tool assesses how parties evaluate the status quo of the negotiation in five categories: parties, issues, activities, situations, and processes. Some questions prompt branching into new sets of questions. For instance, depicting the process as bargaining (win–lose) or problem-solving (win–win) approach leads to different questions addressing the tactics and strategies used. When all questions have been answered, the program generates a diagnostic grid, which depicts "flexibility vectors" of the parties. This grid allows to forecast the expected outcome of the negotiation. The dimensions of the flexibility vector, which are reflected in the questions, stem from research on factors that influence negotiating behavior, whereas weights have been derived from effect size calculations in a meta-analysis of bargaining experiments. In addition, the model was cross-validated with nine historical negotiation cases (for more details, see Ref. 38).

The analysis and advice functions search for the sources of impasses and stalemates and provide tailor-made recommendations for each user. The system utilizes an expert database on negotiations and identifies areas of difficulties using the information supplied in the diagnosis phase. The most problematic areas are presented to each user individually. For instance, the system might identify that negotiators follow a win–lose bargaining approach and are not flexible enough to trade-off issues. In this case, the system would suggest a logrolling strategy, in which negotiators trade-off less important for more important issues.

OUTLOOK AND CONCLUSIONS

The different approaches to negotiation support outlined earlier have reached different levels of maturity. Nevertheless, potential for future developments exists in all of them. Decision support is probably the approach with the longest research tradition. Still, several issues remain open in this field, in particular the development of more active support methods to suggest offers. Analytical decision support in its present form operates from a strictly prescriptive perspective, providing users a "correct" solution. Another challenge could be to tailor support strategies more specifically to a user's individual needs to counteract specific decision biases a user might have (or, in a one-sided approach, to exploit biases of the opponent).

Communication support is more difficult to realize as it deals with nonquantifiable aspects of negotiation. One challenge is to realize a proactive communication support, actively supporting the user in his or her

choice of communicative strategies, in preventing misunderstandings, and communication conflicts.

Behavioral support is a more recent concept, which offers many opportunities for research. One particular aspect of negotiations that so far has been rarely addressed in this context is the role of emotions. Emotions are at the core of conflict interactions, they might hinder negotiators to behave rationally [39]. Emotions emerge from the individual's evaluation of events, are either positive or negative, and predispose individuals to bivalent behavior, that is, either approach or withdrawal [40]. Because of emotional reciprocity and contagion, the expression of emotions leads to a nonconscious and automatic mimicking of counterparts. Emotional stimuli may cause distinct reactions by individuals and create complex patterns in human interactions [41]. Empirical research in negotiations shows that negative emotions increase competitiveness, whereas positive emotions increase cooperation [42]. However, negative affect can also be positive in negotiations: expressions of pain or distress may induce cooperative behavior, and anger and fear may motivate to overcome a crisis [43]. Similarly, positive emotion may negatively affect negotiations by causing biased judgments or expectations. The analysis and management of emotions in negotiation processes has not yet found appropriate consideration in behavioral decision support. It would be necessary to monitor negotiation processes to identify problematic emotional patterns in order to intervene into the process in due time.

The three forms of support we have described earlier address different aspects of the negotiation process. However, their integration and consistency across dimensions is an important issue, which is not yet addressed in existing NSS. Existing systems typically do not provide support in all three dimensions. Integrated support could not only help negotiators to overcome a wider range of obstacles but also address the question of consistency across dimensions. Consistent behavior (e.g., open and cooperative communication about preferences and large concessions) will transmit a coherent message to the other party and thus could improve the possibility of success. However, inconsistencies could also be used as a deliberate negotiation device. Identifying such (in-) consistencies, both by the supported negotiator and by the opponent, and providing advice how to deal with them, could be an important function of future integrated NSS.

REFERENCES

1. Jarke M. Knowledge sharing and negotiation support in multiperson decision support systems. Decis Support Syst 1986;2(1):93–102.
2. Kersten GE, Noronha SJ. WWW-based negotiation support: design, implementation, and use. Decis Support Syst 1999;25(2):135–154.
3. Schoop M. Support of complex electronic negotiations. In: Kilgour DM, Eden C, editors. Handbook of Group Decision and Negotiation. Dordrecht: Springer; 2010. p 409–423.
4. Schoop M, Köhne F, Staskiewicz D, *et al.* The antecedents of renegotiations in practice - an exploratory analysis. Group Decis Negot 2008;17(2):127–139.
5. Lim L-H, Benbasat I. A theoretical perspective of negotiation support systems. J Manage Inform Syst 1992;9(3):27–44.
6. Raiffa H. The art and science of negotiation. Cambridge (MA): Belknap; 1982.
7. Sebenius JK. Negotiation analysis: a characterization and review. Manage Sci 1992;38(1):18–38.
8. Jarke M, Jelassi MT, Shakun MF. MEDIATOR: towards a negotiation support system. Eur J Oper Res 1987;31(3):314–334.
9. Schoop M, Köhne F, Ostertag K. Communication quality in business negotiations. Group Decis Negot 2008;19(2):193–209.
10. Vetschera R. Group decision and negotiation support - a methodological survey. OR Spektrum 1990;12(2):67–77.
11. Kersten GE, Lai H. Negotiation support and e-negotiation systems: an overview Group. Decision and Negotiation 2007;16(6):553–586.
12. Watzlawick P, Beavin JH, Jackson DD. Pragmatics of human communication. New York: W. W. Norton; 1967.
13. Searle JR. Speech acts—an essay in the philosophy of language. Cambridge: Cambridge University Press; 1969.
14. Habermas J. Theorie des kommunikativen Handelns. Frankfurt: Suhrkamp Verlag; 1981.

15. Tutzauer F. The communication of offers in dyadic bargaining. In: Putnam L, Roloff M, editors. Communication and negotiation. Newbury Park (CA): Sage; 1992. p 67–82.
16. Duckek K. Ökonomische Relevanz von Kommunikationsqualität in elektronischen Verhandlungen. Wiesbaden: Gabler; 2010.
17. Schoop M, Jertila A, List T. Negoisst: a negotiation support system for electronic business-to-business negotiations in e-commerce. Data Knowl Eng 2003;47(3):371–401.
18. Schoop M. A language-action approach to electronic negotiations. Syst Signs Action 2005;1(1):62–79.
19. Nash JF. The bargaining problem. Econometrica 1950;18(2):155–162.
20. Thiessen EH, Loucks DP, Stedinger JW. Computer-assisted negotiations of water resources conflicts. Group Decis Negot 1998;7(2):109–129.
21. Wachowicz T. Decision support in software supported negotiations. J Bus Econ Manage 2010;11(4):576–597.
22. Belton V, Stewart TJ. Multiple criteria decision analysis. Amsterdam: Kluwer; 2001.
23. Pomerol J-C, Barba-Romero S. Multicriterion decision in management: principles and practice. Dordrecht: Kluwer; 2000.
24. Sarabando P, Dias LC, Vetschera R. Mediation with incomplete information: approaches to suggest potential agreements. Group Decis Negot 2013;22(3):561–597.
25. Chen E, Vahidov R, Kersten GE. Agent-supported negotiations in the e-marketplace. Int J Electron Bus 2005;3(1):28–49.
26. Vetschera R, Filzmoser M, Mitterhofer R. An analytical approach to offer generation in concession-based negotiation processes. Group Decis Negot 2012. DOI: 10.1007/s10726-012-9329-z.
27. Sycara KP. Negotiation planning: an AI approach. Eur J Oper Res 1990;46:216–234.
28. Kersten GE, Lo G. Aspire: an integrated negotiation support system and software agents for e-business negotiation. Int J Internet Enterp Manage 2003;1(3):293–315.
29. Pruitt DG. Negotiation behavior. New York: Academic Press; 1981.
30. Fisher R, Ury W. Getting to yes. Boston (MA): Houghton Mifflin; 1981.
31. Olekalns M, Smith PL. Understanding optimal outcomes: the role of stategy in competitive negotiations. Human Commun Res 2000;26(4):527–557.
32. Zand DE. Trust and managerial problem solving. Adm Sci Q 1972;17(2):229–239.
33. Butler JK Jr. Behaviors, trust, and goal achievement in a win-win negotiating role play. Group Organ Manage 1995; 20(4):486–501.
34. Greenhalgh L, Chapman D. Negotiator relationships: construct measurement, and demonstration of their impact on the process and outcomes of negotiation. Group Decis Negot 1998;7(6):465–489.
35. Druckman D, Mitterhofer R, Filzmoser M, *et al.* e-mediation and e-negotiation: behavioral decision support or utility maximization? Group Decis Negot 2013. DOI: 10.1007/s10726-013-9356-4. Forthcoming.
36. Mitterhofer R, Druckman D, Filzmoser M, *et al.* Integration of behavioral and analytic decision support in electronic negotiations. 45th Annual Hawaii International Conference on System Sciences. Maui Hawaii: IEEE Computer Society Press; 2012.
37. Gettinger H, Dannemann A, Druckman D, *et al.* in Hernández J, Zaraté P, Dargam F, *et al.* Impact of and interaction between behavioral and economic decision support in electronic negotiations. In: Hernández JE, *et al.*, editors. Collaboration in real environments. Berlin: Springer; 2012, 151–165 in print.
38. Druckman D, Harris R, Ramberg B. Computer-assisted international negotiation: a tool for research and practice. Group Decis Negot 2002;11(3):231–256.
39. Barry B, Oliver RL. Affect in dyadic negotiation: a model and propositions. Org Behav Human Decis Process 1996;67(2):127–143.
40. Hatfield E, Cacioppo J, Rapson RL. Emotional contagion. Curr Dir Psychol Sci 1993;2(3):96–100.
41. Lerner JS, Keltner D. Beyond valence: toward a model of emotion-specific influences on judgement and choice. Cognit Emotion 2000;14(4):473–493.
42. Van Kleef GA, De Dreu CKW, Manstead ASR. The interpersonal effects of emotions in negotiations: a motivated information processing approach. J Pers Soc Psychol 2004;87(4):510–528.
43. Friedman RA, Brett C, Brett J, *et al.* The positive and negative effects of anger on dispute resolution: evidence from electronically mediated disputes. J Appl Psychol 2004;89(2):369–376.