Artificial Computer-Assisted International Negotiation: 
A Tool for Research and Practice

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Abstract

We propose a web-based computer-assisted tool for diagnosing progress in international negotiation. The system is based on a general linear model. Innovative features of the program include branching and flipper question to account for the need to address different types of negotiation processes.

This paper presents a web-based computer-assisted tool for diagnosing progress in international negotiation. Interviews with professional negotiators revealed a need for assistance in monitoring progress, looking ahead at possible outcomes, facilitating “what … if” scenario analyses as part of planning, and brainstorming for impasse resolution. The tool has been designed to address these functions, among others. Emphasizing flexibility in negotiation, the program identifies five sources for flexible behavior: the parties, the issues, the delegations’ characteristics, the situation, and the process. Sets of questions corresponding to each of these sources are asked to provide information that is used for making diagnoses and projecting possible outcomes.

The diagnoses are attempts to capture the state of a negotiation at particular points in time. The “state” is ascertained by answers to questions about both past (e.g., How did your delegation prepare for the talks?, How frequently did they make concessions?) and present (e.g., How complex is this issue?, To what extent are negotiators influenced by public opinion?) activities. The questions are based on findings reported in the empirical literature on negotiating behavior. For example, it has been shown that studying issues prior to negotiation increases the chances for reaching agreements. Respondents are asked whether they planned primarily by studying the issues or by strategizing: Studying is coded for flexibility while strategizing is coded for inflexibility. To the extent that negotiators are flexible, their chances for agreement are improved as indicated in the program’s projections. Amount of joint flexibility (the diagnosis) appears as a point on a nine-cell grid. The point can represent a total score across the five sections or it can reflect a particular section’s score, in which case there may be as many as six points (five sections plus total) on the grid. These diagnoses and projections have both theoretical and practical value. The analyst can use the tool to compare cases and alternative “theories” of negotiation. The professional negotiator can use it for planning, including advice on breaking impasses and assessments on whether the advice was effective. It is an attempt to bridge the gap between theory and research on the one hand and practice on the other (George, 1993).

The program is based on a general linear model which is specified in some detail in the paper. Coded answers to the questions are multiplied by weights derived, in part, from a meta-analysis of bargaining studies (Druckman, 1994). Questions (corresponding to variables in the meta-analysis) with higher weights contribute more to the flexibility estimates than those with lower weights. Because the maximum and minimum possible score is different for each of the five sections (parties, issues, and so on), all scores are normalized, such that the aggregated score for each section goes from zero to one hundred percent of the range. Then, depending on the number of questions in a section, each question (variable) will contribute some percent to the total possible score for that section. A sensitivity analysis, discussed in the paper, shows the percent that each question contributes to the total score for the section.

Innovative features of the program include branching and flipper questions. Branching takes into account the need to address different types of negotiation processes. For example, the distinction between distributive or strategic bargaining and integrative or problem-solving negotiations suggests a set of questions relevant to each of these processes. A lead question establishes the type of process (distributive or integrative) typical of a particular case. Subsequent questions branch from this response to address the relevant process. Question answers contribute to the overall score when they are relevant and this is determined by the answer to the lead question in the section. Flipper questions address the need for non-linear responses concerning some aspects of a negotiation. This type of question provides an opportunity to make a score for an answer higher or lower depending on a follow-up question. For example,
the question, “How involved is the President or Prime Minister in these talks?” is followed by “Is it late or early in the negotiation?” Since involvement by a head of state late in the negotiation process counts more than his or her involvement early, the follow-up question can increase the value of the initial question in the overall score for that section of the program. It has a “trumping” influence on the total score for the section.

Another useful innovation is a help window that provides advice for resolving impasses. When the diagnosis (shown on the grid) indicates an impasse, the negotiators can ask for help. The window is organized by the source of the impasse (in the issues, parties, process, or situation) and tactics for resolving it. Examples of tactics are drawn from historical cases and findings obtained in experiments. Examples include fractionating the issues, displaying firm but flexible posturing, timing of moves or concessions, and insulating the talks from the media and other audiences. Users can then observe the impact of using the suggested tactics by answering the relevant section’s questions again and producing a revised diagnosis.

Validity of the diagnoses were ascertained by comparing diagnosed outcomes to the actual outcomes obtained in a variety of past cases, including negotiations on arms control (e.g., Intermediate Nuclear Forces), territory (e.g., Panama Canal), and the environment (e.g., air pollution, acid rain talks). Strong correspondences were found between the diagnosed and actual outcomes: Eight of nine cases were diagnosed correctly. Further, by comparing diagnoses of the various parts of a case (issues, parties, process, situation) we were able to ascertain the source of an impasse in talks between Spain and the U.S. over base rights (see Druckman, 1995).

In its present version, the program is a monitoring tool that enables negotiators or analysts to: a. ascertain the relative flexibility of parties at any point in time for each of several aspects of negotiation, b. compare flexibility and probable outcomes at different points as events and proposals change during the course of a negotiation, c. compare different cases in terms of flexibility and probable outcomes, and d. compare several perspectives on negotiation based on “hypotheses” about key factors thought to drive the talks (e.g., delegation activities, events surrounding the talks, the process at the table). Users (negotiators or analysts) can also perform their own sensitivity analyses by comparing results obtained from different patterns of answers to the questions in each section. The program serves as a learning device to the extent that feedback given about the state of the talks can influence its course. Each of these functions is facilitated by the web-based access currently available to users. That access also provides for further development of the tool and the framework on which it is based.

References


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1 After the place where Kimbrough and Tan conceived it, a restaurant near the University of Pennsylvania.

2 The reader is referred to Zacharia et al. (1999) for definitions and parameter settings of their rating mechanism; however, the reader is not assumed to have this knowledge in order to go through our investigation.

3 It is straightforward to conduct a statistically significance test of all possible combinations of agent B and C’s strategies. However, we choose not to do so since we believe such statistical formalism would not add much insight.