

## Abstract

AGENTS IN CONFLICT: COMPARATIVE AGENT-BASED MODELING OF INTERNATIONAL CRISES AND CONFLICTS

David P. Masad, PhD

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Dissertation Director: Dr. Robert Axtell

Inter-state conflicts are a key area of study in international relations, and have been approached with a variety of techniques, from case studies of individual conflicts, to formal analysis of abstract models and statistical investigations of all such conflicts. In particular, there are a variety of theories as to how states make decisions in the face of conflicts – such as when to threaten force, when to follow through, and when to capitulate to an opponent’s demand. Some scholars have argued that states may be viewed as rational decisionmakers, while others emphasize the role of psychological biases affecting individual leaders. Decisionmaking is challenging to study in part because of its complexity: the decisionmakers may not just be individuals but organizations, following internal procedures and reflecting institutional memory. Furthermore, the decisions are often believed to be strategic, reflecting the decisionmakers’ anticipation of multiple other actors’ potential responses to each possible decision.

In this dissertation, I demonstrate that agent-based models (ABMs) provide a powerful tool to address this complexity, and advance their use as a bridge between different methodologies. Agents in ABMs, representing countries, can be endowed with a variety of internal decisionmaking models which can operationalize a variety of theories drawn from case

studies, psychological experiments or game-theoretic analysis. The specific decision model agents utilize may be changed without altering the sub-models governing how the agents interact with one another. This allows us to simulate the same overall interactions utilizing different decisionmaking theories and observe how the outcomes differ. Furthermore, if these interactions correspond to real-world events, we may directly see how much explanatory or predictive power the outputs of the model variants provide. If one variant's outputs correspond closer to the empirical data, it provides evidence supporting that variant's underlying theory.

I implement two agent-based models, extending well-established prior models of international conflict: the International Interaction Game (Bueno de Mesquita and Lalman, 1992) and the Expected Utility Model (Bueno de Mesquita, 2002). For each, I start with their original agent decisionmaking models, and develop several variants grounded in relevant theories. I then instantiate the models with historic, empirically-derived data and run them forward to generate sets of simulated outcomes, which I compare to empirical data on the relevant time periods. I find that non-rational models of decisionmaking in the International Interaction Game provide similar explanatory power to the purely rational model, and yield rich satisficing behavior absent in the original model. I also find that the Expected Utility Model variant implementing a Schelling (1966)-inspired model of coercion yields richer dynamics and greater explanatory power than the original model.

In addition to providing evidence in support of particular theories and hypotheses, this work demonstrates the power of the comparative modeling methodology in studying international conflict. Future work will involve adding more statistical controls to the model output analysis, comparative analysis between the outputs of the two overall models, and extension of the decisionmaking models for each. The same methodology may also be expanded to other formal and computational models of international relations, and social science more broadly.