Better Models for National Security Strategic Decision Making

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Research is needed to provide better mathematical models for strategic decision making in national security. National security decision making is fraught with complex and uncertain problems and requires trading off among a variety of objectives. These decisions have some of the most consequential decisions because it can mean sending the nation to war, leading to the loss of life of servicemen and women and costing billions of dollars. Regardless of the strength of the intelligence, there will always be questions among potential adversary's motives, strengths, and future actions.

Although government officials and military leaders rely on mathematical models for many tactical decisions, **strategic decisions are often made without using models** (George, 1993; Heazle, 2010; Mazarr, 2015). Reasons for this failure include ill-suited models for strategic decisions, too much uncertainty, and a lack of trust in mathematical models. Since most national security policy makers come from non-technical fields, they are usually less familiar with using probabilities and mathematical model to make decisions in complex and uncertain environments. Although their success generally demonstrates their ability to make good decisions and lead people, they are still subject to the same heuristics, biases, and misinterpretations of uncertainty that plague humans (Kahneman et al., 1982; Ariely, 2009). Mathematical decision-making models can enhance their decisions, but if policy makers do not understand these models, then the policy makers will not rely on them to make decisions.

There is needed research to understand what is the best way to train experienced public policy officials so that they are comfortable using models and decision-making frameworks. These models could include mathematical models relevant to the official's own area of expertise (e.g., models of a specific region). More important than the specific model, good decision-making models should require a decision maker to think about the uncertainty in the decision, use probabilities to quantify that uncertainty, and require the decision maker to trade off among competing criteria or values (Howard and Abbas, 2016). The goal of the mathematical model is not to provide the answer, but it should help clarify the decision maker's thinking about a particular subject and provide a powerful foundation on which to base a decision.

Such a research program could initially begin by experimenting with different teaching methodologies for students in public policy, international relations, and law programs. These programs typically produce policy makers and government officials in national security. Research should answer whether exposing students in these programs to a short course or a few modules on mathematical models for decision making enhances their analytical capabilities? If students do not have a mathematical background, what is the appropriate level of detail so that they will be comfortable when using these models during their career?

The research should also be extended to current officials in national security. First, research should explore whether government officials see the utility of having better mathematical models of national security problems. If not, further research should explore if these officials are content with their current tools or do not see the need for models for these complex problems. If the officials see a need for better models, qualitative interviews and quantitative surveys can assess what the officials would like to see in models and how they believe their decisions could improve with better models.

On the other side of the coin, there is also a need for analysts and mathematical modelers

to provide better tools for national security decision makers. **Research should be conducted to explore how operations researchers and decision and risk analysts can present, explain, and deliver models that will actually be used for complex and uncertain national security problems.** The interviews and surveys of current government officials can provide insight into this issue. Questions along this vein that need to be answered include: (i) how much should a busy policy maker be involved with constructing the model? (ii) how to build an interactive model so that a policy maker can gain an intuitive feel for the model output? (iii) what visualization and presentations of uncertainty are necessary for a policy maker? and (iv) how to build a model that a policy maker can trust and be comfortable with?

Bibliography

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