

AIR COMMAND AND STAFF COLLEGE

AIR UNIVERSITY

# GAME THEORY, PREDICTIVE ANALYSIS, AND IRAN



A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

Advisor: Dr. Jonathan A. Zartman

Maxwell Air Force Base, Alabama

December 2013

## **Disclaimer**

The views expressed in this academic research paper are those of the author and do not reflect the official policy or position of the US government or the Department of Defense. In accordance with Air Force Instruction 51-303, it is not copyrighted, but is the property of the United States government.

## ***TABLE OF CONTENTS***

	<i>Page</i>
Disclaimer .....	ii
ABSTRACT .....	v
Introduction.....	1
Explanation of Method .....	1
Predictions and Claims .....	8
Assessment as an Analytical Tool .....	10
Assessment of Predictions .....	15
Conclusion .....	19
Endnotes.....	21
BIBLIOGRAPHY .....	22

## ***TABLE OF FIGURES***

	<i>Page</i>
Figure 1. Nolan Chart .....	3
Figure 2. Oil Money Usage Options .....	5
Figure 3. Composite Example Results.....	7
Figure 4. TED Talks: Political Winners and Losers .....	16
Figure 5. Iran's Nuclear Policy .....	18
Figure 6. Iranian Uranium Enrichment.....	19



## **ABSTRACT**

Traditional analysis and prediction of political policy relies principally on expert judgment. Augmenting expert judgment with analytical models, based upon Game Theory, purportedly enhances the accuracy of predictions. The specific claims and methodology of Dr. Bruce Bueno de Mesquita offer an example of such analysis for review and evaluation. This review explains his methodology, investigates his claims of prediction accuracy, evaluates his ability to mitigate analytical biases, and assesses two of his 2009 predictions for the Islamic Republic of Iran. Overall, the approach does not reduce the amount of synthesis or judgment required from the analyst. It shifts it away from the prediction itself and into the model's construction. The method offers a superior capability to predict discontinuous events, mitigates anchoring bias, and enables the rapid evaluation of alternatives. However, its use must be restricted to problems wherein the participants can freely negotiate the outcome to the limits of their power. Bueno de Mesquita's model provides generally accurate predictions. Moreover, given the same information that this model requires a traditional analyst would have reached the same predictions. Ultimately, Game Theory models provide an effective, but not revolutionary, method for structuring analysis that can enhance the prediction of discontinuous events in certain contexts.

## Introduction

Traditional analysis and prediction of political policy relies principally on expert judgment. Game Theory advocates claim that augmenting expert judgment with analytical models, enhances the accuracy of predictions. For example, Dr. Bruce Bueno de Mesquita, a New York University Political Science professor and consultant, extolls this approach. In his book *The Predictioneer's Game* and a February 2009 interview with *TED Talks*, he shared some insight into his methods for predictive analysis and made a few predictions about the future of the Islamic Republic of Iran. A holistic evaluation Bueno de Mesquita's methods and predictions, requires explanation or scrutiny of four areas: a functional explanation of the model itself; an investigation of his claims of accuracy; an assessment of the model as an analytical tool; and an evaluation of the veracity of his predictions about Iran.

## Explanation of Method

In his book, Bueno de Mesquita provides a good deal of insight into his methodology, including the origins of his approach. The core of his model is a system called *Policon*, which his firm implemented for the Central Intelligence Agency (CIA) in the mid-1980s.<sup>1</sup> *Policon* is a fairly straightforward implementation of Game Theory. The following sections explain the fundamentals of *Policon* and provide an explanation and example of its use.

The foundational assumptions of the *Policon* model are that people know what they want and they will use their resources to obtain it. With that set of assumptions, the algorithm requires only three input variables. They are: each actor's preferred outcome, their relative power (Power), and how important the issue is to them (Salience). Then, the model calculates a value for how much energy each actor would apply, for or against, each potential outcome (Utility).

Finally, the algorithm calculates how much each actor would support every outcome under consideration, as an isolated instance.

$$\textit{Support} = (\textit{Power}) \times (\textit{Salience}) \times (\textit{Utility})$$

This equates to each actor asking himself, “if outcome ‘A’ was the only thing on the table, how much effort would I put towards obtaining it?” and doing so for every outcome under consideration. The model predicts the results by totaling and comparing the amount of support each potential outcome received from all actors. The outcome with the most support will win.<sup>2</sup> A more robust model will also apply an assortment of mathematical functions to address uncertainty and produce statistical results.

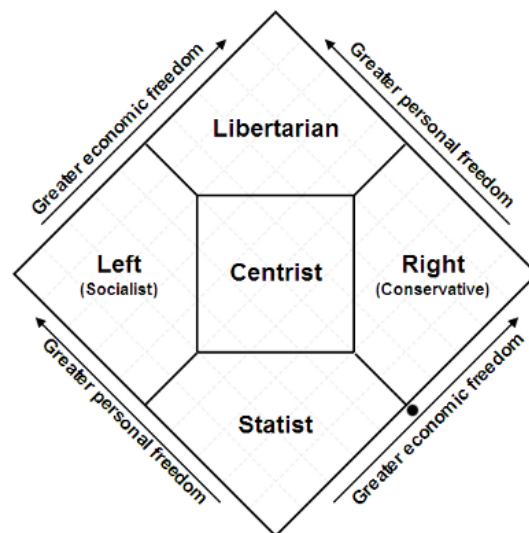
That basic explanation of *Policon* may make the application of Game Theory appear to be a fairly straightforward process of gathering data and calculating results. But, closer examination reveals that a tremendous amount of judgment and art underpin the model. That judgment manifests itself in the construction of the range of possible outcomes and the assignment of preferred outcomes to each actor.

Game Theory proponents frequently claim that the model requires a single assumption, that the actors be rational, i.e. can linearly order their preferences for things and act accordingly.<sup>3</sup> However, this is only one half of a pair of key assumptions. Its partner is, that the analyst can construct a linear range of outcomes that effectively captures the actors’ preferences and their order.<sup>4</sup> The actors must be rational and the model must include rational outcomes for all actors.

In his book, Bueno de Mesquita cites an example of a seminar for environmentalists where the attendants were predicting the results of greenhouse gas emissions policy negotiations. The students proposed only modeling in the range between the status quo and tougher restrictions. But, this would have excluded actors who actually prefer greater greenhouse gas

emissions. For instance, energy and manufacturing companies might reasonably find it beneficial to their bottom line to produce more greenhouse gases.<sup>5</sup> The students' range would have failed to consider their real preferred outcomes. This would skew the utility factor portion of the calculation and erroneously assign their support to lower-end regulations, rather than modeling support for de-regulation. So, the assumption that the companies are rational would be true. But, the model would have predicted irrational behavior, i.e. the companies not pursuing their preferred outcome.<sup>6</sup>

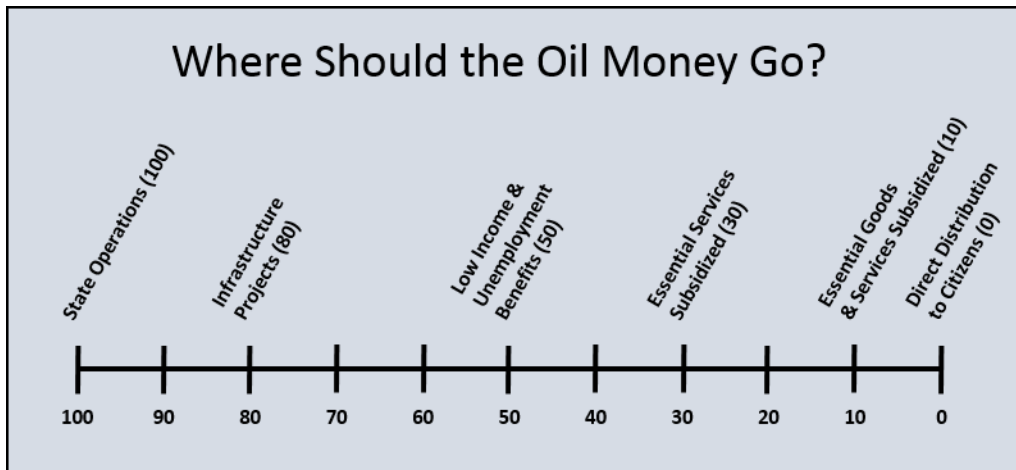
In order to numerically capture a range of social and political outcomes, analysts rely on the Spatial Theory of Voting (STV).<sup>7</sup> The STV asserts that locations in a coordinate system can be used to represent relatively how "far apart" political positions are from one another. A common two-axis example of this is the "Nolan" chart, Figure 1, created by Libertarian party founder David F. Nolan.<sup>8</sup> The chart uses two axes, *Personal Freedom* and *Economic Freedom* to form four ideological zones. The greater the distance between two positions on the chart, the greater the divergence in political views on economic and personal freedom.



**Figure 1. Nolan Chart**

While the Nolan chart exemplifies STV, a two axis system squares the number of calculations required for a simulation. In order to conduct manageable calculations with 10s to 100s of actors, with wide ranges of possible outcomes, *Policon* requires a single axis. Some analysts may reflexively argue that politics are multidimensional and that this cannot be done. Despite the truth of the first assertion, analysts can assess specific issues by themselves. Limiting the scope of the analysis to a single question usually reveals that issue to which the actors consider most sensitive to, e.g. distribution of control, cost, return on investment, short- vs. long-term benefit, etc. Within that context, the CIA analysts who worked with *Policon* found it manageable.<sup>9</sup>

Figure 2 provides an example of a linear range of outcomes for a complex issue that is appropriate to this type of modeling, “where should the oil money go?” The dominant issue differentiating preference was assessed as individual versus collective benefit. On the far left side, position 100, is the funding of the state’s operations with all oil money. This represents both complete state control of the funding and the smallest direct benefit to individual citizens. As the scale moves to the right, towards position 0, the direct benefits of oil funding move through a zone of social welfare activities until finally reaching direct distribution to individuals with no government oversight.



**Figure 2. Oil Money Usage Options**

Now, with a linear scale established, the “real” analysis can begin. The analyst must assign a numerical position to each group being modeled. Obviously, those assignments are subjective. Making them requires traditional analytical technique, historical knowledge, and judgment. To tie this back to the Nolan chart, a strong Statist would favor position 100. Conversely, a Libertarian would favor position Zero. The Socialist and Conservative positions lie in between these two extremes. For this example, a strong Socialist would favor a position around 30, while a Conservative would favor a position near 50. Note that, even in this relatively benign example, the placement of the Socialists and Conservatives can generate considerable argument. Accurate predictions require accurate assignments of preferred outcomes.

With actors identified, the allocation of their preferred outcomes also generates an expected utility value for each possible outcome.<sup>10</sup> In layman’s terms, expected utility answers the question, “how valuable do I consider this outcome?” The analyst assigns a value to each potential outcome, based upon its displacement from the actor’s preferred outcome. Each actor’s preferred outcome is assigned a utility of 1.0. They get what they want. From that point, utility diminishes with distance from their preferred outcome. While not required, some analysts prefer

to allow utility values to go negative to represent outcomes that actors oppose.<sup>11</sup> This correlates with the social-survey scale of: Strongly Agree, Agree, Somewhat Agree, Somewhat Disagree, Disagree, and Strongly Disagree. So, a simple model for utility on a 100-point scale could be expressed as follows:

$$A's \text{ Utility for Outcome } N = 1 - (\text{Absolute Value } (A's \text{ Preferred Outcome} - \text{Outcome } N) * 0.1)$$

Therefore actor 'A' will have 100% utility for his or her preferred outcome, 50% utility for an outcome 25 points away, zero utility for an outcome 50 points away, and negative utility, i.e. oppose, outcomes greater than 50 points away.

Now that the analyst has defined the model and its inputs, the calculations can begin. The top sub-table, in Figure 3, captures the preferred outcome of the previously discussed political groups, an assigned *Power* rating, and an assigned *Saliency* value. The second sub-table applies the example formula to determine each group's *Utility* for each outcome. The third sub-table calculates each group's support for every outcome by multiplying their *Power*, *Saliency*, and *Utility*. The bottom row totals the support from every group for each outcome. Finally, the analyst observes the outcome with the most support and translates the prediction back into words.<sup>12</sup> In this case, outcome position 50 scored the highest with 75.4 points of support. Therefore, the model predicts that the negotiations will result in oil money being directed towards 'Low Income and Unemployment Benefits.'

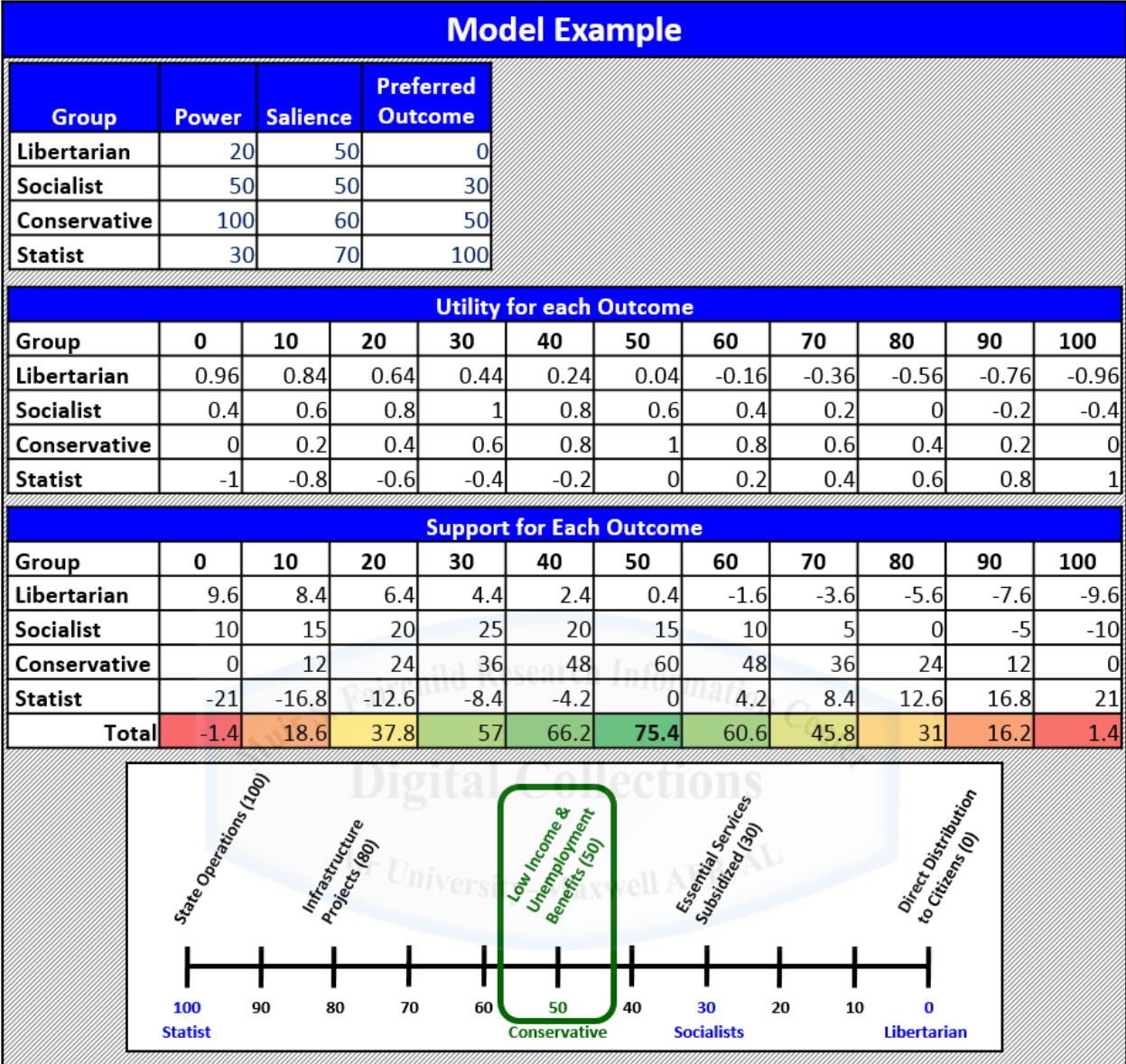


Figure 3. Composite Example Results

Given the small number of actors that were considered and the distribution of power, simple intuition would likely have predicted the same result. So, what did the model really do? First, it required the analyst to formally structure his or her conceptualization of the issue itself. Second, the process produces a traceable and editable accounting of the analyst's assessments of *Power*, *Saliency*, and *Preferred Outcome*. Finally, it lays a foundation to model much larger problems, whose outcome can vary with time, and apply statistical tools to address uncertainty.

An informed analyst's intuition would be very hard pressed to evaluate the positions of the 300-500 members of a typical parliament, consider shifts in *Salience* over time, or provide short-, mid-, and long-range predictions on the same issue.

To make his predictions about Iran, Bueno de Mesquita's used a more complex model than the example. In addition to the features previously described, his model considered each actor's commitment to their position and calculated their ability to influence each other over time. However, he withheld the specific inner-workings of those models in his lecture and books. Presumably, those processes are proprietary, i.e. essential to the marketing of his product. He is a consultant as well as a professor and operates a for-profit business. Never the less, the information available allows an assessment of Bueno de Mesquita's predictions and claims about the model.

### **Predictions and Claims**

During his TED Talks presentation, he made reasonably specific predictions about the future of Iran's nuclear program and President Mahmoud Ahmadinejad's power-base. He also stated that he was going to assess the future of the theocracy in Iran, but did not actually cover that topic. More's the pity, as that issue holds great importance for the future of Iran and its relations with its neighbors. But, the boldest claim that he made was that the Central Intelligence Agency (CIA) says that his predictions have been 90% accurate. All of these statements, as well as his method for making these predictions bear review and assessment.

In his presentation and in his books, Bueno de Mesquita cites a CIA assessment that his predictions were 90-percent accurate and makes a corollary claim that his method "hit the bulls-eye" twice as often as traditional analysis.<sup>13</sup> He challenges his audience to look it up and even

provides the reference. This review accepted his challenge. The results were unimpressive on all counts.

The citation is not, in fact, an official CIA assessment of the performance of his methodology. It is an article published in an internal trade journal for analysts called *Studies in Intelligence*. The article, by Stanley A. Feder, entitled *Factions and Policon: New Ways to Analyze Politics*, examines the use of a pair of tools that political analysts used in the mid-1980s.<sup>14</sup> Given the source and nature of the document, it is inaccurate for Bueno de Mesquita to claim a CIA endorsement for his work. Aggrandizing the source of his citations undermines the credibility of the rest of his claims.

In the same vein, Bueno de Mesquita would also have his audiences believe that a 90-percent prediction accuracy rate resulted from the application of his methods, in the alleged CIA assessment. This was also not the case. The actual statement is provided here, in its proper context. “Interestingly, forecast done with traditional methods and *Policon* were found to be accurate 90 percent of the time. Thus, while traditional methods and *Policon*-based analysis both scored well in terms of forecast accuracy, *Policon* offered greater detail and less vagueness.”<sup>15</sup> Feder was actually commenting on the, unusually high, accuracy of all of the political analysis that was conducted during the period. He was not attributing a 90-percent accuracy rate to *Policon* as an endorsement of its performance. If Feder had only found a 25-percent accuracy rate for all predictions, in all probability, Bueno de Mesquita would not be citing his work.

The preceding quote notes that Feder also made an assessment of the specificity of the predictions. In *The Predictioneer's Game*, Bueno de Mesquita states that, “A declassified CIA study reports that my forecasting model has hit the bulls-eye about twice as often as the government's experts who provided me with data.”<sup>16</sup> The study technically made that assertion.

But, it has been removed from its context. As a result, readers would assume that this refers to the accuracy, rather than the specificity, of his predictions. In order to provide an understandable comparison of specificity, Feder contrived a model with four concentric rings. At the center were 'Highly Detailed' predictions. As the rings expanded outward, specificity falls off from 'Moderately Specific, to 'General,' and finally 'Vague.' Feder actually said that, "Both traditional approaches and *Policon* often hit the target, but *Policon* analyses got the bulls-eye twice as often."<sup>17</sup> The bulls-eye, in question was a 'Highly Detailed' prediction, not an accurate prediction, as Bueno de Mesquita would lead his readers to believe.

Clearly, Bueno de Mesquita is more interested in generating excitement about the possibilities of *Predictioneering*, than the accuracy of his assertions. All of his books, presentations, and websites use these misleading claims. These claims seriously undercut his credibility and the prospects for using this model. Over-selling a product virtually ensures under-delivery.

### **Assessment as an Analytical Tool**

However, that does not mean that the model cannot enhance analysis. Using any model helps analysts structure their analysis and resist cognitive biases and analytical traps. The *Policon* model offers analysts specific advantages in combating continuity and anchoring biases. Additionally, the computational model enables analysts to quickly and impartially consider alternatives.<sup>18</sup> Finally, the structure of the model creates a matrix for identifying and challenging assumptions about each actor's power, preferred outcome, and salience.

Continuity Bias occurs when the assumption that past trends will continue into the future goes untested and is taken as a fact. The *Policon* model is intrinsically resistant to Continuity Bias due to the structure of the algorithm and the way it uses historical information. Past actions

and trends merely provide the starting input variables for each actor. The model does not have a mechanism for representing the influence of memories of past alliances, actions, or events. For example, trend analysis might look at two factions and assert that, their consistent antagonism towards each other will lead to future opposition. Such a prediction may ultimately prove true. But, trend analysis tends to react very slowly to change. The large number of data points in the past tends to outweigh present factors. *Policon* simulations test each possible outcome independently and may show those same two factions supporting the same, winning, compromise outcome. This possibility of discontinuous outcomes mitigates the continuity bias.

*Policon* also offers significant resistance to Anchoring Bias. Anchoring bias results from the initial formulation of a context. Initial conditions tend to dominate predictions developed by modifying an initial hypothesis with new data.<sup>19</sup> In other words, new information does not influence the outcome as much as it objectively should. *Policon* does not require the analyst to develop a hypothesis for the prediction. Instead, the analyst sets up the model and the conditions, then calculates a prediction without forming a hypothesis. Consequently, using the model mitigates Anchoring Bias by removing the mechanisms that facilitate it.<sup>20</sup> In order to inject an Anchoring Bias, an analyst would have to revise the other inputs and re-run the model to uphold an original position. This type of behavior should trigger self-inspection.

*Policon* facilitates the evaluation of numerous alternatives in two different ways. First, the model itself calculates the support for every potential outcome within its range, not just those favored by specific groups.<sup>21</sup> This should be compared to the Analysis of Competing Hypotheses (ACH) method, a popular method in predictive intelligence analysis. Mechanically, it tests the available information, against a set of hypotheses. Only the amount of work required to produce each assessment limits the number of potential outcomes that can be evaluated.<sup>22</sup>

Analysts using the ACH method typically assess three to five cases; worst-case, best-case, and a few in between. Second, the *Policon* model also allows analysts to easily and impartially consider numerous “what if” scenarios. Variables can be adjusted, in a controlled manner, and the model re-run to quickly assess the impacts of variance changes, e.g. actors losing power, an issue gaining salience, etc.

Using *Policon* to frame a line-of-analysis can help make assumptions explicit. If the analytical team documents their rationale for assigning values, it codifies their assumptions. Additional rigor, in compliance with the CIA’s analysis guide for *Assumption Checking*, can be achieved by two means.<sup>23</sup> First, a series of comparisons of each actor can be made, relative to each other, to confirm the team’s opinion on the relative power and salience rankings, i.e. is actor ‘A’ really 20% more powerful than actor ‘B’ on this issue? Why do the analysts think that? Second, the model allows for sensitivity analysis of the predictions, which may be instrumental in identifying the critical actors to change the outcome. From a political intelligence perspective, the process of conducting the rack-and-stack itself may be more valuable than the model’s prediction.

Naturally, using a model to aid analysis is not a panacea. Before using any model, an analyst must consider a series of questions. First, does the model correlate well with the system being modeled? Second, is there sufficient validated information to feed into the model? Third, does the model itself create new biases or cognitive traps? All three of these risks affect the *Policon* model.

The *Policon* algorithm is fundamentally based on the idea that the position with the most support will be the outcome. This correlates well with a hypothetical multi-party negotiation. But, political positions are not always freely negotiated. For instance, the Supreme Ayatollah of

Iran has ultimate control of foreign policy. Even a majority of the political power blocs in Iran supporting a position does not ensure that the Ayatollah will pursue it. In his work on North Korea, Bueno de Mesquita admits as much.<sup>24</sup> The model must be applied to systems where free negotiations occur. For example, an internal issue that has been delegated to the Iranian Majlis to resolve may be a good candidate for the model. Presumably, a delegated issue will not draw a veto from the Supreme Ayatollah.

All models require good data. But, the truism of, “garbage in, garbage out,” applies acutely to *Policon* because it requires the distillation of an unusually large amount of information into merely three input variables. The vast majority of the work and judgment goes into constructing the model. The collection, validation, interpretation, and fusion of the factors that determine an actor’s preferred outcome, power, and salience, constitutes “doing the analysis” for any method.

If presented with intellectual integrity, the Game Theory approach does offer analytical benefits. *Policon* can be described as a modeling tool that rides on top of an analytical effort. However, Bueno de Mesquita, prefers the wholesale outsourcing of responsibility for the inputs. Regarding this laborious process, he argues that,

“Luckily, there is a more efficient way to get the information—ask the experts. It is that simple. Experts have invested years in learning a place’s culture, language, and history. They follow the intimate political details that go on in the area they study. If anyone knows who will try to shape decisions, how influential those people can be, where they stand, and how much they care about an issue, it is the experts. Come to think of it, isn’t knowing this information what it means to be an expert?”<sup>25</sup>

While no one would fault the idea of consulting with experts as a research strategy, his delivery glosses over the critical synthesis step, where the analyst translates those “expert opinions” into numerical values. Clearly, practitioners of *Predictioneering* must take more care with the underlying data and its transformations than the marketing department does with its messaging.

Presupposing that the analyst has selected a system that correlates well with the model, collected and validated the data, then carefully transformed his or her understanding into numerical values, *Policon* faces one more challenge that is specific to this form of modeling. Humans understand the world in a story-based framework. The simple human preference for an explanation to make a “good story” results in Narrative Bias.

The probability of a Narrative Bias is proportional to the amount of interpretation required for a process. *Policon* requires a lot of interpretation. The analyst contrives and orders the range of possible outcomes. He or she also sets the four major variables: *Power*, *Preferred Outcome*, *Salience*, and *Utility* equation. Finally, simply explaining the outcome requires a degree of story-telling. The model only produces a spreadsheet full of numbers, which the analyst must express in terms of political outcomes. People generally accept a prediction explained in narrative form much more easily than an abstract numerical score.

Bueno de Mesquita gives us a great example of Narrative Bias in his explanation of the data from his TED Talks interview. “...we get to a stable equilibrium outcome...it's probably an equilibrium that the United States can live with...Iran will achieve that nationalist pride by making enough weapons-grade fuel...so that they could show that they know how to make weapons.”<sup>26</sup> In a 20-second explanation, Bueno de Mesquita has injected, by way of explanation, a significant narrative based upon his own value-judgments that did not derive from

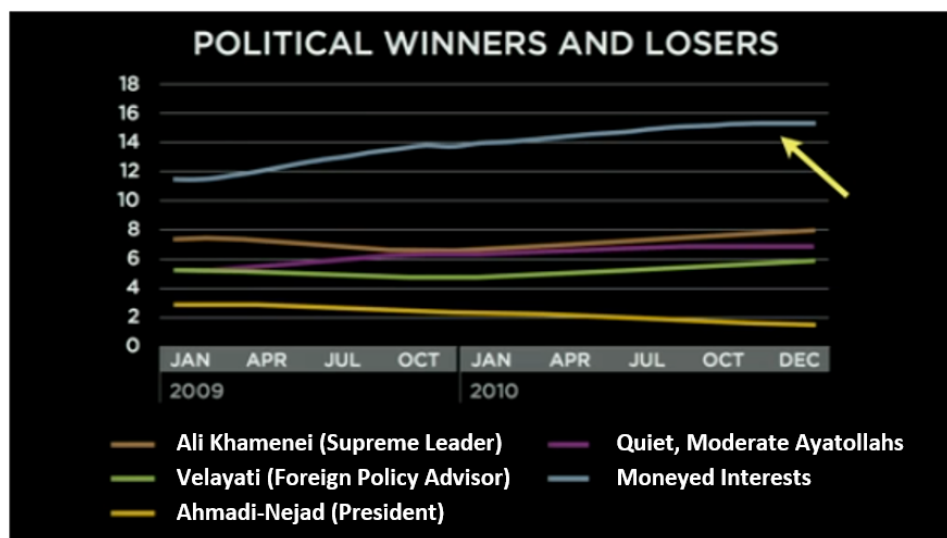
the model. The model merely found an equilibrium point indicating that there was more support for the option of “produce enough weapons-grade fuel for research” than any other option in the range. The explanation provided no information about the US’s ability to accept that outcome or about the importance of Iran’s national pride in relation to their nuclear program. Bueno de Mesquita has injected his own storytelling vision to build the audiences confidence in his predictions.

Ultimately, *Policon* analysts should bear in mind that *Policon* is a tool, like any other. It helps an analyst structure information and evaluate possible outcomes. But, it also suffers from the usual limitations of modeling and especially from the quality of the information that goes into it. Analysts should not expect that the model will work effectively in all situations. Therefore, they must carefully select the problems to which they apply it.

### **Assessment of Predictions**

This review of the *Policon* model itself and Bueno de Mesquita’s claims of accuracy lead to the conclusion that Game Theory modeling serves only as another tool in the analyst’s toolbox. But, his TED Talk predictions also provide an opportunity to assess his implementation of the tool. In the hands of a strong practitioner, it can produce good results.

In his TED Talk, Bueno de Mesquita stated that he would assess President Ahmadinejad’s power-base. While he does not provide details regarding the exact method of calculation, he clearly employs a more complex version of Game Theory analysis than the *Policon* model. In Figure 4, extracted from his presentation, major political factions are shown gaining and losing power over time.



**Figure 4. TED Talks: Political Winners and Losers**

This prediction offers two important take-aways. First, President Ahmadinejad has much less power than most Americans might assume. All of the other factions portrayed in the chart hold more power than he does. Also, his predicted loss of power primarily benefits the moneyed interests: the bankers, the oil people, and the bazaaries.<sup>27</sup>

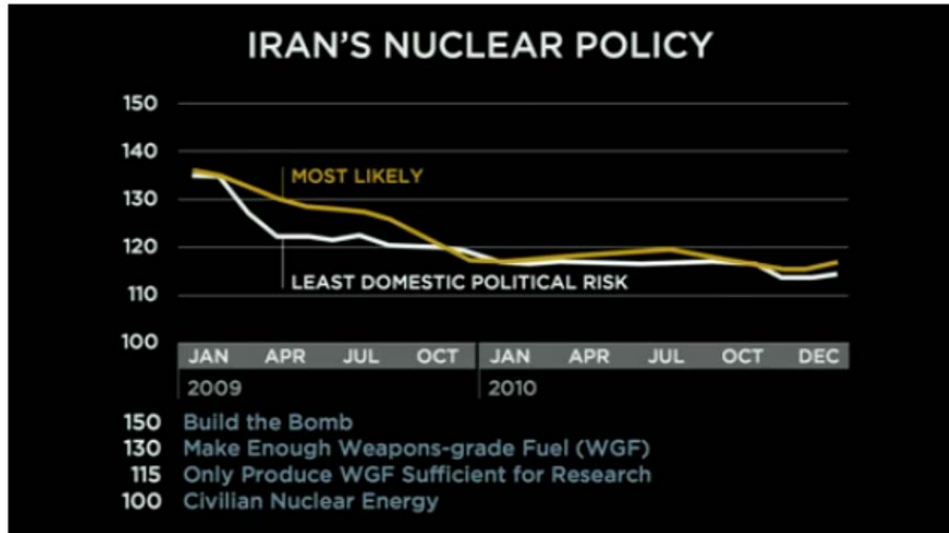
The most visible signals of Ahmadinejad's waning power occurred beyond the prediction's timeline. In May of 2012, his faction did not fare well in the Parliamentary election, securing 43 of 290 seats. The largest faction, led by Ali Larijani, one of Khamenei's allies, took 98 seats. This shift in power in the Majlis made his last two years in office much more difficult politically. Prior to the elections, the Majlis had already taken action to undermine him. The Majlis stripped the Presidency of oversight authority of state-owned energy assets and banks. The Majlis also initiated legal proceedings against several of his appointees.<sup>28</sup> Additionally, over the last two years of his Presidency, the Iranian press reported several direct confrontations between Khamenei and Ahmadinejad.<sup>29</sup>

This predicted loss of power also played out in the 2013 elections, wherein Hasan Rouhani defeated Ahmadinejad's favored successor.<sup>30</sup> After Ahmadinejad stepped down from

the Presidency, Khamenei appointed him to the Expediency Council, a body designed to mediate disputes between the Majlis, or parliament, and the President. Ahmadinejad will have to recognize the leadership of the head of this council, ex-president Akbar Hashemi Rafsanjani, who has regularly criticized Ahmadinejad's political and economic policies in the past.<sup>31</sup> Ahmadinejad has little prospect of wielding significant influence in that position.

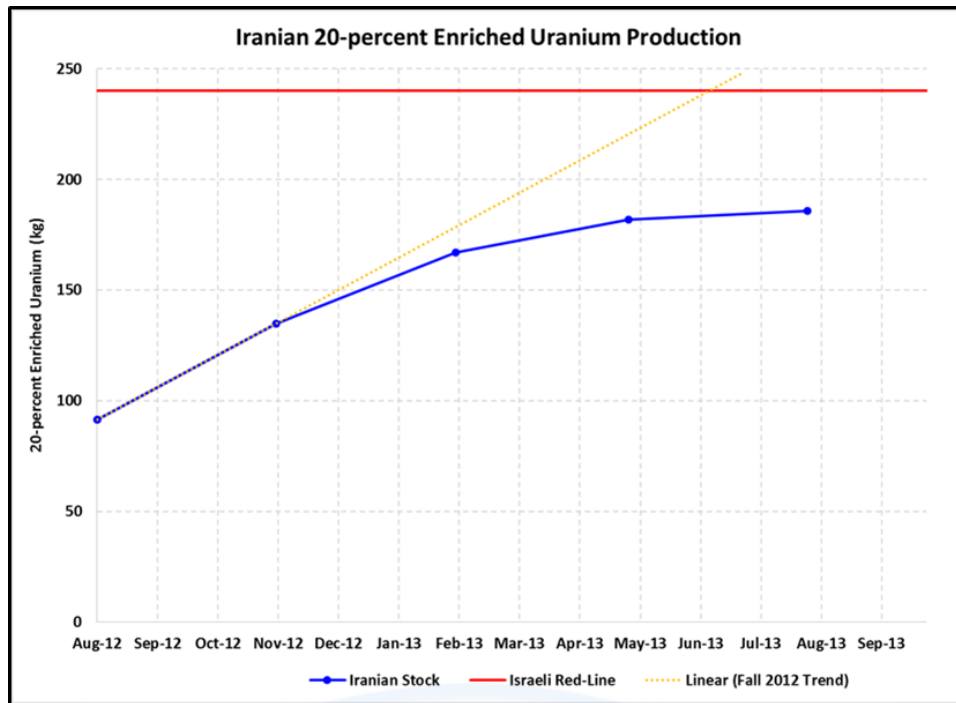
Ahmadinejad also appears to have recognized his declining political fortunes and made provisions for a less prominent role. In fact, it appears that he created a "landing pad" for himself and his supporters, prior to leaving office. He applied for permission to establish a University in Tehran in 2010. He then proceeded to staff it with co-workers and supporters including: Shamsaddin Hosseini, ex-minister of economy and finance; Hamid Baghaei, ex-head of the Iranian presidential administration; and Behrouz Moradi, ex-vice president of planning. As one of his last acts as President he apparently moved \$6.45 million from a Presidential bank account to a university. However, later reports claimed that the University returned the money after his opponents initiated an investigation.<sup>32</sup> All of this supports the conclusion that Ahmadinejad's power has waned considerably.

Bueno de Mesquita's also predicted the end-point of the Iranian nuclear program. For this prediction, he began by establishing a sequential range of objectives that Iran could pursue. He then assessed some combination of support and risk for each option across the full gamut of stakeholders including the United States, the International Atomic Energy Agency (IAEA), and a host of domestic power blocks. His model predicted that, over a two year period, moderate elements would exercise sufficient influence to undermine support for a nuclear weapons program and stabilize on a civilian program, see Figure 5.<sup>33</sup> This would maintain Iranian prestige, while gradually retreating from Ahmadinejad's bellicose rhetoric.



**Figure 5. Iran's Nuclear Policy**

Monitoring the amount of uranium that Iran has enriched to 20% purity provides one of the few empirical indicators of the status and direction of the program. The Iranians have continued to enhance their capability and capacity to refine uranium. However, they have slowed their actual rate of production, see Figure 6. Had production continued at the same rate as in the fall of 2012, the Iranians would have breached the threshold established by the Israelis in June of 2013.<sup>34</sup> Unfortunately, this action does not necessarily indicate a policy shift. Iran may simply not want to provoke an international reaction until they possess and can assemble all of the elements for building an employable weapon.



**Figure 6. Iranian Uranium Enrichment**

Overall, the program appears to be functioning consistently with Ahmadinejad’s successor’s policies. Iran continues to buy time for their program, e.g. not pushing the Israeli red-line, while maintaining their claims of only pursuing peaceful purposes. This does not necessarily represent a change in objective. All policies ultimately originate with Ayatollah Khamenei. Rouhani does not have the authority to actually change Iran’s nuclear policy, regardless of how much dialogue he conducts. Until Khamenei’s public position changes on the issue, Iran appears content to stroll towards nuclear capability, at least publicly.<sup>35</sup>

In hind sight, Bueno de Mesquita failed to accurately predict Iran’s nuclear policy. But, he did manage to predict the program’s actions. Even though Iran did not alter its policies, some of the forces that were considered in the analysis did impact their actions. While he did not “hit the bulls-eye,” the prediction would have effectively informed mid-range decision making. That is still useful predictive analysis.

## Conclusion

Ultimately, Game Theory models, such as *Policon*, provide analysts with effective tools to structure their analysis and offer an alternative to trend-based methods. The method offers superior capability to predict discontinuous events, mitigates anchoring bias, and enables the rapid evaluation of alternatives. But, its use must be restricted to problems wherein the participants can freely negotiate the outcome to the limits of their power. Despite Bueno de Mesquita's exaggerated claims of accuracy, he demonstrated the ability to use the model effectively in his predictions.



## Endnotes

- <sup>1</sup> H. Bradford Westerfield, ed. *Inside Cia's Private World: Declassified Articles from the Agency's Internal Journal, 1955-1992*. (3rd ed. London: Yale University Press, 1995), 277.
- <sup>2</sup> Westerfield, *Inside CIA's Private World*, 279.
- <sup>3</sup> Bruce Bueno De Mesquita, *The Predictioneer's Game: Using the Logic of Brazen Self-Interest to See and Shape the Future* (New York: Random House Trade Paperbacks, 2010), 17.
- <sup>4</sup> James Johnson, "What Rationality Assumption? Or, How 'Positive Political Theory' Rests on a Mistake" *Political Studies* 58, no. 2 (March 2010): 282-299. *Academic Search Premier*, EBSCOhost (accessed October 15, 2013), 291.
- <sup>5</sup> Bueno De Mesquita, *The Predictioneer's Game*, 71.
- <sup>6</sup> James Johnson, "What Rationality Assumption? Or, How 'Positive Political Theory' Rests on a Mistake", 291.
- <sup>7</sup> Westerfield, *Inside CIA's Private World*, 277.
- <sup>8</sup> Thiessen, Walt. *Welcome to the Nolan Chart*. Available online from: <http://www.nolanchart.com/article101-welcome-to-the-nolan-chart.html>. (Accessed November 12, 2013).
- <sup>9</sup> Westerfield, *Inside CIA's Private World*, 277.
- <sup>10</sup> Westerfield, *Inside CIA's Private World*, 277.
- <sup>11</sup> Westerfield, *Inside CIA's Private World*, 281.
- <sup>12</sup> Westerfield, *Inside CIA's Private World*, 279.
- <sup>13</sup> Bruce Bueno De Mesquita, *The Predictioneer's Game*, xix.
- <sup>14</sup> Westerfield, *Inside CIA's Private World*, 274.
- <sup>15</sup> Westerfield, *Inside CIA's Private World*, 275.
- <sup>16</sup> Bueno De Mesquita, *The Predictioneer's Game*, 51.
- <sup>17</sup> Westerfield, *Inside CIA's Private World*, 275.
- <sup>18</sup> Westerfield, *Inside CIA's Private World*, 276.
- <sup>19</sup> Cottam, M.L., E. Mastors, T. Preston, and B. Dietz-Uhler. *Introduction to Political Psychology*. New York: Psychology Press (2010), 83.
- <sup>20</sup> Westerfield, *Inside CIA's Private World*, 276.
- <sup>21</sup> Westerfield, *Inside CIA's Private World*, 276.
- <sup>22</sup> Roger Z. George and James B. Bruce, eds., *Analyzing Intelligence: Origins, Obstacles, and Innovations* (Washington D.C: Georgetown University Press, 2008), 252-256.
- <sup>23</sup> Central Intelligence Agency. *A Tradecraft Primer: Structured Analytic Techniques for Improving Intelligence Analysis*. (US Government, 2009), 7.
- <sup>24</sup> Bueno De Mesquita, *The Predictioneer's Game*, 59.
- <sup>25</sup> Bueno De Mesquita, *The Predictioneer's Game*, 51.
- <sup>26</sup> Bruce Bueno de Mesquita. TED Talks. Interview. Available online from: [http://www.ted.com/talks/bruce\\_bueno\\_de\\_mesquita\\_predicts\\_iran\\_s\\_future.html](http://www.ted.com/talks/bruce_bueno_de_mesquita_predicts_iran_s_future.html). Accessed on 25 Nov 2013.
- <sup>27</sup> Bueno de Mesquita. *TED Talks*.
- <sup>28</sup> "Iran: Implications of Ahmadinejad's Parliamentary Defeat." *Stratfor Analysis* (May 2012): 34. *Business Source Complete*, EBSCOhost (accessed October 28, 2013).
- <sup>29</sup> Ramin Ahmadi, "Tensions in Tehran." *World Affairs* 176, no. 3 (September 2013): 35-40. *Academic Search Premier*, EBSCOhost (accessed October 15, 2013), 39.
- <sup>30</sup> Central Intelligence Agency. "World Fact Book: Iran Government," Available online from: <https://www.cia.gov/library/publications/the-world-factbook/geos/ir.html>. Accessed on 3 Nov 2013.
- <sup>31</sup> "Ahmadinejad Appointed to Top Iran Council," *Al Jazeera*, 5 Aug 2013. Available online from: <http://www.aljazeera.com/news/middleeast/2013/08/201385134040912530.html>. Accessed on 3 Nov 2013.
- <sup>32</sup> N. Umid. "Iranian Ex-President's University Proves Legal Status, Showcases Official License Online," *Trend*, 30 Oct 2013. Available online from: <http://en.trend.az/regions/iran/2206400.html>. Accessed on 3 Nov 2013.
- <sup>33</sup> Bueno de Mesquita. *TED Talks*.
- <sup>34</sup> Broad, William J. *Iran Slows Its Gathering of Uranium, Report Says*. New York Times online. Available online from: <http://www.nytimes.com/2013/08/29/world/middleeast/iran-slows-its-gathering-of-uranium-report-says.html?ref=world>. Accessed on 17 Nov 2013.
- <sup>35</sup> Abbas Milani, "The Biggest Mystery in Tehran." *New Republic* 244, no. 16 (October 7, 2013): 7-9. *Academic Search Premier*, EBSCOhost (accessed October 28, 2013).

## BIBLIOGRAPHY

- Ahmadi, Ramin. "Tensions in Tehran." *World Affairs* 176, no. 3 (September 2013): 35-40. *Academic Search Premier*, EBSCOhost (accessed October 15, 2013).
- "Ahmadinejad Appointed to Top Iran Council," *Al Jazeera*, 5 Aug 2013. Available online from: <http://www.aljazeera.com/news/middleeast/2013/08/201385134040912530.html>. Accessed on 3 Nov 2013.
- Broad, William J. "Iran Slows Its Gathering of Uranium, Report Says." *New York Times Online*. Available online from: <http://www.nytimes.com/2013/08/29/world/middleeast/iran-slows-its-gathering-of-uranium-report-says.html?ref=world>. Accessed on 17 Nov 2013.
- Central Intelligence Agency. *World Fact Book: Iran Government*. Available online from: <https://www.cia.gov/library/publications/the-world-factbook/geos/ir.html>. Accessed on 3 Nov 2013.
- Central Intelligence Agency. *A Tradecraft Primer: Structured Analytic Techniques for Improving Intelligence Analysis*. US Government, 2009.
- Cottam, M.L., E. Mastors, T. Preston, and B. Dietz-Uhler. *Introduction to Political Psychology*. New York: Psychology Press (2010).
- George, Roger Z., and James B. Bruce, eds. *Analyzing Intelligence: Origins, Obstacles, and Innovations*. Washington D.C: Georgetown University Press, 2008.
- "Iran: Implications of Ahmadinejad's Parliamentary Defeat." *Stratfor Analysis* (May 2012): 34. *Business Source Complete*, EBSCOhost (accessed October 28, 2013).
- Johnson, James. "What Rationality Assumption? Or, How 'Positive Political Theory' Rests on a Mistake." *Political Studies* 58, no. 2 (March 2010): 282-299. *Academic Search Premier*, EBSCOhost (accessed October 15, 2013).
- Mesquita, Bruce Bueno De. *The Predictioneer's Game: Using the Logic of Brazen Self-Interest to See and Shape the Future*. New York: Random House Trade Paperbacks, 2010.
- Milani, Abbas. "The Biggest Mystery in Tehran." *New Republic* 244, no. 16 (October 7, 2013): 7-9. *Academic Search Premier*, EBSCOhost (accessed October 28, 2013).
- Thiessen, Walt. *Welcome to the Nolan Chart*. Available online from: <http://www.nolanchart.com/article101-welcome-to-the-nolan-chart.html>. (accessed November 12, 2013).
- Umid, N. "Iranian Ex-President's University Proves Legal Status, Showcases Official License Online," *Trend*, 30 Oct 2013. Available online from: <http://en.trend.az/regions/iran/2206400.html>. Accessed on 3 Nov 2013.

Westerfield, H. Bradford, ed. *Inside Cia's Private World: Declassified Articles from the Agency's Internal Journal, 1955-1992*. (3rd ed. London: Yale University Press, 1995)

