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THESIS

PREDICTIVE FACTORS IN CONFLICT: ASSESSING THE LIKELIHOOD OF A PREEMPTIVE STRIKE BY ISRAEL ON IRAN USING A COMPUTER MODEL

by

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March 2013

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ABSTRACT

The ability to predict the likelihood of conflict between two states based primarily on extrinsic factors is an arduous task, particularly given the complicated nature of analysis required and the large number of input factors involved. However, the benefits that may be gained from such an evaluation could reveal valuable insights for a decision-maker if seemingly small factors exhibit a large impact on a state's prospect or ability to take action. A software model can be used to address the problem of aggregating and analyzing the information available to make a graphical model that facilitates quantitative analysis between different factors that are linked together. This thesis will look specifically at the elevating tensions between Israel and Iran with such a model to estimate whether the known factors can lend information to forecast the prospect of action by Israel as the two nations reach thresholds for combat. Specifically, this work will account for factors that would likely be present and perhaps predictive of Israel making a preemptive strike on Iran. The objective will be to create a product that can be used by an intelligence analyst as a briefing tool and to gauge its effectiveness as potential decision-making aid for commanders.

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LIST OF ACRONYMS AND ABBREVIATIONS

CAST	Causal Strengths
CNO	Computer Network Operations
COA	Course of Action
COCOM	Combatant Command
EUCOM	European Command
GCC	Gulf Cooperation Council
HEU	High-Enriched Uranium
IAEA	International Atomic Energy Agency
IAF	Israeli Air Force
IDF	Israeli Defense Force
IO	Information Operations
LEU	Low-Enriched Uranium
MISO	Military Information Support Operation
NPT	Non-Proliferation Treaty
OSINT	Open Source Intelligence
SAFF	Safing, Arming, Fuzing, Firing
SIAM	Situational Influence Assessment Module
SME	Subject-Matter Expert
SWU	Separative Work Unit
U.N.	United Nations

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I.   INTRODUCTION

A.   PROBLEM STATEMENT

In today's age, nearly every country in the world is influenced by conflict that befalls two nation states. Whether the ramifications are merely far-removed economic effects or as impactful as direct action resulting in the loss of lives, there is unquestionably a range of consequences that may ensue as an outcome of hostilities. That said, the likelihood of those consequences increases greatly as a country is more tied into the affairs of the world, both politically and economically. Those effects are further increased given the reality that many countries are obligated to come to the collective defense of other nations under a host of treaty agreements in place today. This fact alone will likely ensure that dominant nations keep a watchful eye on budding disputes between states around the world. With that in mind, the ability to forecast conflict is invaluable in a state's strategic decision-making, posturing, and planning.

As one looks at the process of predicting the likelihood of conflict occurring, the process is rife with potential impediments stemming from the multitude of input factors involved, not to mention the complicated nature of the analysis. Any evaluation process would be an arduous one, with that difficulty amplified by the unfortunate fact that analysts may only have open-source or extrinsic information at their disposal to work the problem. In looking at factors that get fed into such a decision-making process, especially when related to the use of force, a challenging problem set is created in attempting to both aggregate the mass of data and to provide a relatively simple process for evaluation. This is especially onerous when most of the input variables are based on qualitative factors to look at how each may come together to influence the effects on a wholly inclusive outcome.

In the case of discord between two specific states, there must be elements present that drive one or both of the respective governments to take action. Assumed as fundamentally rational actors, history tells us time and again that particular factors are repeatedly present on the road to war. In taking preemptive actions, generally a number

of preconditions are first met, which one may be able to gauge and enumerate as precursors leading up to action. The problem is that, while these factors can be identified and analyzed, there is difficulty in bringing the data together and organizing those factors in an explicable manner such that one can draw a reasonable conclusion regarding the overall status of the potential conflict. For example, if a small regional alliance changes, how does this impact the overall statement that a state is more or less likely to take action when compared to all other factors? This problem can be dealt with using software that aggregates the different factors and links them together in a Bayesian-based *influence net*.

B. OBJECTIVES

This thesis will focus on using a computer model to assess and aggregate the factors that will likely be present in a conflict between two states to forecast how those factors (and changes in those elements) may impact the likelihood of one state taking action against the other. The work will look specifically at the conflict between Israel and Iran and the dynamics involved in their dealings to envisage the likelihood that Israel will conduct a preemptive strike on Iran.

The model will utilize the Situational Influence Assessment Module (SIAM) modeling software to enable the creation of a graphical model to facilitate analysis of various factors and to allow a quantitative analysis between the dynamic elements involved. The aim will be to isolate individual indicators that may collectively impact a state's decision to take action and to tie each of those indicators together to show the causal relationship by which one factor may change the overall likelihood that action will be taken. By enumerating individual factors and assessing each as it may impact the entire model, an influence net can be formed that results in a holistic product capable of yielding a simplistic output to a relatively complex problem set. The advantage to this approach is that once the model is created, a military intelligence analyst can make changes to individual nodes, and can concentrate on the accuracy and validity of the individual nodal statement, without worry as to how that one change will impact the overall complex system.

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The potential benefit of modeling conflict in this manner is an output that allows decision-makers another tool to estimate the impact of changes among multiple causal factors to judge the status of the impending conflict. This information can be used as a situational awareness tool or factors can be altered based on potential courses of action and excursions can be run within the model to see how different factors may affect the overall situation. Those runs of the model can potentially be used to support strategy towards avoiding conflict (if that is the goal) by way of controlling nodes through policy decisions and other influence factors that our forces are capable of impacting. In looking at the Israel-Iran conflict specifically, there is also a benefit to the European Command (EUCOM) Information Operations Cell, whose leadership has expressed interest in a modeling product as a tool in assessing the current state of affairs and how changes may affect the current enmities. While the product produced may be a framework for modeling conflict in general, the near-term objective is to produce a model that provides a simplistic input and a single output to provide a snapshot based on those inputs and to allow for excursions to provide possible chains of events that may occur based on what-if scenarios posed by a Combatant Command (COCOM) staff.

C.   BRIEF EXPLANATION OF METHODOLOGY

In creating a SIAM model of this type, there are three main phases of development that will be completed before running the program and any excursions. The first is the creation of the general model architecture, starting with the root statement that is being assessed. In this case, the root statement is: Israel will execute a preemptive strike on Iran. From there, different nodes will branch off to support or inhibit the root strength as will be outlined in Chapter II. The key method for devising the nodes that feed into the model will stem from case studies and literature on historical factors present in earlier conflicts. Primarily, those factors will look at fighting that has erupted in the Middle East over the past fifty or so years and conditions present in any Israeli wars. Additionally, literature on why nations go to war and decision that led others to avoid it will be referenced to build a list of questions that may be asked in reference to the current strife between Israel and Iran for their applicability.

The second phase will involve looking at the links between the nodes to assign strengths between the statements. This portion essentially involved taking qualitative factors and assigning them quantitative values to influence the *net* that is built. The primary source for assigning these values will be with reference to the same literature used to come up with the nodes, but also by consulting subject-matter experts (SME) that are familiar with both the countries involved and the current conflict. Assigning link strengths is really what comprises up the *meat* of the model and will be somewhat of a subjective process. That said, the general consensus on those factors will be used to generate the Causal Strengths (CAST) Logic for SIAM and will ultimately lead to the output based on initial inputs.

The final phase will involve answering the initial nodes for the model. These will be true or false statements, and although most may be answerable with open-source research, these statements may also require SME input. Ideally, intelligence analysts working for the COCOM, who are able to inject the model with more accurate information from a wider range of collective intelligence and classified information at their disposal, will eventually provide this input. Once this is complete, a few excursions will be done based on possible link strength scenarios and assessments will be performed to see what the key pressure points are in impacting the likelihood of a strike.

D.   THESIS STRUCTURE

Six chapters and three Appendices compose this thesis. Chapter I is an introduction and outlines the problem statement and objective of the work done. Chapter II, taken largely from Rosen and Smith, includes a background of the SIAM modeling software to include the basics of the model structure and the outputs available from the completed model. Chapter III discusses the methodology used for research, specifically the resources used for assigning values to the link strengths within the model. Chapter IV displays the top two levels of the Iran-Israel model including nodal analysis for runs of the model based on likely scenarios. Chapter V includes assessments of the model once complete with built-in SIAM analysis tools to isolate key factors within the model for decision-making. Chapter VI includes conclusions based on the model, suggestions for its

use and employment in potentially guiding policy decisions, and recommendations for future applications and research involving computer-based models of this type. Appendix A includes the initial node questions that must be answered to run the model. Appendix B includes the entire link strengths matrix used between nodes in the model from top to bottom. Appendix C includes the visual depiction of the model for an overall general sense of how different factors are connected and to show lower level factors that were not addressed in either Chapter IV or the list of initial nodes in Appendix A.

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II. BACKGROUND

An influence net is a graphical model that depicts a group of events and the causal relationships between them to assess how they relate and influence one another. The technique of constructing such a model combines two established methods of decision analysis: Bayesian inference net analysis typically employed by the statisticians and influence diagramming techniques used by operations researchers. [1]

A. SIAM

SIAM is a robust software tool designed specifically for the creation of influence nets. The program facilitates this process with a simplified graphical user interface for easily organizing a complex set of factors and linking together statements that impact each other. Networks created in SIAM can then be used to identify important issues, actions, or factors that can and do influence a specific outcome in the model.[2] SIAM uses Bayesian probability techniques among the links to assess the relationship factors once the model is constructed, which yields a probabilistic vice deterministic result. As different factors are changed in the model, the overall outcome changes, which allows for decision-makers to *wargame* scenarios. This allows them to not only determine the possible outcomes of a course of action (COA), but also unintended consequences that reverberate throughout the net with seemingly small changes that are made. While traditional wargaming involves an adversarial element of a staff, or a *Red Cell*, to assess possible actions and reactions, a SIAM influence net provides a different type of wargaming in that link strengths within the model will generally be vetted through subject matter experts (SMEs) for the particular scenario as opposed to a staff that may lack expertise and may not be able to consult the experts with each iteration of a possible COA.

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[1] Julie A. Rosen and Wayne L. Smith, "Influence Net Modeling with Causal Strengths: An Evolutionary Approach," Proceedings of the 1996 Command and Control Research and Technology Symposium (Monterey: 1996), accessed 17 December 2012, http://www.inet.saic.com/docs/_docs_/math.pdf.

[2] Bradd C. Hayes and Jeffrey I. Sands, "Understanding and Using SIAM," Naval War College, accessed 17 December 2012, http://www.au.af.mil/au/awc/awcgate/modeling/usesiam.doc.

In building a SIAM model, a root statement is made and then causal nodes are connected to the root statement that have the most immediate overarching effect on the possibility of that root statement being true or false (Figure 1). From that point forward, additional nodes are added down the model and the number of influencing factors increases as is needed to assess the problem and to adequately address each node above it.
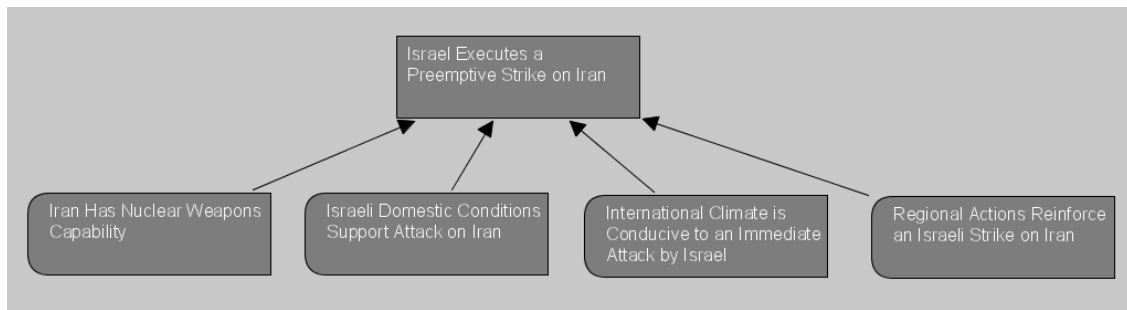
Figure 1.   Graphical Representation of the Root Level of the Model.

B.   SIAM NODES

The most basic element in the influence net is the node, which can be an event or idea that influences the issue. Each node is placed into the model on a level in relation to another node and connected by a link (described in Chapter II, Section C). The problem to be evaluated is called the root node and is referred to as the top level, or Level 1 of the model. The connected nodes are either parent nodes, which are causes, or child nodes, which are effects, all of which sit below the root node. At the lowest level of the model are initial nodes. These are the only nodes where the user enters data once the model is constructed and they should be basic true or false statements. Those parent nodes influence all of the nodes above them up to the root statement. It is important to note that the nodes in the middle levels of the model serve as both parent and child nodes. For example, a level three node in a four level model may have three initial nodes feeding into it and it also may be one of two feeding into a level two node. Thus, it is the child for the level four nodes feeding it and a parent feeding into level two. The Iran-Israel model has four primary levels of nodes that lead up to the root.

When a node is built, it is a sub-statement that is ultimately an assertion that would directly affect the node above it. Thus, the node is populated with a description and comments to ensure the user populating the initial node knows exactly what is being assessed. If it is the initial node, the user will also use a slider bar to classify his or her belief that the nodal statement is true or false (Figure 2). This will then trickle up to impact the slider bars automatically on all the levels between the initial node and the root depending on the link strengths between the created nodes.

Figure 2.   Node Property Window with Belief Value Slider.

C.   SIAM LINKS

The other fundamental elements in the model are the links that join nodes. These links effectively make up the inner logic of the model and are used to describe the causal relationship between two statements. Once the nodes are made, they are appropriately linked together and link properties are filled in as needed (Figure 3). The cause node is the parent and it is the premise for the link slider bars. The child node slider indicates the effect that the parent will have on it, depending on whether the statement is true or false. If the premise for the statement is considered true, the slider bar is adjusted to represent an estimate of how that would impact the likelihood of the child node being impacted. The same assessment is done to address the impact if the statement is false. In judging where the slider bar should fall, this is the key phase where a qualitative assessment is turned into a quantitative measurement to the software to feed into the model.

As slider bars are adjusted, nodes are termed as reinforcing or reversing. A reinforcing node describes a situation where, if the parent node is true, it will reinforce the child node. If a parent node is true and makes the conclusion less likely, the impact is a reversing one. Identifying nodes that have the most influence as far as reinforcing or reversing are vital to a decision-making process. They can isolate small causes that may end up creating large effects on the overall problem and that information can be leveraged in identifying priority intelligence requirements, in different planning phases, and in the wargaming process.
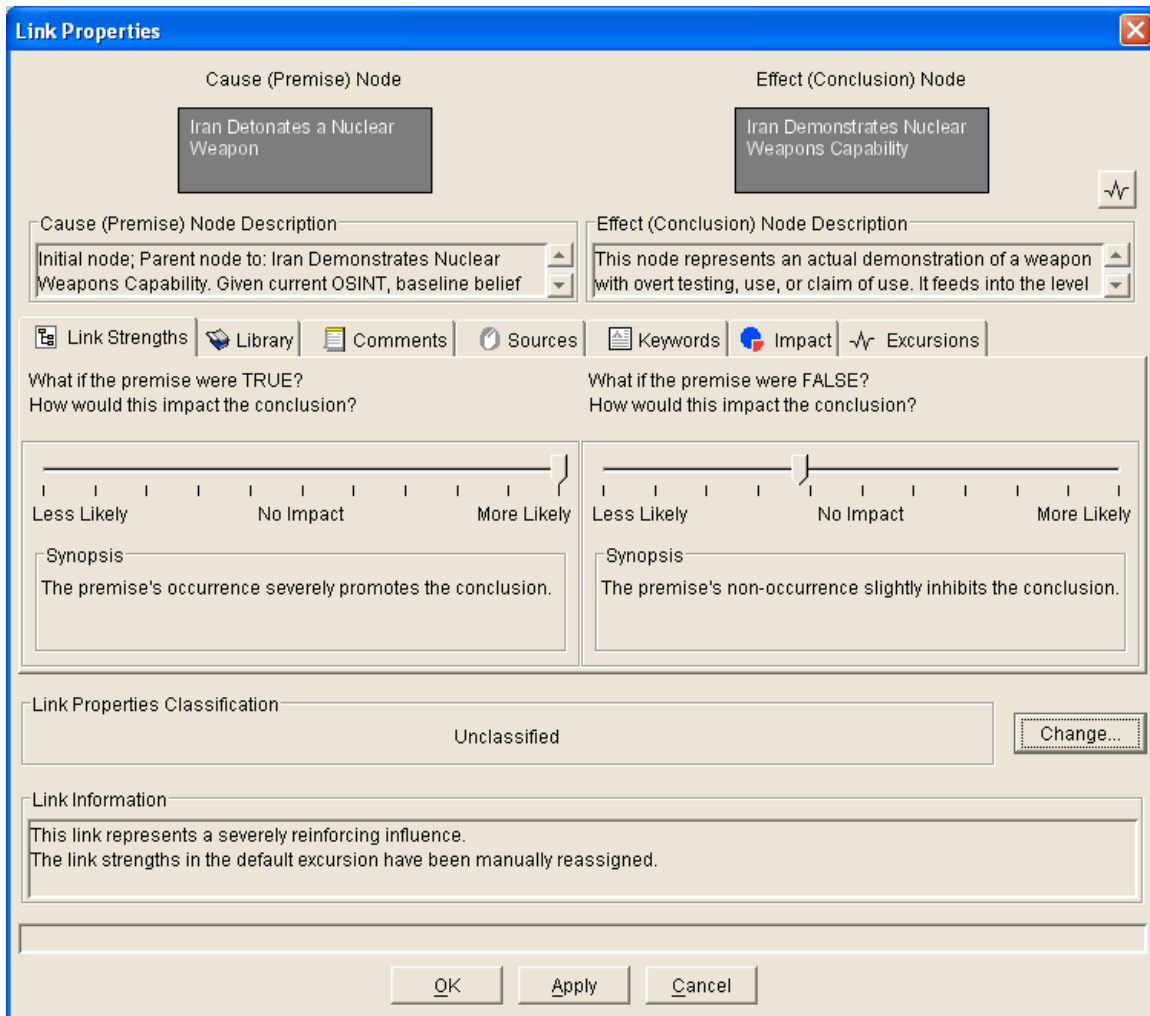
Figure 3.   Link Properties and Premise Slider Bars.

D.   SIAM BASICS

Once nodes are built and linked together, the model is ready to be run. Baseline beliefs need to be assigned for all of the initial nodes based on SME input for the initial run, which should be done in the initial build of the model based on conditions at that time. The SIAM program uses color to demonstrate the belief strength of each node. The colors are green and red, and the range in shades indicates how true or false, respectively, that the likelihood of each statement is. Both colors shade to gray as likelihoods approach an assessment that is less known. Thus, a statement with an extremely high likelihood would be bright green, and one that is calculated to be extremely false would be a bright red color. These colors are generated through the influence net propagation algorithm,

which is based completely on CAST logic (discussed below). Once a belief to the initial nodes changes, the statements can be adjusted as needed and the model can be run again. It is important to note that the model is not temporal in any way. It does not track changes to account for any of the statistical calculations nor does it have any kind of a built-in history. This precludes trend analysis unless the data is transferred outside of the model and also means that for the model to be accurate, the assumptions needs to be kept current.

E.   CAUSAL STRENGTH LOGIC

It is worth presenting a short background on causal strength logic to have an understanding of how the internal calculations are done within the model. While the statistics are relatively straightforward, the examples demonstrate how the chain of probabilistic nodes can get very complicated as the chained statements grow. Below is an explanation of the CAST logic. As stated, the model is based on Bayesian statistics. Bayesian statistical methods provide a paradigm for both statistical inference and decision-making under uncertain conditions. Bayesian statistics use the word probability in precisely the same sense in which this word is used in everyday language, as a conditional measure of uncertainty associated with the occurrence of a particular event—given the available information and the accepted assumptions. Thus, $\Pr(A|B)$ is a measure of belief in the occurrence of the event A under conditions B.
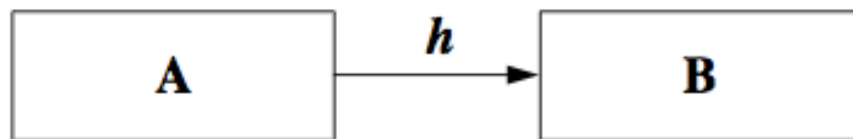
Figure 4.   Pairwise Influence Example.[3]

If Figure 4 were to represent two statements in an influence net and we were to follow the statement that if A were to occur, then B will result, then a third measure

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[3] Rosen and Smith, "Influence Net Modeling," 5.

should also be present to represent the strength of causality between A and B. This is denoted as h, which can be considered the probability of an event Z, where A and Z fully determine B.[4] For example, consider a case where event Z is the result of a *flipped* coin. If the coin lands *heads up* ($h = 1$), then it is certain that the occurrence of event A will result in event B; if the coin lands *tails up* ($h = 0$), then A's occurrence has no effect on event B.[5] Again, this cause-effect relationship assumes that there are no other events that can occur or influence this pair so, by itself, event A implies/causes event B's occurrence.[6] We must also account for the effect that the non-occurrence of influencing events may have on the outcome. That is to say, what is the chance that event B will occur anyway if A does not? To continue the coin flip analogy, consider a second coin flip, say event W, whose likelihood, denoted g, determines the probability of event B; if $g = 1$, then the absence of event A is certain to produce event B's occurrence; if $g = 0$, then event A's non-occurrence has no effect on the outcome of B.[7]

To look at this practically, we can turn to an example model involving a historical SIAM model dealing with the Iraqi incursion into Kuwaiti territory. Particularly, the influencing parameters around Iraqi leadership's decision to consider a peaceful withdrawal can be evaluated to better understand these causality arguments. Assuming pairwise causality in Figure 5, the truth in the statement "Hussein believes U.S. has resolved to liberate Kuwait" is assessed to cause the event "Saddam decides to withdraw from Kuwait peacefully" with a strength of h = 0.9. The numerical value given to h (on a minus one to plus one scale) indicates the assessment made by the modeler that there is a very high causal strength that, if Hussein believes the U.S. has the resolve to liberate Kuwait, he will very likely decide to withdraw. Conversely, if Hussein does not believe in the United States' resolve, then the causality value has a lesser strength of g = −0.1. The minus value here indicates that it is an inhibiting statement if the statement is false.

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[4] Ibid.

[5] Ibid.

[6] Ibid.

[7] Ibid.

That is to say that if Hussein does not believe in the U.S. resolve, then not only is he less likely to withdraw, but he is reinforced in his likelihood to keep forces in country.
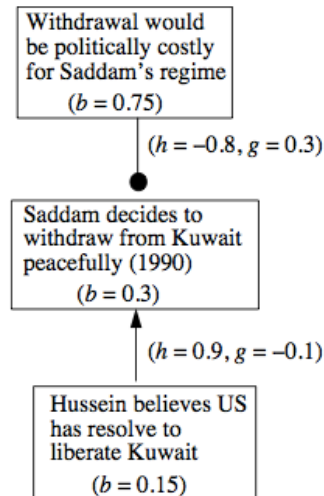
Figure 5.   Iraq Model Example CAST Parameters.[8]

The illustration in Figure 5 introduces two more concepts to the CAST logic construct, those being negative causal strengths for a true statement and baseline probabilities. When one states that an influence *inhibits* the occurrence of an event, the implication is that the likelihood of the effect occurring is inversely affected by the presence of that respective influence.[9] In the example of Figure 5, if the *parent* node (withdrawal would be politically costly for Saddam's regime) were true, then Saddam's decision to withdraw peacefully is unlikely to occur; specifically at a strength of h = −0.8.[10] It is important to note that if Hussein did not believe that withdrawal would be costly, then he still might consider withdrawal, but at a strength level of g = 0.3. Taken together, these two strength values imply that the overall influence of the political cost of withdrawal would inhibit Saddam's decision to withdraw from Kuwait.[11] Along with inhibiting events, the idea of a baseline probability is also seen with Figure 5. After

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[8] Rosen and Smith, "Influence Net Modeling," 6.

[9] Ibid.

[10] Ibid.

[11] Ibid.

identifying the cause-effect event pairs, the modeler assigns pairwise causal strengths to indicate the influence of the parent event by itself on the child event.[12] The cumulative effect of the modeled influences is calculated for each affected event in the *Influence Net.* However, unidentified influences must also be included. To account for these unidentified influences, the baseline probability of an event is the user-assigned assessment that the event would occur independent of the modeled influences in the net.[13] For example, all knowledge of the situation not explicitly included implies that the likelihood that Saddam will decide to withdraw from Kuwait is 30% (b = 0.3). Figure 6 depicts how the baseline is set with b_x as the baseline value to the statement.

X = *Saddam decides to withdraw from Kuwait peacefully.*
Y = *Hussein believes US has resolve to liberate Kuwait.*
Z = *Withdrawal would be politically costly for Saddam's regime.*

Positive Causal Strength

Negative Causal Strength
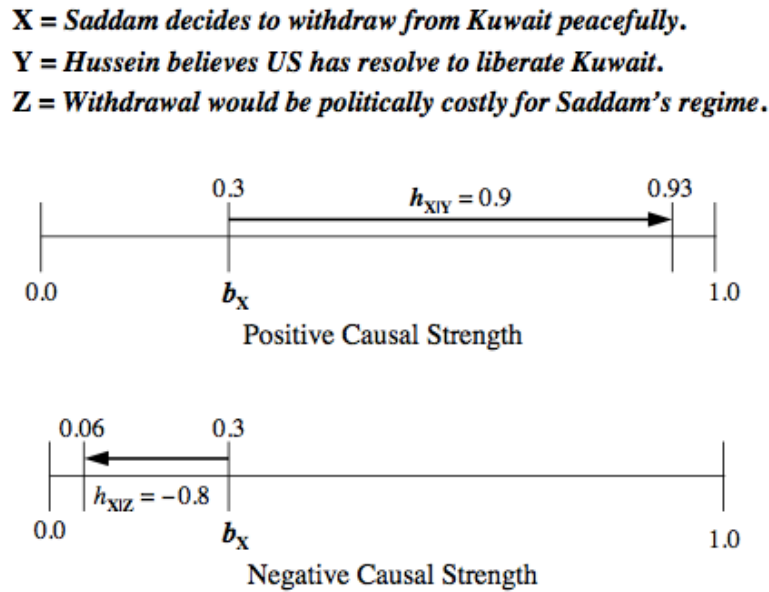
Figure 6.   Baseline Probability Example.[14]

For this depiction, we assume that the two parent events denoted *Y* and *Z*, respectively, are assumed to be true. Therefore, we consider their *true* causal strengths on the child event *X* (Saddam decides to withdraw from Kuwait peacefully).[15] In this figure, the *true* causal strengths are denoted as $h_{X|Y}$ and $h_{X|Z}$, respectively. The event *X* has a

[12] Ibid.

[13] Ibid.

[14] Ibid.

[15] Ibid.

baseline probability of 0.3, so there is a 70% belief that Saddam will not decide to withdraw from Kuwait.[16] That is, ignoring the influences Y and Z, there are about 3 chances in 10 that Saddam will withdraw peacefully.[17] When considering the influence of event Y on X, the *true* causal strength $h_{X|Y} = 0.9$ implies that the likelihood of X is increased by 90% of the remaining uncertainty (recall that the causal strength assumes an influence of Y on X, by itself, and therefore should not be considered a conditional probability).[18] On the other hand, event Z's *true* causal strength on event X is negative, $h_{X|Z} = -0.8$. That is, if Saddam believed withdrawal would be politically costly, then the likelihood of his decision to withdraw peacefully would decrease by 80%.[19] These same types of calculations would be performed if the parent events were false with the values representing whatever respective values were assigned. In the false causal strength calculations, the user-assigned strengths $g_{X|Y}$ and $g_{X|Z}$ would replace the corresponding h values.[20] These calculations are summarized as follows: If Y is true, $b_{X|Y} = b_X + h_{X|Y} (1 - b_X)$ for $h_{X|Y} \geq 0$ and $b_{X|Y} = b_X - h_{X|Y} * b_X)$ for $h_{X|Y} < 0$. If Y is false, $b_{X|Y} = b_X + g_{X|Y} (1 - b_X)$ for $g_{X|Y} \geq 0$ and $b_{X|Y} = b_X - g_{X|Y} * b_X)$ for $g_{X|Y} < 0$.[21] To explain this concept in terms of the traditional probabilities, consider $b_{X|Y}$ to be the conditional probability that *outside* influences will cause X *or* that Y (by itself) will cause X (again assume event Y is true).[22] The outside influences cause X with a value of 0.3. By itself, Y will cause X with strength of $+0.9$. This is analogous to flipping two coins, the first landing *heads* with a probability 0.3 and the second landing heads with probability 0.9. That said, the probability that either coin lands heads equals 0.93.[23]

[16] Ibid.

[17] Rosen and Smith, "Influence Net Modeling," 7.

[18] Ibid.

[19] Ibid.

[20] Ibid.

[21] Ibid.

[22] Ibid.

[23] Ibid.
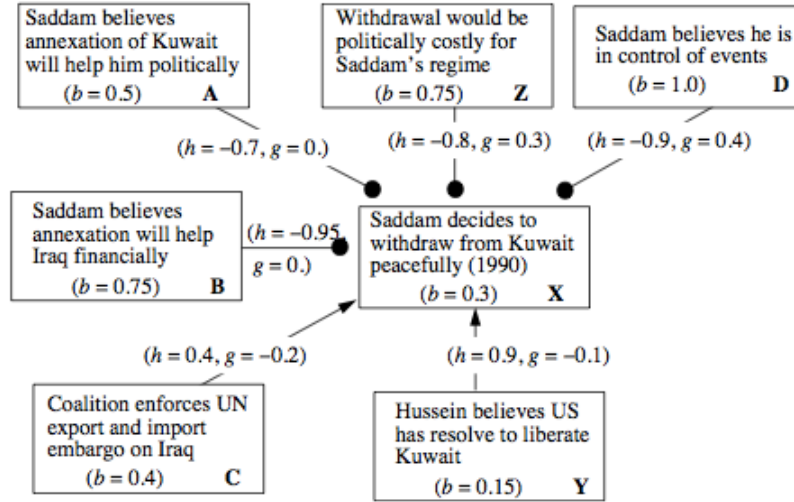
Figure 7.   Kuwait-Iraq Model Example.[24]

1.   Causal Strengths Algorithm

The preceding discussion considered the impact of pairs of events with cause and effect characteristics. However, real-world situations would take into account the cumulative effects of multiple causes on a single event. Figure 7, taken from the example model, depicts multiple parents feeding into one child to look at the possible cases that could result. Each box is assigned a letter to differentiate the nodes. For the child node X, there are 6 parent influences. Therefore there are $2^6 = 64$ conditioning cases as follows: Case 1: {X | Y, Z, A, B, C, D}, Case 2:{ X | ¬Y, Z, A, B, C, D}, Case 3:{ X | Y, ¬Z, A, B, C, D}, … Case 2^6: { X | ¬Y, ¬Z, ¬A, ¬B, ¬C, ¬D}.[25] Once the cases are identified, there are only a few steps remaining as a part of the CAST algorithm. Once these steps are completed, the traditional probability calculations are performed to derive the cumulative likelihood of any event included in the influence net. First, we must aggregate positive causal strengths and aggregate negative causal strengths and then combine them.[26] Then, conditional probabilities must be derived for each. To simplify the notation used to further describe the math in this process, let C_i denote the causal strength of the ith

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[24] Ibid.

[25] Ibid.

[26] Ibid., 8.

parent event in the conditioning case of interest.[27] For example, in Case 2 above: C_1 $=g_{X|Y} =-0.1$, $C_2 =h_{X|Z} =-0.8$, $C_3 =h_{X|A} =-0.7$, $C_4 =h_{X|B} =-0.95$, $C_5 =h_{X|C} =+0.4$, $C_6 =h_{X|D}$ $=-0.9$.

To aggregate positive causal strength, we combine the set of causal strengths with positive values for each of the 2^n conditioning cases associated with the selected child event. These positive causal strengths are aggregated using the combination rule in the following equation: $C_+ =1-\prod_i (1-C_i)$ over all $C_i \geq 0$.[28] This expression follows from the assumptions of independence of the pairwise cause-effect relationships. In other words, the complement of the aggregate positive causal influence C_+ (i.e., $1 - C_+$) is the increase in the probability that the child event will not occur unless (at least) one of the multiple independent influences cause the event to occur.[29] For example in Case 2, above: $C_+ = 1 - (1 - 0.4) = 0.4$.[30] To aggregate negative causal strengths, a similar process is done. We combine the set of causal strengths with negative values for each of the 2^n conditioning cases associated with the selected child event. These negative causal strengths are aggregated using the following combination rule: $C_- = 1 - \prod_i (1 - | C_i|)$ over all $C_i < 0$.[31] The interpretation for this rule is that the complement of the aggregate negative causal influence C_- (that is to say $1 - C_-$) is the increase in the probability that the child event will occur unless (at least) one of the multiple independent influences cause the event not to occur.[32] For example in Case 2, above: $C_- =1 - (1 - 0.1)(1 - 0.8)(1 - 0.7)(1 - 0.95)(1 - 0.9) = 0.99973$. Finally, the positive and negative causal strengths must be combined to yield the ultimate effect of each strength. This is done with a cancellation axiom where we let $(1 - C_+)$ denote the potential of a child's occurrence being promoted due to a set of parents, and let $(1 - C_-)$ denote the potential of a child's occurrence being inhibited by a set of parents.[33] Then, there is an overall influence, O, that represents the net influence of

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[27] Ibid.

[28] C_+ indicating positive causal strength

[29] Ibid.

[30] Ibid.

[31] Ibid.

[32] Ibid.

the set of parents.[34] The overall influence is given by the ratio of the aggregated promoting and inhibiting influences. Heuristically, this axiom asserts that the accumulated influence of all parents (specified in the conditioning case) is partitioned into: a portion that balances out the *opposing side*; and the remaining overall influence.[35]

From the form of this axiom, we now introduce the following expressions for calculating the overall influence on the child event, O: If $C_+ \geq C_-$, then we solve for O (≥ 0) with $(1 - C_+) = (1 - O) * (1 - C_-)$.[36] If $C_+ < C_-$, then we solve for O (< 0) with the equation $(1 - C_-) = (1 - |O|) * (1 - C_+)$.[37] Thus, using Case 2 above as we have with prior examples, $C_- > C_+$, and thus the second equation would be using to yield $(1 - 0.99973) = (1 - 0.4) * (1 - |O|)$, which implies $O = -4.5 \times 10^{-4}$. Recall that this procedure is employed for each of the 2^n conditioning cases associated with the respective selected child event.

In the final step to the CAST algorithm, we need to derive conditional probabilities. Specifically, the overall influence, O, is used to update the baseline probability of each child event in the matrix. The updated value then can be inserted into the transition matrix to yield the required values. Consider the jth conditioning case and let O_j denote the overall influence on the child event from the jth set of parent states. Then the conditional probability of the child, given the jth set of parent states is given by the equation: $P[\text{child} \mid j\text{th set of parent states}] = b_{child} + (1 - b_{child}) * O_j$ for $O_j \geq 0$ and $b_{child} - b_{child} * O_j$ for $O_j < 0$.[38] Again for Case 2 above, we have the following entry for the corresponding element of the transition matrix: $P[X \mid \neg Y, Z, A, B, C, D] = 0.3 - 0.3 * (-4.5 * 10^{-4}) = 0.300135$.

Once the transition matrix is completed through the use of equation to derive conditional probabilities on each of the 2^n parent states, then the traditional law of total

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[33] Ibid.

[34] Rosen and Smith, "Influence Net Modeling," 8.

[35] Ibid.

[36] Ibid., 9.

[37] Ibid.

[38] Ibid.

probability ($\Pr(A) = \sum_{n} \Pr(A \cap B_n)$) can be employed to determine the current estimate for the likelihood of the child event.[39] Specifically, $P[X] = \sum_{j=1,\ldots,2^n} P[X \mid j^{th}$ set of parent states] $* P[j^{th}$ set of parent states].[40] Again, the typical analyst investigating a crisis will not have the resources to complete the joint probability matrix for real world situations and therefore, a sufficient approximation is to assume the parents are independent.[41] In Case 2 above, the joint probability, $P[j^{th}$ set of parent states], on the right side of the previous equation is calculated as the product: $P[\neg Y, Z, A, B, C, D] = P[\neg Y] \, P[Z] \, P[A] \, P[B] \, P[C] \, P[D]$.[42]

Thus, with the expert-assigned understanding of the situation as it existed in early 1990, the probability that *Saddam decides to withdraw from Kuwait peacefully* is less than 0.1.[43] Thus it was assessed that the combined influences on Hussein did not serve to convince him to leave Kuwait peacefully. This type of product can be used in formulating plans given the fact that force will likely be required if the factors in the model hold true. This probabilistic math is applied to all nodes in the model as a means of getting a final percentage of likelihood that any root statement is true or false.

F.   BENEFITS OF SIAM ANALYSIS

The benefit of SIAM for a model of this type hinges on the fact that as the model grows, it would otherwise be infeasible to track the effects of a small change on the entire model without exhaustively repeating statistical calculations each time. Another key value in such software is that both the inputs and the outputs are relatively simple to enter and assess once the model is constructed. At the lowest level nodes, an analyst will merely have to answer true or false questions without regard for the impact of those statements, which adds to ease of use. At the top level, the output is just as clear for a decision-maker with a single number output with regard to the likelihood that the

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[39] Ibid.

[40] Ibid.

[41] Ibid.

[42] Ibid.

[43] Ibid.

statement is true or false. In the case of the Israel-Iran model, the more green the root node is, the higher the likelihood is that Israel will conduct a preemptive attack and the opposite goes for if it is red.

Once the initial model is run, a leader can also ask what-if type questions and excursions can be run to allow for analysis based on different courses of action or variations in link strengths. The software also has tools that generate driving parent analysis and pressure parent analysis. These will provide information that highlights the nodes with the greatest relative impact (driving parent) and those that are most sensitive in promoting or inhibiting parent nodes (pressure parent). These tools take into account the entire model and overlapping changes given the hundreds of possible outcomes in generating this information. This affords the decision-maker information up front to make decisions without even running sets of belief evaluations. Finally, there is a pressure point analysis tool that identifies the initial notes that have the greatest potential to increase or decrease the likelihood of occurrence of a specific event, which can be leveraged to provide immediate changes to one path in particular.

It is important to note that the product generated should not be a substitute for judgment. It is a valuable software tool for assessing the overall status of a situation based on complex inputs and relationships and for analyzing alternatives in action, but at the end of the day it should only be one of many inputs in deciding policy and courses of action.

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III. METHODOLOGY

The primary means for establishing nodes in the model will be through a comprehensive review of literature dealing with both Iran and Israel. This will include current events and historical conflicts between Israel and other nations since the root statement deals solely with the Israeli side of initiating a strike. A secondary assessment of sources detailing factors surrounding state conflict in general (not specific to the region or countries involved) will also be conducted. If similar factors are present in multiple instances leading to conflict repeatedly, they are worth assessing as possibilities that would also antagonize a country like Israel, even if they had not specifically faced those problems in the past. The more generalized the literature is, however, the less weighted the node or consideration will be as the links are made.

A. ASSUMPTIONS

In the approaching the creation of the model, a few key assumptions must be taken into account for the model to operate properly. Particularly, one must assume that both Iran and Israel will act as rational actors. This means that neither country will carry out actions that are deliberately against their self-interest (as they would perceive it). While bold actions are sometimes carried out during wartime, which may seem unreasonable or irrational given *in extremis* situations, the likelihood of irrational actions as a first move in a planned preemptive strike is highly unlikely. Furthermore, and more importantly, if either party was assumed as an unfounded actor, the CAST logic that links each node would be irrelevant as there is simply no way to predict what an irrational state would do. The model can only act on statistical probabilities and those must stem from logical chains of reason, making this assumption a condition precedent to any type of conflict-related model. Aside from assuming rational actors on both sides, this model also assumes the scope to be a limited-war situation. The model is intended only to look at first-strike factors surrounding the development of a nuclear Iran and a kinetic response. It is not intended to address acts short of war such as espionage, cyber munitions, or covert action against either state, but it will take the assessment of some of those actions

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into account when looking at first-strike likelihood. Finally, with regard to capability assessments, the same factors apply. Israeli attack is not assumed to imply that any type of occupation or control of Iran will take place as a result of a strike so only capabilities required for that type of action will be assessed.

B.   LINK ANALYSIS AND ANALYST INPUT

The methods for link analysis will be largely accomplished using the same type of research done to create nodes and assess factors leading to conflict. Characterizing link strengths will be done with more emphasis on public avowals made by both state representatives and the subsequent SME analysis of those statements. As the situation is a dynamic one, information passed on from Israeli leadership will play a large part in judging how the CAST logic should be configured initially. This logic can be changed once the initial build of the *influence net* is complete but since the model is a snapshot in time under circumstances, using those sources is appropriate. While classic triggers to conflict may be present, much can be inferred from the tone and words used by those in power who have decision-making powers or influence on those in power. If multiple SME sources agree on the tone that one speech or proclamation takes, then it will assist in judging the worthiness of inferences made. As much of the information fed into the model will be judged qualitatively, these statements will be vital in constructing the model.

The initial nodes will be set with baseline values using the same methods mentioned above, but they will ideally be sourced out to intelligence analysts for current belief settings. The root nodes are broken up into nuclear, domestic, international, regional, and provocation nodes as are described further in Chapter IV. Thus, area experts can provide inputs for each second-level node based on their respective area of expertise. One of the analysts can also be trained to tweak CAST logic as needed. In this initial build, only open-source intelligence (OSINT) will be used and thus some nodes may be missing from a final product that would be fielded to a command like the EUCOM Information Operations (IO) Cell.

IV.   ISRAEL-IRAN MODEL CONSTRUCT

The premise of the model and all supporting nodes is to determine the strength of the root node statement, that Israel will conduct a preemptive strike on Iran as a result of increased tensions surrounding the development of their nuclear program. As different factors feed into the prospect that the root is true or false, the subject can be broken down into categorical areas to parse out different distinct themes among the nodes. These categories were derived primarily from common sense reasoning that factors feeding into the decision-making cycle would stem from what will be termed *soft* and *hard* factors.

The hard factors are those that would force the hand of the Israelis to take action and demand a response. For example, if Iran tested a nuclear weapon and then made a public statement that they were going to use all of their capabilities to attack Israel, these would fall into the *hard* category as Israel would have almost no option other than to respond with some force. For this model, the two hard categories are the nuclear and provocation level two nodes. The nuclear node will deal directly with nuclear production activities. The provocation parent node will deal with non-nuclear factors that may spark a strike nonetheless. For example, Iran may have zero nuclear weapons capability but may make statements declaring that they are planning a first strike. This type of language would still feed into the decision cycle that prompts a strike before Iran gains the ability to use a bigger *hammer* in their plans. Israel may use the nuclear development as the excuse to carry out an operation with the provocative language as a compounding factor that is the proverbial *straw that breaks the camel's back*.

The soft factors are those that may not directly spark a strike, but will undoubtedly feed into the timing and the ultimate decision to use force. The three *soft* categories are domestic, regional, and international level two nodes. If internal factors would preclude a strike because of public opinion, military equipment shortfalls, or economic factors, those ideas will be represented in the domestic nodes. Also, regional instability may result from a strike and official backing by one country for or against Israel with a prospective strike will be inevitably drive the type of mission that is planned. These factors will be represented under the regional node. Finally, international

influence, particularly from the United States (U.S.) given the alliance between the U.S. will be accounted for under the international node. All initial nodes in the levels below that will feed into one of those main categories.

The primary drivers to the conflict are with Iran's perceived initiative to produce nuclear weapons. Iran and Israel have long been enemies and Iranian President Ahmadinejad has made frequent calls for Israel to be "wiped off the map" in several instances over the past decade.[44] Thus, the development of any weapons that could provide increased capability to fulfill their anti-Zionist aspirations significantly escalates the tensions with Israel as they worry about self-preservation and the stability of the region. While Iran outfitting itself with conventional capable of destroying Israel would not necessarily be grounds for action alone, Israeli is able to justify plans for a potential strike on the premise that Iran may be moving toward the production of a nuclear weapon. While this is not known definitively, Israel has the United Nations (U.N.) to back them in their efforts to stop potential production, as Iran is a signatory of the U.N. treaty on the non-proliferation of nuclear weapons (NPT). With the treaty in place, certain safeguards, to include inspections, are mandated to ensure that a country does not move towards the development of nuclear weapons. Recently, the International Atomic Energy Agency (IAEA) expressed serious concern regarding the continued enrichment and heavy water-related activities in Iran, along with blocked access to certain nuclear sites.[45] With no assurances that Iranian nuclear activities are solely being used for scientific ventures and continued hostile rhetoric, Israel finds itself at a point where the aforementioned *hard* and *soft* factors need to be assessed to account for a decision on the subject of action. The statements that feed into the nodes, link weights, and baseline beliefs towards making a model around an Israeli decision to strike are discussed below.

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[44] Safa Haeri. "Iran on Course for a Showdown." *Asia Times Online*, 28 October, 2005, accessed 22 December 2012, http://www.atimes.com/atimes/Middle_East/GJ28Ak03.html.

[45] International Atomic Energy Agency, *Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council Resolutions in the Islamic Republic of Iran*, Report GOV/2012/37 (Vienna, Austria: IAEA, August 2012).

A.   NUCLEAR

The level three nodes and link strength that feed into the level two statement "Iran has a nuclear weapons capability" are listed below in Table 1[46]. Nodes feeding into level three are listed in Appendix A. The heart of the issue surrounding the conflict between Israel and Iran is centered on Iran's nuclear program. It is likely that nodes feeding from level two to the root node will be the most impactful as they fall in the *hard* category that was described supra.

Ref #	Nuclear Level Three Node	Impact to Level Two if True	Impact to Level Two if False
1.1	Iran possesses weapons-grade enriched uranium	Strongly Promotes (+0.9)	Strongly Inhibits (-0.8)
1.2	Iran is able to enrich weapons-grade enriched uranium	Promotes (+0.3)	Inhibits (-0.6)
1.3	Israel assesses Iran as having crossed the *red line* in production	Strongly Promotes (+1.0)	Strongly Inhibits (-0.8)
1.4	Iran obtains materials to build a nuclear weapons	Promotes (+0.7)	Inhibits (-0.2)
1.5	Iran demonstrates nuclear weapons capability	Strongly Promotes (+1.0)	Slightly Inhibits (-0.1)
1.6	Other indicators of Iran's nuclear capability are observed	Slightly Promotes (+0.2)	Slightly Inhibits (-0.1)
1.7	IAEA concludes with certainty that in-country nuclear work is for entirely peaceful purposes as allowed under the NPT.	Strongly inhibits (-0.8)	Promotes (+0.6)
1.8	Iran possesses a used reactor fuel reprocessing capability	Promotes (+0.7)	No impact

Table 1.   Nuclear Level Three Nodes and Link Strengths.

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[46] The impact levels listed in the table are indicators of where the slider bars that were described in Figure 3 of Chapter II will be positioned in the link strengths. For example, if premise statement 1.1 is true, the impact to the conclusions statement on level two statement is 90% in the direction of the more likely (promoting) side. If it is false, the slider bar is 80% in the direction of the less likely (inhibiting) side. If zero for either true or false is set, it indicates that there would be no impact on the child node if the respective statement belief is made. The numbers listed are also the exact probabilities that will be used in the statistical calculations done by the model as outlined in Chapter II CAST logic explanation.

1.   Iran Demonstrates Nuclear Weapons Capability / Crosses *Red Line*

If Iran is to be assessed as having a nuclear weapons capability, several factors need to be overtly present to conclude that Iran is on a clear path to weapons production. Alternatively, a set of *pop-up* actions could take place from covert activity that is discovered that immediately alerts the world that they have the capability if development of weapons had been successful and only discovered on short-notice. The most obvious indicator of a clear capability within this sublevel is a weapons test or demonstration (#1.5). If a nuclear bomb is tested, this will have the strongest promoting potential for the idea that Iran possesses a nuclear weapons capability. Even if the test is small or a *fizzle*, it is likely that any such test will be perceived as a strong indicator of Iran's intentions and capabilities in the near future. In the absence of a test, however, this is no guarantee that Iran does not possess a weapon so it would only slightly inhibit the conclusion statement. While one may say no testing should lead to no impact, prudence dictates that Iran would test any weapon before use, which is why the slight (-0.1) inhibiting potential is present.

Although Israeli Prime Minister Netanyahu has never explicitly stated that he will make a strike given a certain point of production or testing, in recent speeches, he has expressly stated that the only peaceful way to prevent Iran from getting atomic weapons is to set a *red line* that they should not pass in their production.[47] This implied that if they did, in fact, pass the line, that a non-peaceful method of stopping the country would become necessary to ensure the country's security. Using that supposition in the model (#1.3), if Iran passes the *red line* or overtly tests a weapon (which would mean the red line was already passed), then the impact will be strongly promoting to both the statement that Iran has a nuclear weapons capability and to the root statement on whether or not a strike will occur. If Israel sets *red line* criteria, then it is likely that Iran must cross that line for a strike to occur under any circumstances. Ergo, if that line is not crossed, then there is a strong inhibiting impact to the statement that Israel believes Iran has a nuclear

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[47] Jeffrey Heller, "Netanyahu Draws 'Red Line' on Iran's Nuclear Program." *Reuters Online,* 27 September 2012, accessed 22 December 2012, http://www.reuters.com/article/2012/09/27/us-un-assembly-israel-iran-idUSBRE88Q0GI20120927.

capability. However, just because Iran does not test complete a demonstration of their capabilities as mentioned before, it does not necessarily mean that they do not have the capability and thus the inhibiting potential is still a factor for this statement. The idea here is that these few factors that will have a strong impact on the notion that Israel believes Iran has a weapon, however, a strike may still come about even if those stronger driving factors are not present, especially given the subjective nature of a *red line*. The inhibiting potential based on those factors is adjusted to assess for such a variance.

2.   Iran Obtains Material to Build a Nuclear Weapon

Four nodes stem from factors involving the material required for a bomb. One if that Iran has weapons-grade enriched uranium (#1.1), one states that they are able to enrich weapons-grade uranium (#1.2) and a third involves the ability to reprocess used reactor fuel to obtain plutonium (#1.8). One final consideration is the more general statement that Iran obtains materials to build a nuclear weapon (#1.4). This distinction of the first statement from the fourth is that the latter involves specifically non-nuclear materials needed for a bomb (e.g., internal components or materials to construct a delivery vehicle).

To address statement #1.2, a short discussion on uranium enrichment is of value to understand why the task of monitoring is so complicated for the IAEA and how this statement plays into the overall statement that Iran has a nuclear weapons capability. Along with plutonium, high-enriched uranium (HEU) is one of two materials that can be used as the explosive material in nuclear weapons. Uranium itself is used widely for civilian application for fuel in nuclear reactors, biological science, and in the medical community. Thus, the mining and processing of uranium is not an indicator of illicit activity in any modern country. The enrichment process increases the concentration of the uranium-235 isotope, which fissions far more readily than the more common uranium-238 isotope.[48] Uranium-235 is also the type used as fuel in power reactors so its enrichment in mass quantities is justifiable. Natural uranium is only 0.7% uranium-235 so

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[48] Paul Kerr, "Steps to Developing a Nuclear Weapon: The Uranium Route," *Iran Watch*, September 2004, accessed 28 December 2012, http://www.iranwatch.org/privateviews/ACT/perspex-act-deveopweapon-0904.htm.

the enrichment process needs to occur to yield fuel used for these civilian applications on a large scale.[49] The fuel required for the reactors needs to only be low-enriched uranium (LEU) to 3.5%, however, Iran enriches up to 20% for use with research reactors.[50] The amount of enrichment required for weapons-grade uranium is 90%.[51] While it is assumed that Iran has not yet enriched any uranium to weapons-grade, the amount of 3.5% LEU and 20% HEU can be used in conjunction with the number of known centrifuges to estimate how long it would take Iran to enrich to weapons-grade with the current facilities. It's estimated that with the amount of LEU and separative work units (SWU), the time needed to convert this LEU to one bomb's worth of finished uranium metal enriched to 90% U-235 would be three to twelve months.[52] If the reactor-grade 20% uranium were further enriched, it would be done in about six months. If the centrifuges were quadrupled, this timeline goes down to 1.6 months.[53][54] Thus, given that Iran has the ability to enrich to 20% already, it is known that they have the capability to enrich to higher levels if they desire to do so, and it becomes a question of how quickly they can get the amount of material needed. Additionally, one might contend that if Iran already has the ability to enrich, that perhaps they have already begun to do so in a covert facility. This is where the differences between #1.1 and #1.2 lay. There is currently no reason for Iran to have uranium enriched to 90%, and thus, the presence of material enriched to that level is a strong promoting statement to their overall capabilities as a weapons producer. However, just the mere ability to enrich at all still promotes to some degree with the idea that they could be doing it covertly. This may become even more complicated in the future as Iran further develops and builds their naval fleet. Iran is

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[49] Ibid.

[50] U.S. Library of Congress, Congressional Research Service, *Israel: Possible Military Strike Against Iran's Nuclear Facilities* by Jim Zanotti et al., CRS Report R42443 (Washington, DC: Office of Congressional Information and Publishing, September 28, 2012), 5.

[51] Ibid.

[52] Ibid.

[53] Ibid.

[54] These statements assume that Iran would use 16 kilograms of weapons-grade uranium in the finished core of each nuclear weapon. Sixteen kilograms are assumed to be sufficient for an implosion bomb. This was the amount called for in the implosion device Iraq was trying to perfect in the 1980's, and the design for such a device has circulated on the nuclear black market, to which Iran has access.

currently looking to build nuclear submarines, of which the reactors require a higher-enriched level than the 20% used in normal power plants. U.S. nuclear submarines use uranium that is enriched to 90% however it is assessed that 90% enrichment is not necessarily needed for a nuclear submarine. It is estimated that uranium will undoubtedly be enriched to levels of 50-60% if they move forward with the development of these vessels.[55] However, even if they decided to enrich to a higher level, they would still be able to do so under the NPT as the venture is strictly for scientific use in designing a reactor for use on one of their naval vessels. This would terribly complicate the job of the IAEA and ability of other world powers to fully know the intentions of the Iranians. At that point, shaping the uranium into a core shape would be the next sign that the HEU they possessed was in fact, for a weapon.

The third factor listed involves the reprocessing of used reactor fuel. Iran's construction of a nuclear reactor moderated by heavy water has also been a source of proliferation concern. This is because the reactor's spent fuel will contain plutonium, which is well suited for use in nuclear weapons. To be used in nuclear weapons, however, plutonium must be separated from the spent fuel—a procedure called *reprocessing*. Iran has said that it will not engage in *reprocessing*, and there is no public evidence that Iran either has constructed or is constructing a *reprocessing* facility.[56] Thus, the presence of such a facility would be a strong factor towards having the capability to produce a weapon (+0.7) since there would not be many other reasons towards *reprocessing* plutonium. That said, if a reprocessing facility is not built, it does not necessarily impact the likelihood of a capability since it is not needed for a bomb if there is weapons-grade uranium available. As a result, there is no impact to statement #1.8 being false.

The last general statement concerning materiel used (#1.4) involves a delivery capability and other internal components. Assuming Iran wanted to build their bomb in a manner similar to other countries, the safing, arming, fuzing, firing (SAFF) process

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[55] Elad Benari, "Iran's Statements on 90% Uranium Enrichment Exposed." *Arutz Sheva Israel National News Online*, 28 September 2012, accessed 28 December, 2012, http://www.israelnationalnews.com/News/News.aspx/160367#.UNqviqUk_wx.

[56] U.S. Library of Congress, Congressional Research Service, *Israel: Possible Military Strike Against Iran's Nuclear Facilities*, 5.

requires a number of specialized components to design the triggers and arming mechanisms used in the use of such weapons. While the design or development of these devices does not indicate a capability per se (as getting the fuel is the most difficult task), knowing that the devices are potentially in production promotes to the overall capability of the state as far as their ability to complete a full weapon. However, since these precautions aren't necessarily required for a bomb, the absence of such devices also does not have a significant inhibiting potential.

3.   Other Factors Present to Indicate a Nuclear Weapons Capability

Other factors involved in assessing a nuclear weapons capability involve the storage and procedures involved with such weapons (#1.6). If facilities suspected of nuclear weapons storage are established, changes in military doctrine or procedures are made to account for special nuclear weapons handling capability, or if any type of nuclear command is set up, these factors will play into the overall readiness of the regime as they attempt to become a nuclear state. Thus, the presence of these promotes their capabilities and likely would not come until the final stages of production. While one may take the stance that since these factors won't occur until a completed weapon is in its final phases that the promoting potential should be very large, it's likely that the stronger links involving the possession of weapons-grade uranium will also be positive at this stage and the combined links will make have the intended effect. The mere planning for a weapon eventually is not an actual sign of capability though which is why it only has a slightly promoting potential in this model. The same factors account for the relatively low inhibiting potential if they are not true.

4.   IAEA Reports on Iranian Nuclear Facilities

Currently there are provisions in place for the inspection of all Iranian nuclear facilities by the IAEA to ensure Iranian programs are for peaceful purposes. These stemmed from resolutions of the U.N. Security Council and the Board of Directors for the IAEA frequently reports on the status of both inspection efforts and the nuclear program. As of September 2012, they issued a statement stressing serious concern that Iran continues to defy requirements and obligations contained in the relevant IAEA Board of

Governors and U.N. Security Council Resolutions, including the continuing and expanding uranium enrichment activities in Iran, as reported in GOV/2012/37, in particular at the Fordow Fuel Enrichment Plan.[57] Thus, without current access, there is no way to validate the activities taking place in Iranian facilities, and if the IAEA cannot make a definitive statement about those activities, illicit activity can be assumed to some degree. This is why there is a promoting potential to #1.7 being false. If the IAEA were to gain access to all facilities and make a declaration that all activities were in line with NPT provisions and inspection requirements though, this would be a strong inhibiting statement to the statement that Iran has a nuclear weapons capability. While they may still be making developments covertly, it would be very difficult to enrich and move the uranium required from already known facilities for the amount of materials required. Furthermore, if Iran appears to be in compliance with all international requirements, it would be very difficult for Israel to claim Iran has a nuclear capability without any overt evidence or statements from Iran contradicting IAEA reports.

B.   DOMESTIC

Aside from Iranian nuclear capabilities, the domestic state of Israel is an exceedingly central consideration to any type of move towards an attack on Iran. The stance of Israel's decision-makers, the opinion of the public at large, and of course the question of whether Israel is even capable of a strike are all vital in estimating Israeli actions. For example, even if Iran has an overt nuclear weapons capability, but does not possess a way to bring a strike to Iran because of limitations on military equipment, then their desire to strike still makes a strike nearly impossible without support from other countries (addressed in other sections below). Those points relating directly to Israeli domestic considerations are addressed in this section.

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[57] International Atomic Energy Agency, *Implementation of the NPT Safeguards Agreement and Relevant Provisions of United Nations Security Council resolutions in the Islamic Republic of Iran*, Report GOV/2012/50 (Vienna, Austria: IAEA, September 2012).

Ref #	Domestic Level Three Node	Impact to Level Two if True	Impact to Level Two if False
2.1	Economic conditions support Israeli attack on Iran	Slightly Promotes (+0.2)	Inhibits (-0.4)
2.2	Doctrine supports attack on Iran	Slightly Promotes (+0.1)	Slightly Inhibits (-0.2)
2.3	Terrorism attacks have been committed against Israel	Promotes (+0.5)	No Impact
2.4	Public opinion supports an attack on Iran	Promotes (+0.5)	Inhibits (-0.5)
2.5	Israel has the military readiness required for a strike	No impact	Strongly Inhibits (-0.9)
2.6	Current Israeli government supports an attack on Iran	Strongly Promotes (+0.7)	Strongly Inhibits (-0.8)

Table 2.   Domestic Level Three Nodes and Link Strengths.

1.   Economic Condition

In just 32 days of war with Lebanon in 2006, the cost of the conflict on the Israeli economy was a combined 1.8 % with a 0.5 % reduction in economic growth and another 1.3 % in direct costs and damages.[58] Taking figures from past conflicts and looking towards the estimated requirements for a conflict with Iran, a full-scale conflict could cost as much as 167 billion shekels ($42 billion) over a period of five years.[59] Direct immediate costs would be 47 billion shekels ($12 billion), which would be equivalent to over five percent of the country's Gross Domestic Product from last year.[60] Although a five-percent drop in GDP does not qualify as a depression from an economical standpoint (most would define it as a drop in real GDP of ten percent or more), if those numbers were revised and it was assessed as higher and closer to that limit, the assessment could

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[58] Steven Scheer, "Iran War Could Cost Israel Economy $42 billion: Report," *Reuters Online*, 21 August 2012, accessed 29 December 2012, http://www.reuters.com/article/2012/08/21/us-israel-iran-economy-idUSBRE87K0K820120821.

[59] Ibid.

[60] Ibid.

considerably change the courses of action.[61] Inevitably, a strike on Iran may lead to a longer-term kinetic conflict that will require activation of reserve Israeli forces and a shift towards a wartime economy. If it is assessed that the impact of a conflict on the economy will be devastating to the populace, this will inhibit the statement that Israel can support a war from the strictly domestic standpoint. However, the inhibiting potential will not be as significant as it could be if Israel believes their existence in jeopardy and thus may lead to a strike, which is why the inhibiting value is not as high as some other factors (-0.4). If the current defense budget is assessed as adequate for the conflict, then this will promote the statement from an economic standpoint. Justification for different values between the node being true and false are due to the fact that not having the defense funds would be more devastating to the courses of action available than if economic conditions were satisfactory. Furthermore, given the availability of funds or a favorable assessment of the impact on the Israeli economy (favorable in that it would not be crippling), that fact alone would not necessarily drive Israel towards calling the state capable of supporting war when compared to some of the other reference points. Thus, the impacts are scaled down to account for just how impactful nodes concerning military readiness and government support will be in comparison.

2.   Military Readiness

The ability for Israel to actually conduct a strike on Iran is a vital factor in crafting any course of action (#2.5). Simply put, if Israel does not have the organic capability to conduct a strike, they will need to either develop those capabilities or garner support from allies to provide what is needed in a coordinated attack. Parents to this node will also take into account the ability to defend against a counterattack as a weighted factor and the types of munitions available as Iranian facilities are hardened. Defense Minister Barak noted that both military capability and the ability to withstand a counterattack as factors that would require an affirmative response before a decision is made to attack.[62] If the

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[61] "Economic Focus: Defining Depression," *The Economist*, 30 December 2008, accessed 29 December 2012, http://www.economist.com/node/12852043.

[62] U.S. Library of Congress, Congressional Research Service, *Israel: Possible Military Strike Against Iran's Nuclear Facilities*, 16.

overall statement is true, however, the mere capability does not necessarily indicate domestic support or that an attack will happen.

Since the readiness assessment is somewhat subjective, the opinions of Israeli government officials and analysts that are experts on the subject will be the primary feeders into this node. In open source assessments mainly in non-Israeli media, analysts currently assert that although the Israel Air Force (IAF) is formidable, an attempt to destroy Iran's nuclear capability would be a challenge due to both the IAF's technical capabilities and the limited numbers of aircraft in its fleet that are equipped to simultaneously operate over long ranges, carry the necessary ordnance, and thwart foreign air defenses.[63] Further assertions from experts like former Central Intelligence Agency and National Security Agency Director Michael Hayden have also noted potential deficiencies in capability with Hayden saying that airstrikes capable of seriously setting back Iran's nuclear program were beyond the capacity of Israel as of early 2012.[64]

While no one outside of the Israeli government knows the full capability of the Israeli military, there have also been independent assessments made that state very diametric opinions about both current capabilities and what is needed for a strike to be effective. For example, Harvard's *Belfer Center for Science and International Affairs* made a case that an effective strike would actually require much less air power than some have predicted, and they claim that Israel already has what they need to perform an effective strike.[65] If this were true, the mere capability to strike, however, does not necessarily indicate domestic support. Thus, domestic support would be affected negatively if this statement were false because no reasonable person would support a strike doomed to fail, which is why the node being false carries such an impactful inhibiting weight. If readiness supports a strike, however, it does not mean that domestic

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[63] Ibid., 26.

[64] Elisabeth Bumiller, "Iran Raid Seen as Huge Task for Israeli Jets," *New York Times Online*, 19 February 2012, accessed 14 January 2013, http://www.nytimes.com/2012/02/20/world/middleeast/iran-raid-seen-as-complex-task-for-israeli-military.html.

[65] Austin Long and Whitney Raas, "Osirak Redux?: Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities," *International Security* 31, no. 4 (2007): 7–33.

support will increase merely because the option is available though, which is why there is no impact to the statement being true.

3.   Government Support

According to one report, the issue of a possible Israeli strike on Iran has sparked fierce public debate in Israel among political and military leaders, past and present, dividing cabinet ministers, generals and Mossad chiefs.[66] Most see military action as a last resort to be contemplated only if sanctions and diplomacy fail; others insist that bombing Iran could actually stabilize the Middle East by setting back the radical cause indefinitely."[67] The view of government officials, particularly those in crucial government decision-making positions, will be key in the verdict to make a strike. The parent nodes feeding into #2.6 will be broken down to represent the views, of the Prime Minister, the National Security Cabinet, the President of Israel, and the Knesset. Additionally, consideration will be taken for input from the Israeli Defense Force Leadership and Israel's intelligence organization, the Mossad, to feed into those views of the Prime Minister.

Israeli law requires that major national-security decisions, like signing peace accords or ordering airstrikes, must receive a majority vote in either the full cabinet or a smaller ministerial committee on national security—a panel comprising half the ministers of the 30 member cabinet.[68] However, it is largely held that eight cabinet members, called *the octet*, hold the power to sway the entire cabinet.[69] Another factor that will affect the internal decision-making in Netanyahu's cabinet is the opinion of the country's military and intelligence leaders. Giora Eiland, a national-security adviser to former Prime Minister Ariel Sharon, has stated that the opinion of General Benny Gantz, the IDF chief of staff, carries significant influence within the government decision-making

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[66] U.S. Library of Congress, Congressional Research Service, *Israel: Possible Military Strike Against Iran's Nuclear Facilities*, 15.

[67] Ibid.

[68] Eli Lake, "Meet the Israeli 'Octet' That Would Decide an Iran Attack", *The Daily Beast*, 9 March 2012, accessed 26 January 2013, http://www.thedailybeast.com/articles/2012/03/09/meet-the-israeli-octet-that-would-decide-an-iran-attack.html.

[69] Ibid.

process.[70] While the government can make any decision, and the professional military is subordinate to the political decision, it would be unwise if the chief of staff were against the decision, as he would have to carry out the orders. In public testimony, Gantz made it clear that he believes Israel has a right to strike at Iran's nuclear program.[71] Behind the scenes, however, some Israeli observers, such as *Ha'aretz*'s defense correspondent Amir Oren, have written that Gantz does not favor an attack.[72] Another voice of opposition comes from the former chief of Mossad, Meir Dagan, who is likely the architect of Israel's covert war against Iranian nuclear scientists and sensitive installations.[73] In public interviews, his language was very strong, even to go far enough to call it the "stupidest idea" he had ever heard.[74] While he is not the current intelligence chief, his insider knowledge of the situation still carries some weight and it can be inferred that the current Chief is privy to the same information that Dagan based his opinions on. As parent nodes to the Knesset, the Prime Minister, and the cabinet, the views of both the chief of staff and the Mossad chief will both have strong promoting or inhibiting potentials based on their assessments of the capabilities and threats against Israel.

While a few of those feeding into Prime Minister's decision-making cycle may have opinions for or against action, ultimately the decision to strike (with the support of the cabinet) will be that of Netayahu and his Defense Minister. They both carry significant weight within the cabinet, and currently, it is assessed that the majority of the cabinet support the views of their decision advocating a strike.[75] Furthermore, history has shown that a few determined people at the top are able to bring others along. According to a senior fellow at the Washington Institute for Near East Policy, it was the case in 1981 with Osirak in Iraq and in 2007, with Syria.[76] Barak and Netanyahu should not be

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[70] Ibid.

[71] Ibid.

[72] Ibid.

[73] Ibid.

[74] "Ex-Israeli Spy Chief: Bombing Iran a Stupid Idea," *CBS News*, 8 March 2012, accessed 24 January 2013, http://www.cbsnews.com/8301-202_162-57393833/ex-israeli-spy-chief-bombing-iran-a-stupid-idea.

[75] U.S. Library of Congress, Congressional Research Service, *Israel: Possible Military Strike Against Iran's Nuclear Facilities*, 17.

[76] Eli Lake, *Meet the Israeli 'Octet' That Would Decide an Iran Attack.*

underestimated in their ability to bring others in the cabinet and the defense establishment around to support their views.[77] Thus, the prime minister will carry the largest weight in statement #2.6 with the Security Cabinet following as the prime factors in determining government support.

4. Public Opinion

The responsiveness of government decision-making based on the perceived preferences of the citizens in any state is a central concern of various normative and empirical theories of democracy.[78] This is no different in Israel where the question of the public's influence on the Knesset and the Prime Minister must be taken into account for as the country decides whether or not to strike (#2.4). However, different leaders within the Israeli government feel differently about how the weight of public opinion should shape the decisions being made within the political arena. For example, Defense Minister Barak feels that the public debate over fateful decisions ought to be limited, while Yossi Sarid, a former politician, minister, and Knesset member, holds that the public must not be excluded from the preliminary debate about such decisions.[79] While it is difficult to make statements regarding the causality between public opinion and the ensuing decisions of leaders, there is some history in Israel to suggest that the public may have some impact. With the 2000 withdrawal from Lebanon and with the 2005 withdrawal from the Gaza Strip, there seemed to be a disparity between public opinion and the stance of Israeli leadership; in both cases, the leaders ended up making decisions in line with the public.[80] With both of these major policy decisions, there is some evidence that public opinion played a role. Thus, while it may affect different leaders in different ways, #2.4 should have a promoting or inhibiting effect on the overall domestic support of action.

While the weight of public opinion will feed into the overall statement that Israel supports a strike domestically, it is interesting to note that many nodes will likely feed

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[77] Ibid.

[78] Benjamin I. Page and Robert Y. Shapiro. "Effects of Public Opinion on Policy," *The American Political Science Review*, 77, no. 1 (1983): 175.

[79] Tamar Hermann, "Something New Under the Sun," *Strategic Assessment*, 14, no. 4 (2012): 43.

[80] Ibid., 47.

into the public opinion piece. For example, a terrorist attack (#2.3) would likely spark outrage amongst civilians and create support for action as would a stark change in the economic conditions of the country (#2.1). Recent polls indicated that Israelis put economic factors (involving socioeconomic gaps) a much higher priority than military readiness.[81] Other factors, such as American support, will also be parents to this node. Public opinion polls conducted in early 2012 indicated reluctance by a majority of Israelis to support an attack on Iranian nuclear facilities in the absence of U.S. cooperation.[82] Assuming an Israeli attack without U.S. cooperation, a poll conducted jointly by Israeli and Palestinian organizations in 2012 indicated that Israelis would oppose a strike by a 51%–42% margin; a sizeable majority, however, would apparently support an attack with U.S. cooperation by a 69%–26% margin.[83] An Israeli political science professor involved with another poll on the same questions reportedly explained the Israeli views as follows: "They are not challenging the right to [attack], [they are] challenging the ability to do it effectively and with international support. People don't want Israel to become the troublemaker of the world."[84] While the influence on the overall Israeli opinion will be fed by many sources, it seems that if history is any indicator, those sentiments will likely have some influence on the overall decision-making process within the Israeli government and may play into whether a preemptive strike is in the best interest of the people who will ultimately be forced to fight.

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[81] Ibid., 55.

[82] Palestinian Center for Policy and Survey Research, "Joint Israeli Palestinian Poll, March 2012," 28 March 2012, accessed 25 January 2013, http://www.pcpsr.org/survey/polls/2012/p43ejoint.html.

[83] The Israel Democracy Institute, "The Peach Index: February 2012," 3 August 2012, accessed 25 January 2013, http://www.peaceindex.org/indexMonthEng.aspx?num=240&monthname=February.; Independent Media Review Analysis, "IMRA – Friday, March 9, 2012 Poll: National Camp between 71 to 74 seats—Kadima 10 with Livni," 9 March 2012, accessed 25 January 2013, http://www.imra.org.il/story.php3?id=55988.

[84] Joshua Mitnick, "Majority of Israelis oppose a unilateral strike on Iran nuclear program," *Christian Science Monitor*, 8 March 2012, accessed 24 January 2013, http://www.csmonitor.com/World/Middle-East/2012/0308/Majority-of-Israelis-oppose-a-unilateral-strike-on-Iran-nuclear-program.

INTERNATIONAL

While nuclear and domestic issues deal directly with the two states involved and their actions on either side, international considerations will weigh heavily into any considerations to strike by the part of Israel. With public opinion within Israel being tied directly to United States backing, and ultimately, some causality presumed between public opinion and the course Israeli leaders will take, a number of these nodes will be tied to both domestic and regional factors. Additionally, if worldviews sway overwhelmingly in one direction or the other in favor or against a strike, Israel may heed to the pressures of those bodies. The international nodes deal directly with both specific organizations and the intervention or support of key countries on the international stage. They do not take into account regional factors, as those will be addressed in the next section.

Ref #	International Level Three Node	Impact to Level Two if True	Impact to Level Two if False
3.1	International community formally supports an Israeli-led strike against Iran	Promotes (+0.4)	Slightly Inhibits (-0.2)
3.2	U.N. demonstrates the ability to deter Iranian Aggression towards Israel through non-kinetic means	Inhibits (-0.6)	Promotes (+0.4)
3.3	U.S. supports Israel with capabilities negating the need for immediate action	Inhibits (-0.4)	Slightly Promotes (+0.2)
3.4	United States Supports a Preemptive Strike	Promotes (+0.6)	Inhibits (-0.4)
3.5	Overall U.S. support for Israel declines	Inhibits (-0.3)	No Impact

Table 3.   International Level Three Nodes and Link Strengths.

5.   International Organizations Voice Support for Israel

Support from international organizations would likely have a promoting effect on Israel's likelihood of taking action. With the backing of an organization like the U.N., Israel would have justification in taking action and there would be an assumed backing

from U.N. forces if it reached that point. With that kind of support and some confidence that they would be protected from a counterattack by Iran from international forces, they would certainly be more likely to strike if the capability and triggers were there. If an organization like the U.N. voiced support in favor of action by Israel, this would likely be tied to other links in the model as well with regard to support from Israel's leaders and the public opinion of the Israeli people at large. However, the backing of the international community is certainly not needed for action. In 1981, for example, the U.N. Security Council (including the United States) voted unanimously in favor of Resolution 487, which condemned Israel's strike on Iraq's Osirak reactor as a violation of the U.N. Charter and the "norms of international conduct."[85] Israel likely knew there would be a backlash from the organization, however, they chose to take action anyway. Thus, this is why #3.1 only shows a slight inhibiting impact if they lacked the support.

6.   United Nations Demonstrates Ability to Deter Iranian Aggression

Israeli officials and analysts generally agree that a strike would not completely destroy the Iranian nuclear program. According to multiple news sources, a successful strike would inflict significant enough damage to delay production of a weapon three to five years.[86] That, of course, would be if Iran chose to continue production after a strike, knowing the potential for another future strike may be a factor. However, knowing that the initial strike may only delay production vice completely destroying the program, it's worth considering the implications if other options may lead to that same end-state. If the U.N. sanctions are assessed as successful or if specific actions are taken that makes it so difficult that Iran's production would be delayed for years through non-kinetic actions like those, such regulations by the international community could be an ideal alternative to a risky air strike. Thus, if this capability were true, this would be a strong inhibiting node for the international community's support for a strike (#3.2). If sanctions are assessed as not working, it is assumed that the international community would also concur with their ineffectiveness. Thus it would be a promoting factor because one could

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[85] U.S. Library of Congress, Congressional Research Service, *Israel: Possible Military Strike Against Iran's Nuclear Facilities*, 25.

[86] Ibid., 32.

say that all other options had failed at that point with military action being the next logical step. The fact that sanctions are in place at all would likely result in the perception of favorable international views for Israel whether they were working or not though which also contributes to the level that it would promote if false.

7. United States Provides Additional Capabilities to Israel

The overall success rate for the current Israeli *Iron Dome* missile defense system has been described by various officials as having anywhere between a 75 and 95 percent success rate based on statistics from their 2012 clash with Hamas.[87] While Israel already has a capability in place, some of the rockets launched still made it through their system and while 95 percent is a high number, the system can still be improved upon. That said, the United States has committed to assisting the Israeli's defense at least by setting aside funding for the expansion of their *Iron Dome* missile defense system. The IAF's air defense layout was initially equipped with two batteries funded by Israel, and was later upgraded to an additional two batteries that were funded by the US (so far, the US has funded construction for four *Iron Dome* batteries).[88] The US Congress recently began the process to approve an additional grant of $600 million to fund four supplementary batteries and a substantial quantity of interception missiles.[89] Under the assumption that the special budget will be approved, the Israeli Defense Force (IDF) is preparing to operate a total of ten *Iron Dome* batteries throughout the country. However, according to IDF scenarios, they require thirteen to fourteen *Iron Dome* batteries to protect IAF bases, strategic infrastructure sites, and central cities in southern and northern Israel.[90] There are currently no plans to field that many units and thus, a part of the country is still left vulnerable.

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[87] Clay Dillow, "How Israel's Iron Dome Knocks Almost Every Incoming Missile Out of the Sky," *Popular Science*, 19 November 2012, accessed 25 January 2013, http://www.popsci.com/technology/article/2012-11/fyi-how-israel's-'iron-dome'-knocks-incoming-missiles-out-sky.

[88] "10 Iron Domes for IDF," *Israeli Defense Online*, 13 June 2012, accessed 25 January 2013, http://www.israeldefense.com/?CategoryID=411&ArticleID=1351.

[89] Ibid.

[90] Ibid.

If the United States were to further augment missile defense capabilities with more *Iron Dome* units or with United States assets in the region to protect Israel completely, this would likely have an influence on their decision-making. For example, if Israel feels protected from an Iranian-based nuclear missile based on the defense capabilities available, they may feel that the need to make a first strike is much less and can wait until Iran makes the first move. This would prevent the international community from condemning their actions while still assuring their existence is not put in jeopardy by the mere existence of an Iranian weapon. Thus, if the international community felt as though Israel were completely protected by missile defense, node #3.3 would inhibit support for a strike if that statement was true and would slightly promote if false with the idea that the international community would look at them as more vulnerable (and thus with more of a right to strike) if those capabilities were not given by the United States.

8. United States Supports an Attack

Support from the United States is a crucial point with the decision to attack, not just from the possibility of the U.S. actually providing military hardware but also from a political standpoint. Israel Defense Minister Barak indicated that Israel must have overt or at least tacit support from America for carrying out an attack.[91] Public opinion is also tied in very closely with support from the United States and shifts drastically depending on the support received as was addressed in the domestic section. That said, while Israel looks to the United States for support, non-support does not necessarily mean a strike it out of the question. According to multiple sources, Israeli leaders have not been satisfied with U.S. responses to their attempts to obtain assurances that the United States would use force against Iran if non-military measures are deemed insufficient.[92] These sources also noted that while Israel has asked Obama for assurances, Defense Minister Barak also said that if sanctions fail, he would use force against Iran.[93] Obama's refusal to provide

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[91] U.S. Library of Congress, Congressional Research Service, *Israel: Possible Military Strike Against Iran's Nuclear Facilities*, 16.

[92] The Associated Press, "Israel Won't Alert U.S. About Attack on Iran: Report," *NY Daily News*, 28 February 2012, accessed 20 January, 2013, http://www.nydailynews.com/news/world/israel-won-alert-u-s-attack-iran-report-article-1.1029741.

[93] Ibid.

that assurance has helped shape Israel's posture, which is a refusal to promise restraint on Israel's part or even to give the United States advance notice of an attack if some type of support is not made by the Obama Administration.[94] As a result, while statement #3.4 being true would clearly promote the statement that there is international support, a lack of United States support would not inhibit as much as one may think based on these types of statements being made. While U.S. support is highly desirable, it is not a hard requirement for the Israelis to take action.

9.   United States Support for Israel Declines

While overt or tacit support from the United States would signal a strong promoting sentiment for the Israelis to take action, a lack of support does not necessarily inhibit action based on statements from the previous section. However, it is worth considering what a decline in support, a condemnation of action, or less support in light of more pressing issues on the American agenda would mean for the decision-making process. It has been largely assessed that the relationship between the Obama Administration and Israeli leadership has been tense and with less manifested support in comparison to previous U.S. administrations.[95] Additionally, prospective Secretary of Defense Senator Chuck Hagel has made comments over his career that have been considered by some as anti-Israeli, or at least cavalier, regarding complicated issues in the Middle East, lending to a possible perception of a less supportive Executive branch.[96] While the impact of the executive leadership and those holding the presidential cabinet positions may not explicitly change the official political course that the United States takes with Israel, it may cause Israeli decision-makers to trust the support of the United States less. Thus, as a general assessment of the U.S. administration is made, this may have a slight impact on how the international support piece is weighed. If more of the

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[94] Ibid.

[95] Don Waxman, "The Real Problem in U.S.—Israeli Relations," The Washington Quarterly 35, no. 2 (2012): 71-73, doi:10.1080/0163660X.2012.666172.

[96] Glenn Kessler, "Chuck Hagel and Israel in Context: A Guide to his Controversial Statements,"Washington Post, 8 January 2013, accessed 29 January 2013, http://www.washingtonpost.com/blogs/fact-checker/post/chuck-hagel-and-israel-in-context-a-guide-to-his-controversial-statements/2013/01/07/be1cc3f8-591c-11e2-9fa9-5fbdc9530eb9_blog.html.

executive leadership were assessed as having wavering support towards Israeli policy, it could easily be said that there is less overall international support, which is why there is a slight inhibiting link strength for #3.5.

Additionally, domestic issues unrelated to the Israel/Iran crisis internally or abroad (e.g., a conflict with China) may focus the country and the administration on concerns that may affect how much attention is given to the Israelis. If they perceive that the United States must concentrate efforts elsewhere, there would be an incidental lack of support by necessity and this would have the same inhibiting effect on international support. If either of those prospects are false, though, there will be no impact as the status quo stance on Israel (overall U.S. support) will be assumed.

C.   REGIONAL

In the twenty-first century thus far, the Middle East experienced a time period of ever-increasing tensions and transformation as the regional populace became discontent with many of the regimes in power.[97] This was highlighted in 2010 when the *Arab Spring* began, which led to leaders being toppled, civil uprisings, and protests in more than fifteen Middle East states.[98] As regional governments were overthrown in regions directly neighboring Israel, it led to a large degree of uncertainty as far as the end-state and how the balance of power would settle with regard to new leadership and largely new shifts in governance. These factors will largely affect the relationships with neighboring states, especially those countries directly bordering Israel like Egypt, where the Muslim Brotherhood has assumed some degree of power following former Egyptian leader Mubarak. Factors on the Iranian end of the spectrum will also impact regional affairs as they interact with those in the Gulf Cooperation Council (GCC). The nodes in this section will account for those factors along with regional military cooperation and the nearby conflict with the region of Palestine as they relate to the Israeli decision to take action.

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[97] David Ignatius, "Obama's Calculated Gamble," *Real Clear Politics*, 6 March 2011, Accessed 1 February 2013, http://www.realclearpolitics.com/articles/2011/03/06/obamas_calculated_gamble_109123.html.

[98] "The Arab Spring Country by Country," *National*, 17 June 2011, accessed 1 February 2013, http://www.thenational.ae/news/world/middle-east/the-arab-spring-country-by-country#full.

Ref #	Regional Level Three Node	Impact to Level Two if True	Impact to Level Two if False
4.1	Regional countries unite and ally themselves publicly with Iran	Inhibits (-0.7)	Slightly Promotes (+0.2)
4.2	Palestinian peace process deteriorates	Slightly Inhibits (-0.2)	No Impact
4.3	Israel has freedom to use regional airspace as a strike route to Iran	Promotes (+0.4)	Slightly Inhibits (-0.2)
4.4	Iran internal affairs discourage an Israeli strike	Inhibits (-0.5)	No Impact

Table 4.   Regional Level Three Nodes and Link Strengths.

1.   Regional Countries Ally Publicly with Iran

Based on alliances in the region with both Israel and Iran, sentiments from nearby countries will play a role in the decision-making process of Israel. If countries remain neutral or support Israel, it will not have as much of an effect as if a country unequivocally supports Iran in the conflict. Overt support of Iran will lead Israel to question the strength of a retaliation effort with prospective assistance from those states and the consequences of a larger isolation in the region after a strike. It generally assessed that overall regional reactions to a preemptive strike would be negative, further inflaming anti-Israel sentiment that is already present to some degree in nearby Arab nations.[99] Any prospect of shared anti-Iranian sentiment forging a relatively discreet common cause between Israel and Arab Persian Gulf states or Israel and Turkey would dissipate in the face of a strike.[100]

While Iran has been losing ground with Arab populations that are disillusioned with its repression at home and its support for President Assad's brutal repression in Syria, an Israeli strike could allow Iran to bounce back as it plays the victim and fuels

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[99] Dalia Kaye, "Why an Israeli Attack on Iran Doesn't Make Sense," *Los Angeles Times*, 21 February 2012, Accessed 25 January 2013, http://articles.latimes.com/2012/feb/21/opinion/la-oe-0221-kaye-israel-20120221.

[100] Ibid.

popular hatred toward Israel.[101] Likewise, Israel's relationship with key neighbors Egypt and Jordan, more bound to popular sentiment in the aftermath of the Arab uprisings, could be severely strained, putting at risk vital peace treaties.[102] This is amplified as Iran reaches out to Egypt to strengthen diplomatic ties following the overthrow of Mubarak. Egyptian President Morsi's visit to Iran in 2012 prompted a wave of speculation regarding the reestablishment of diplomatic ties between the two countries.[103] In an interview published in late 2012, around the time of the visit, Iranian Foreign Minister Salehi said that Tehran was eager to establish relations of "friendship and brotherhood" with Cairo, elaborating that Tehran hoped to restore "normal" relations with Egypt.[104] While the merits of these statements or the likelihood of whether or not Egypt would go through with such a move are up for debate, the fact still remains that if they did decide to exchange ambassadors and reinitiate ties, Israeli relations would be in jeopardy. Having any alliance between an Israeli-bordering nation would only dissuade Israel from acting, given the increased chance that defense from retaliation would be made much more arduous with an Iranian partner in such close proximity.

On the other hand, while there may be shifts in some countries after the Arab Spring, other nations will not be allying themselves with Iran any time soon. Thus, information feeding into this node will be split up by country for parent nodes in level four of the model. For example, while the situation with Egypt changes, a country like Saudi Arabia takes a completely different stance on relations. One message from the leadership of Saudi Arabia repeatedly asked the United States to "cut off the head of the snake"—presumably meaning to attack Iran's nuclear program—while there was still time, and another went as far to warn that if Iran is not stopped, gulf Arab states would

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[101] Ibid.

[102] Ibid.

[103] Chelsea Daymon, "The Resurgence of Egyptian-Iranian Relations," *OpenDemocracy*, 30 August 2012, accessed 04 February 2013, http://www.opendemocracy.net/opensecurity/chelsea-l-daymon/resurgence-of-egyptian-iranian-relations.

[104] Ibid.

develop their own nuclear weapons. [105] As a result, it can be said that Israel won't face complete opposition to a strike, but the dynamics within the region are complicated, and the pull of each nation will need to be carefully weighed as it is fed into the model.

Israel has never been fully integrated into the Middle East, but on the diametric end they have also never faced complete isolation from regional states, which will require staunch support abroad in the face of such a prospect. In the past, when Israel has confronted Arab nationalist adversaries in the past (Egypt and Iraq), it had the non-Arab *periphery* to turn to (Iran and Turkey), and when Israel perceived a rising threat from Iran, it turned to peacemaking with its Arab neighbors.[106] Israel has not faced a strategic situation in which it is isolated from Arabs and non-Arabs alike, while at the same time facing growing isolation on an international scale. Thus, the more countries that align themselves with Iran, the more it will affect node #4.1. That will strongly inhibit the strength of any regional support (and ultimately a strike) based on the number of nations that come forward to take a stance on the situation over time.

2.   Palestinian Peace Process Deteriorates

At the time of this writing, there is little expectation of significant movement on either side of the Israeli-Palestinian conflict. Despite paying lip service to the principle of two states for two people, Netanyahu has done almost nothing to advance it as a reality.[107] In fact, accelerated settlement expansion has come very close to killing off the two-state solution for good, say many diplomats.[108] The next move on either side will depend heavily on how the new parliament acts towards the situation. The *Jewish Home* political party, expected to be the third biggest party in the parliament, has called for the

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[105] Glenn Kessler, "WikiLeaks's Unveiling of Secret State Department Cables Exposes U.S. Diplomacy," *Washington Post*, 29 November 2010, accessed 28 January 2013, http://www.washingtonpost.com/wp-dyn/content/article/2010/11/28/AR2010112802395.html.

[106] Dalia Kaye, "Why an Israeli Attack on Iran Doesn't Make Sense."

[107] Harriet Sherwood, "Iran, the Palestinians, the US: Issues the New Israeli Government Must Tackle," *Guardian*, 22 January 2013, accessed 5 February 2013, http://www.guardian.co.uk/world/2013/jan/22/iran-palestine-us-israel-government.

[108] Ibid.

annexation of large swaths of the West Bank and flatly opposes a Palestinian state.[109] The Hatnuah Party is the only potential coalition partner that has advocated meaningful negotiations on a permanent two-state solution.[110] While any absence of action or positive action towards peace may not affect the likelihood of a strike, deterioration on the other hand would mean bracing for immediate conflict between the two populations. This would undoubtedly divert valuable defense resources in an effort to concentrate the use of force regionally towards the Palestinian crisis. This, if this is true for node #4.2, the deviation from the status quo would reduce readiness and make regional conditions less likely to support a strike. However, the action is only slightly inhibiting as the Iranian surrogate Hamas, which may also inflame the Iranian issue further, may largely influence actions coming from within the Gaza Strip.

3. Israel Has Freedom to Use Regional Airspace as a Strike Route

The distance from Israel to Iran poses a significant difficulty in terms of access to airspace that is needed for a successful operation. Depending on the route selected, Israeli aircraft would have to cross the sovereign airspace of some combination of Saudi Arabia, Jordan, Iraq, Syria, or Turkey on both legs of the trip (see Figure 8). According to one report, the route over Iraq would be the most direct and likely, because Iraq effectively has no air defenses and the United States, after its withdrawal, no longer has the obligation to defend Iraqi skies.[111] Thus, if Israel is able to bypass Syrian airspace, whether by transiting surreptitiously as they did with the 2007 raid on the suspected Syrian nuclear site near Deir al Zur, or due to rebels overthrowing the Syrian regime (or at least air defense facilities), the combined Syria-Iraq route may work. While Israel can travel through Iraq by going through Jordan instead of Syria, this route is less likely to work. Jordanian officials have been largely supportive of Iran's right to develop a peaceful nuclear program and Jordan's King Abdullah II has publicly opposed any

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[109] Ibid.

[110] Ibid.

[111] U.S. Library of Congress, Congressional Research Service, *Israel: Possible Military Strike Against Iran's Nuclear Facilities*, 27.

military strike against Iran, advocating a diplomatic solution to the conflict instead.[112] Thus, this route is less likely if the IDF believes they can bypass Syrian airspace. A third option would be down through the Gulf of Aqaba over Saudi Arabia and then either Iraq of Kuwait. In recent years, Saudi Arabia has publicly questioned the peaceful nature of Iran's nuclear enrichment program and their overall opposition to Iran's nuclear program has generated speculation that the country might endorse military action against Iran should diplomatic approaches fail.[113] There have even been reports that have suggested that that Saudi Arabia had already granted permission for Israel to overfly its territory for a strike if needed at one point and even conducted drills to ensure air defense systems weren't active during such an overflight.[114] A final route may involve Turkey, however they are also unlikely to allow use of their airspace, as it may constitute a Turkey-Israel conspiracy to strike, which could have other negative political implications.[115] While any route comes with some operational or political risk, Israel may always choose to disregard permissions and may attempt to utilize foreign airspace without getting permission. They may also try to skirt the borders of two countries as they make their way back and forth, meaning that even if they don't have explicit permission to use a route, it is less inhibiting on node #4.3 than it is promoting if they have explicit or tacit permission from any one country. Either way, access to airspace will be a regional consideration that needs to be accounted for before any type of strike can be planned and executed.

[112] Will Fulton, et al., "Jordan-Iran Foreign Relations," *American Enterprise Institute Iran Tracker*, 11 August 2011, accessed 5 February 2013, http://www.irantracker.org/foreign-relations/jordan-iran-foreign-relations.

[113] Will Fulton, et al., "Saudi Arabia-Iran Relations," *American Enterprise Institute Iran Tracker*, 1 August 2011, accessed 5 February 2013, http://www.irantracker.org/foreign-relations/saudi-arabia-iran-foreign-relations.

[114] Hugh Tomlinson, "Saudi Arabia gives Israel clear skies to attack Iranian nuclear sites," *Times*, 12 June 2010, accessed 5 February 2013, http://www.thetimes.co.uk/tto/news/world/middleeast/article2552397.ece.

[115] Abdullah Toukan, *Study on a Possible Israeli Strike on Iran's Nuclear Development Facilities*, CSIS Report (Washington, DC: Center for Strategic and International Studies, 2009), 62.

Figure 8.   Map of Potential Israeli Strike Routes. From [64].

4.   Iran Internal Actions Discourage a Strike

The Islamic Republic of Iran and other such regimes, which base their survival on fear tactics and intimidation, constantly face the danger of the populace gaining strength and revolting. The Iranian people, three-fifths of whom are younger than 30, and more than 30 million of whom are connected to the Internet, have shown signs in recent years of testing the limits of the security forces' loyalties to the current regime.[116] Protests post-election and the Green Movement have been clear indicators as catalysts for potential change and civil disobedience may be sparked at any time. Although the movement has lost some of its momentum over the past year, the fact remains that if it ever strengthened again, Iran could someday be faced with an insurrection. If there was an uprising, it is likely that the challenged leadership within Iran would have to shift focus drastically to quelling the revolt and may have to halt efforts toward their goals for any kind of an advanced weapon. Additionally, if it looked as though there would be a

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[116] Abbas Milani, "New Republic: Iran Green Movement Needs Water," *National Public Radio*, 25 February 2011, accessed 5 February 2013, http://www.npr.org/2011/02/25/134051135/new-republic-iran-green-movement-needs-water.

complete change of power, it would be advantageous for Israel to delay any strike with the hope that a new regime may take a slightly different view towards the Jewish state. Thus, node #4.4 implies conditions present that would lead to a overall decreased threat towards Israel from Iran, which would certainly be an inhibiting factor towards a strike.

D.   PROVOCATION AND OTHER FACTORS

There are a few occurrences that may sway a decision to strike that fall outside of the four general categories discussed. While they seem as though they could be related to some other categories, the nodes are actually distinct points that should be taken into account separately. For example, #5.3 and #5.4 (Table 5) both seem related to the nuclear node given that they assess capability to some degree. However, the nuclear level two statement is that "Iran has a nuclear weapons capability," while the statements in this section assess possible post-strike implications on capability vice the actual nuclear capability that would bring on a strike. Since those questions needed to be accounted for, this section exists for other factors in involved that Israel would likely wargame as they evaluate courses of action. Those, among other provocative statements, are meant to account for other smaller factors that may feed into the overall decision to strike and will have a smaller impact than any of the other level two nodes discussed in this Chapter.

Ref #	Provocation / Other Level Three Node	Impact to Level Two if True	Impact to Level Two if False
5.1	Iranian rhetoric towards Israel sparks conflict	Slightly Promotes (+0.2)	No Impact
5.2	Iranian rhetoric towards international community is made concerning attacks	Slightly Inhibits (-0.3)	No Impact
5.3	An attack is assessed to speed up nuclear weapons development within Iran	Inhibits (-0.4)	No Impact
5.4	An attack is assessed to only delay production and will not completely stop nuclear weapons aspirations based on current strike capabilities	Slightly Inhibits (-0.2)	Promotes (+0.4)

Table 5.   Provocation and Other Factors Level Three Nodes and Link Strengths.

1. Iranian Rhetoric Toward Israel Sparks Conflict

In recent years, the Iranian leadership has frequently made anti-Semitic and anti-Israel comments that place the regime among the foremost threats to Jews and the state of Israel. Iranian President Ahmadinejad has repeatedly demonized the state of Israel and openly calls for its destruction at every opportunity, most notoriously describing Israel as a "fake regime" that "must be wiped off the map."[117] While these general statements do not pose a specific threat or imply impending attack by Iran, they do add fuel to the fire in terms of the overall conflict. If Iran decides to increase propaganda against Israel or makes statements implying that they will actually attack once they are appropriately positioned from a readiness standpoint (whether nuclear or conventional), this will probably only increase the likelihood of action taken towards Iran. Even without crossing a *red line*, at some point the government of Israel may decide they have to defend the name of the country and may use the combination of statements made by the Iranian regime implying attack, in concert with the suspected weapons development program, as justification for a strike.

Thus, if propaganda toward Israel is increased, node #5.1 accounts for a slightly promoting factor towards a strike. If statements are not made, this will have no impact since the status quo is based on statements already made and with the nuclear enrichment program continuing in the absence of rhetoric from Iran.

2. Iranian Rhetoric Toward International Community Inhibits Attack

From December 2011 to January 2012, some Iranian government officials openly threatened to close the Strait of Hormuz if sanctions were imposed on Iran's oil exports.[118] While they have not attempted to do this with the sanctions put in place thus far, it demonstrates the idea that Iran believes they can use the Strait, a major artery of the global oil market, as a tool to leverage action (or inaction) on a global scale. Roughly 90

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[117] Anti-Defamation League, "Iran's President Mahmoud Ahmadinejad in his Own Words," 25 September 2012, accessed 07 February 2013, http://archive.adl.org/main_International_Affairs/ahmadinejad_words.htm.

[118] U.S. Library of Congress, Congressional Research Service, *Iran's Threats to the Strait of Hormuz*, by Kenneth Katzmann, R. Chuck Mason, Neelesh Nerurkar, and Michael Ratner, CRS Report R42335 (Washington, DC: Office of Congressional Information and Publishing, January 23, 2012), 1.

percent of all Arabian Gulf oil leaves the region on tankers that must pass through this narrow waterway opposite the Iranian coast; land pipelines would not provide sufficient alternative export routes if the waterway was blocked.[119] Extended closure of the strait would remove roughly a quarter of the world's oil from the market, causing a supply shock of the type not seen since the glory days of OPEC.[120] There is no doubt that countries around the world would want to avoid the repercussions of this given the second and third-order effects on oil-dependent economies. If Iran made threats to close the Strait of Hormuz as a response to a strike by Israel, there would likely be pressure from abroad to pursue every other available option first in an effort to avoid such an economic crisis. This is addressed in node #5.2 as having a slightly inhibiting effect on the likelihood of taking action. The same effect would likely be present for any threats that Iran makes that would directly impact other nations. Whether they be threats toward the embassies of Israeli allies or vows to attack on a larger scale, it is likely that there would be pressures to avoid conflict on a worldwide scale if possible. While statements pointing toward these responses in light of an attack would all inhibit Israel from striking without exhausting all other available options, a lack of these types of statements would have no impact on their actions. This is another case of the status quo being represented if a node's statement is false and only having a promoting/inhibiting action if true. A lack of these statements will not mean anything in terms of the nuclear situation that drives them to strike in the first place.

3.   An Attack is Assessed to Speed up Nuclear Weapons Development

The primary reason for pursuing a kinetic strike option against Iran's rests on the supposition that it would prevent Iran from obtaining a weapon that could be used to destroy Israel. If it were assessed that the outcome of a strike would actually result in Iran obtaining a weapon faster, that fact would likely change the strategy of the Israelis and would have an inhibiting effect that is represented in node #5.3. While it is difficult to predict, this is an outcome that is a very realistic scenario according to some experts on

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[119] Cailtin Talmadge, "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz," *International Security* 33, no. 1 (Summer 2008): 82.

[120] Ibid.

the issue. Those experts argue that an airstrike on Iran's nuclear facilities could actually lead to Iran's speeding up its efforts, ensuring the realization of a bomb and hastening its arrival.[121] Such a move would certainly free officials in Tehran of many constraints in that they would likely expel international inspectors, which, in turn, would allow the government to undo hundreds of monitoring devices and safeguards, including seals on underground storage units.[122] Often cited as a historical example is what happened after the attack on the Osirak reactor in 1981. Many say that Hussein had yet to decide to seek nuclear weapons until the humiliation of the strike, and that the strike both hardened his resolve and brought new life to the aspirations for a weapon.[123] If Israeli leadership agreed that this scenario was possible, and they believed that they could not effectively destroy all of the nuclear facilities, this would likely inhibit their decision to strike, as it would go against their ultimate goals of keeping a weapon from Iran. If they did not believe it to be true, it would not impact the way ahead as it would not change the status quo path towards their reasons for a strike.

4.   An Attack Is Only Assessed to Delay Production and Not Halt It Completely

While the International section (node #3.2) also addresses sanctions delaying production of a weapon, that node was just one example of the U.N. setting back Iranian progress in factors that may take place to delay a strike. Certainly other avenues exist for the U.N. to prevent nuclear efforts and that node was not meant to specifically address the implications of a delay on deciding whether or not to strike. Furthermore, this node is meant to specifically address the perceived effects on the Iranian program post-strike while the international node addresses effects that are seen pre- strike with regard to Iran's readiness and desire to enrich in the face of sanctions. There is a set of experts that believe that while a strike would, in fact, inhibit the development of a weapon, that it

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[121] Ynetnews, "Experts: Strike May Speed Up Nuclear Plan," 29 September 2012, accessed 8 February 2013, http://www.ynetnews.com/articles/0,7340,L-4286880,00.html.

[122] Ibid.

[123] Ibid.

would only be a temporary setback in production.[124] That said, the decision to strike would be more likely if it was assessed to completely destroy the program vice only delaying it. Israeli officials have said that a delay as opposed to full destruction of the program would not preclude a strike altogether in their decision so this node merely accounts for the impact of that outlook.[125] Thus, there is a slight inhibiting potential if it only delays production and a promoting potential if it is assessed that an attack would completely destroy their nuclear program.

E.   ROOT NODE

Up to this point in the chapter, all link strength explanations have been to explain and support level three nodes and their respective link strengths that feed into the primary categories under the root statement. However, link strengths also need to be assigned to each of the more general level two statements with regard to impact on the root statement. Assigning these link strengths is much more difficult, given that they are general categories and not specific items that can be researched individually for supporting references. Thus, the explanations for each of the level two node link strengths as parents to the root are based primarily on a qualitative assessment of research factors thus far to populate the lower level nodes. While this may seem unacceptable at first glance, since everything below level two is well supported, there are two justifications for assigning link values in this manner for the highest level below the root: one being fewer nodes at the top and the other being the likelihood for excursions at this point in the model.

The first goes back to the reason SIAM is used in the first place to assist with this problem; aggregating links between seemingly unrelated items is incredibly difficult when there are over fifty nodes to consider in the evaluation. However, by making the majority of those factors parents to the level two nodes, the problem is much simplified when we only have to compare the five general factors and how they impact the root. Aside from only dealing with

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[124] U.S. Library of Congress, Congressional Research Service, *Israel: Possible Military Strike Against Iran's Nuclear Facilities*, 32.

[125] Ibid., 16.

a few factors, there are no cross-links above level three in the model so it is just a matter of stepping back to look at how each would impact with some reference to the other factors. For example, if Iran has a nuclear capability, it can easily be said that the impact of that factor is both significant on its own, and more significant, than say, the regional factors involved (when put side by side). Thus, while each link is supposed to be accounted for individually, there is some reference to other nodes at this level just to ensure a similar scale is being used when assessing the promoting or inhibiting potential of each node.

The second justification for doing level two in this manner is the fact that, since these are largely qualitative statements, they are much more open to debate by subject matter experts. This is where the excursion features of SIAM can be implemented and it would likely only be done with a higher-level link if there were not time to dig through each node of the entire model. While a general assessment and baseline link strength will be made, it is much more likely that SMEs will argue over how important each general category is and thus multiple higher-level excursions can be conducted for their own view points. Those can then be aggregated for comparison and left to a high-level decision-maker on whose judgment he or she trusts to assign the values. With that in mind, the baseline link strengths used are below for level two along with brief notes on the qualitative factors that lead to the assignment of each category's link strength.

Ref #	Level Two Nodes	Impact to Root if True	Impact Root if False
1.0	Iran has a nuclear weapons capability	Strongly Promotes (+0.8)	Inhibits (-0.7)
2.0	Domestic conditions support a strike	Strongly Promotes (+0.7)	Inhibits (-0.6)
3.0	International conditions support a strike	Promotes (+0.5)	Inhibits (-0.5)
4.0	Regional conditions support a strike	Promotes (+0.5)	Slightly Inhibits (-0.5)
5.0	Provocation / other factors support a strike	Slightly Promotes (+0.2)	No Impact

Table 6.   Root Node Level Two Factors and Link Strengths.

1. Nuclear

The basis of Israel's action towards Iran is preventing Iran from getting weapons that could be used against Israel to, as President Ahmadinejad put it, would "wipe them off the map."[126] This, in conjunction with statements from Israel about *red lines* with Iranian enrichment efforts, makes the nuclear capability of Iran the primary driver towards Israel conducting a strike against Iran. Thus, node #1.0 is assessed to have the largest promoting/inhibiting potential depending on whether the capability is there or not. Absent a nuclear capability, justification for a strike would be very difficult in the eyes of the world and may completely isolate Israel if action is taken without some evidence of perceived hostilities from Iran.

2. Domestic

If Iran is assessed to have a nuclear capability, Israel's domestic ability to conduct an effective strike that is supported by both the government and the people is the next largest factor after Iranian nuclear capabilities. It is plausible that if Israel felt as though they were faced with an existential threat, that they would attempt a strike even if they could not guarantee success from a domestic readiness standpoint. That said, a strike may occur despite this node not reflecting full support and this is the justification for the promoting/inhibiting strength of domestic nodes being slightly less than the nuclear level two node. That said, aside from the existential threat, the domestic ability to strike and surrounding support from within Israel is the second strongest factor in deciding whether or not the Israelis should strike. Aside from an existential threat, there would not likely be a reason to strike if they did not believe it could be supported from a domestic readiness standpoint. This is because there would be time to either improve readiness or wait out the status of the Iranian nuclear program based on other factors.

3. Regional and International

While regional and international factors will have a large impact on the decision to take action, they are less important factors overall when compared to the nuclear and domestic nodes. This is simply because if there is a nuclear capability from Iran and

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[126] Anti-Defamation League, "Iran's President Mahmoud Ahmadinejad in his Own Words."

Israel has the ability to eliminate that threat based on domestic readiness (military capability and government/public support), it can be said that conditions support a strike based on the statements outlined from Israeli leadership. However, up until the point that both the domestic and nuclear nodes show up completely true, there is quite a bit of uncertainty with the problem; this is what the model aims to assist with in the first place as it looks at the whole range factors leading up to a decision to strike. While Israel may not be fully capable of supporting from a domestic standpoint, or while Iranian capabilities may only be suspected to some degree, the other two factors may make or break the decision to go forward with kinetic action. For example, support from the United States will play a large role in the overall decision, which falls in the international node, or the availability to obtain a suitable strike route from the regional node both play large factors contributing to domestic readiness. While both of those factors fall under other nodes, respectively, many of their parent factors will be cross-linked with the nuclear and domestic nodes, highlighting their importance and still influencing across the model. Thus, both international and regional factors overall are listed as either promoting or inhibiting at equal weights depending on their factors. While the strength levels are below those of the *hard* factors that are the nuclear and domestic nodes, they still have a significant ability to influence the decisions and are treated as such based on assigned strengths. These are certainly two nodes where SMEs may disagree to some degree about the link strengths and where excursions will be likely as they may place slightly more strength with either category.

4.   Provocation/Other

Finally, the provocation / other category is meant to account for other smaller factors that may tip the scales marginally as far as smaller decisions that come into play and as Israel wargames their courses of action. These factors, if true, only slightly promote the decision to strike as most are *soft* factors surrounding Iranian rhetoric or post-strike outcomes. If they are false, however, there will be no impact to the root level based on the nature of the statements in the nodes and the fact that they are either based on rhetoric that may not be present at all to inflame the situation or assessments that may not necessarily happen to impact the decision at all.

V. MODEL OUTPUT AND ASSESSMENTS

A. INITIAL MODEL OUTPUT (BELIEF EVALUATION)

Belief evaluation is the process of mathematically updating the current belief of every node in the model based on user inputs. In essence, this is the process used to run and re-run the model based on adjustments to each initial node. The initial run of the model was done using open-source information and a qualitative assessment of the certainty of each of the 70 initial nodes in the model. The high-level graphical depiction of the model is depicted in Figure 9 with the results at the Root Level shown in Figure 10. Overall, based on the first run of the model, it yielded a 43% belief that current conditions support a preemptive strike on Iran. To note, the model looks at 50% as unknown, with anything below that level to yield a false forecast and anything above resulting in a calculation of true. Thus, the statement that Israel will conduct a strike based on current factors with default excursion link strengths is false.

Multiple excursions can be run to adjust link strengths with comparison of the output to gauge how different weights may affect the outputs. Instead of running multiple scenarios, however, it is better to look at other assessments that SIAM gives based on the current link strengths to see how those may glean information useful in to a high-level decision-maker. Those assessments and their results are reflected below. Conclusions and analysis based on the results of those assessments are addressed in Chapter VI.
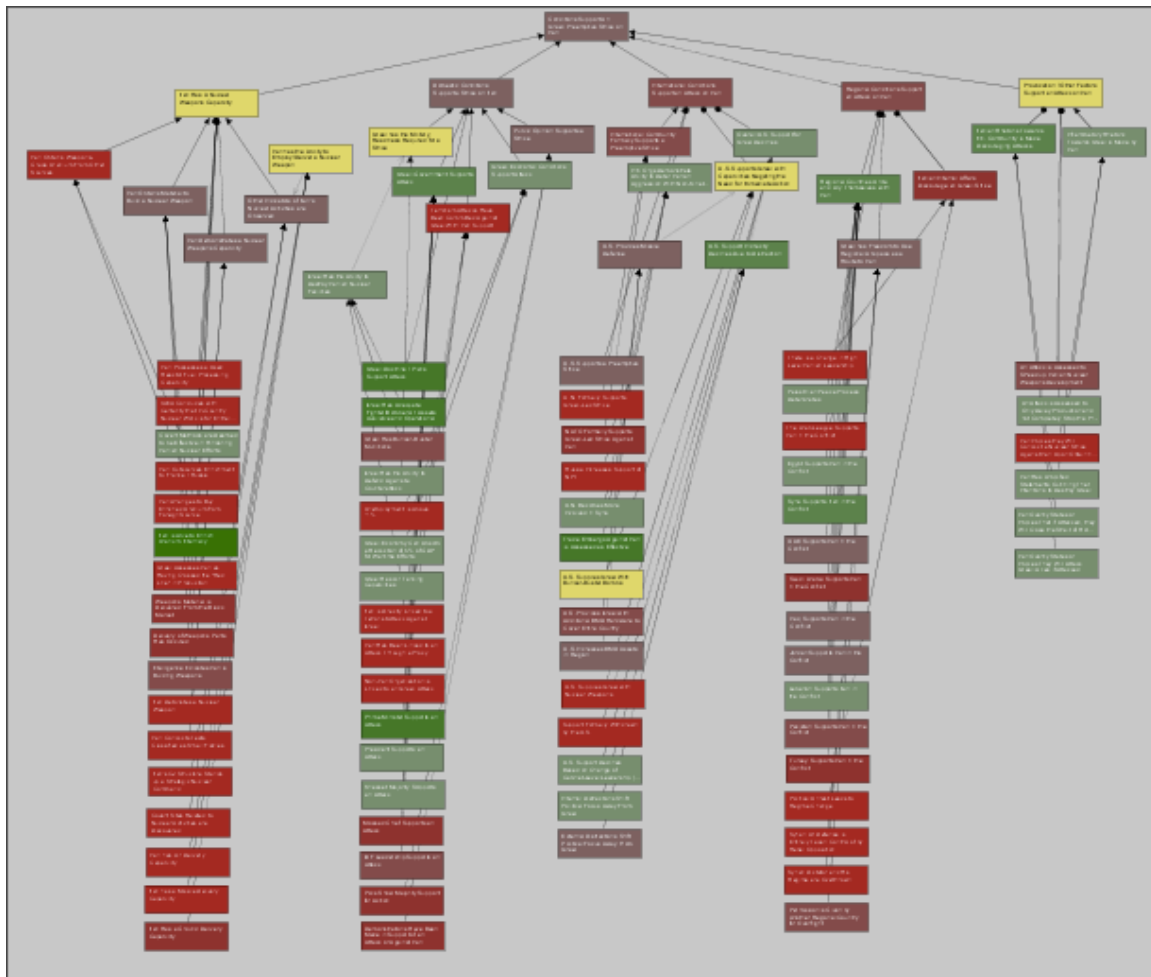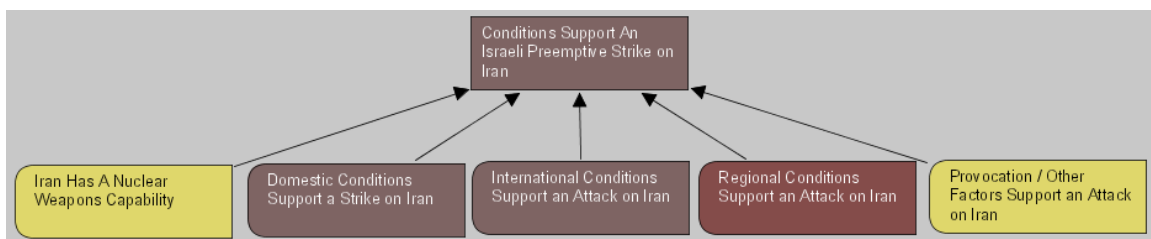
Figure 9.   Initial Belief Evaluation Overview.[127]

Figure 10.   Root Level View of Initial Belief Evaluation.

B. MODEL ASSESSMENTS

Impact analysis and sensitivity analysis allow one to extract information about individual nodes that may have a significant impact on the overall model. As described earlier, one of the problems with looking at such a broad problem is isolating factors that may impact the problem, especially those that are not especially obvious at first glance. Certain factors, for example, like Iran getting a nuclear capability certainly don't require a model to inform a decision-maker that the likelihood will be high that Israel considers a strike. The model is not intended yield this type of information. Rather, smaller factors may be concentrated on with assessments that would not normally be looked at or obvious as a route to push policy for guiding the problem or forecasting what direction the conflict is headed in as a briefing tool.

1. Impact Analysis

The impact analysis technique can be performed on any user-selected effect node within the model. The immediate influencing events are assessed to determine their relative influencing impact on the selected node. The impact of each parent on the selected node is determined from the user-assigned link strengths of the parent-child link. The intent of impact analysis is to identify which direct cause (parent) holds the greatest influence over the desired effect (child).[128] While impact analysis is important towards forecasting, it is arguably the less important of the two assessments that can be performed. What will yield more results from a decision-maker's perspective is sensitivity analysis, which is dealt with in the next section. Impact analysis results for each category are shown in Figures 11-16, with the root node being first and then the impact analysis on each of the general categories.

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[128] Science Applications International Corporation, "Situational Influence Assessment Module User's Manual Version 6.0," *SAICWebsite*, February 2006, accessed 13 February 2013, http://www.inet.saic.com/docs/_docs_/siam_manual.pdf.
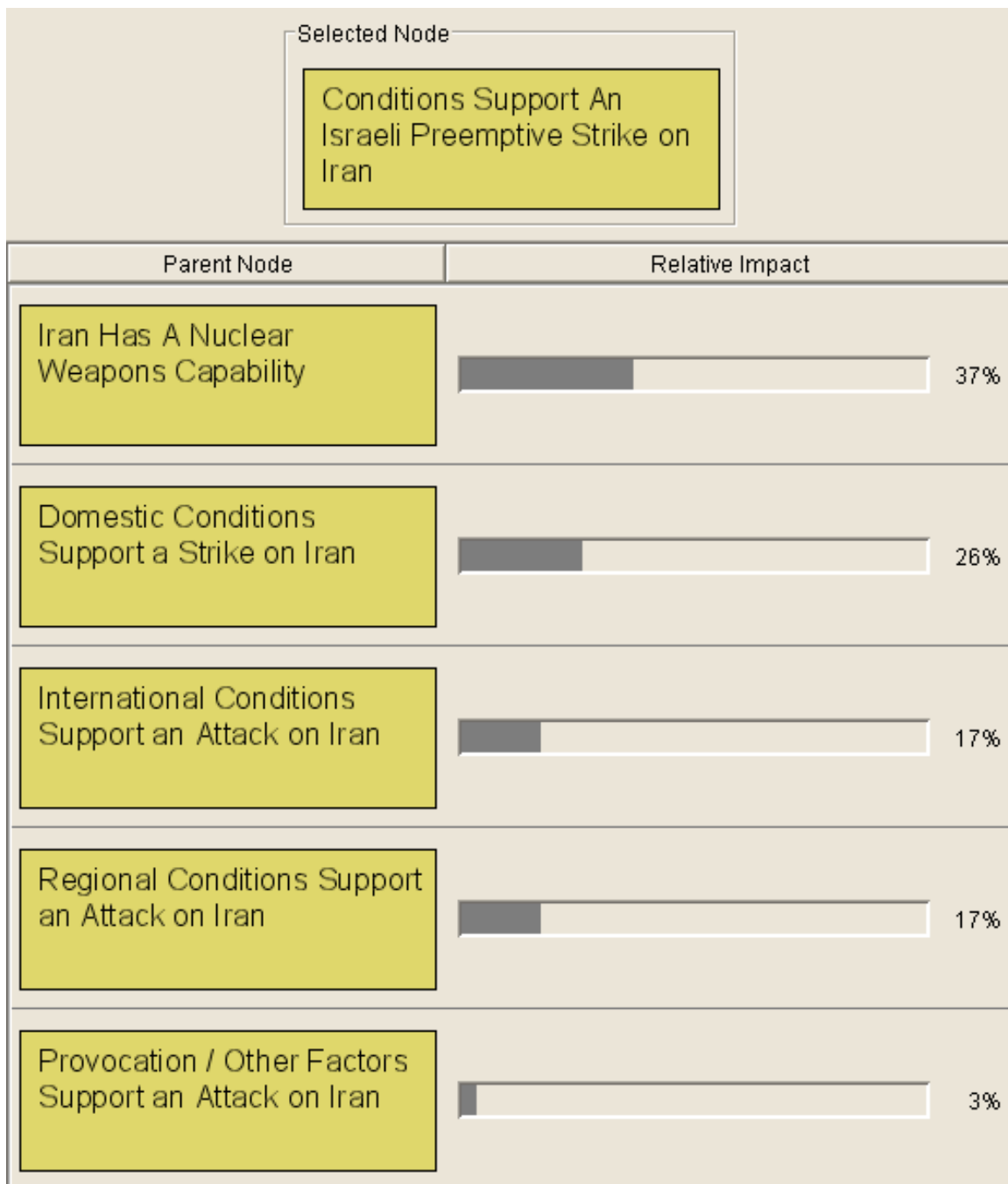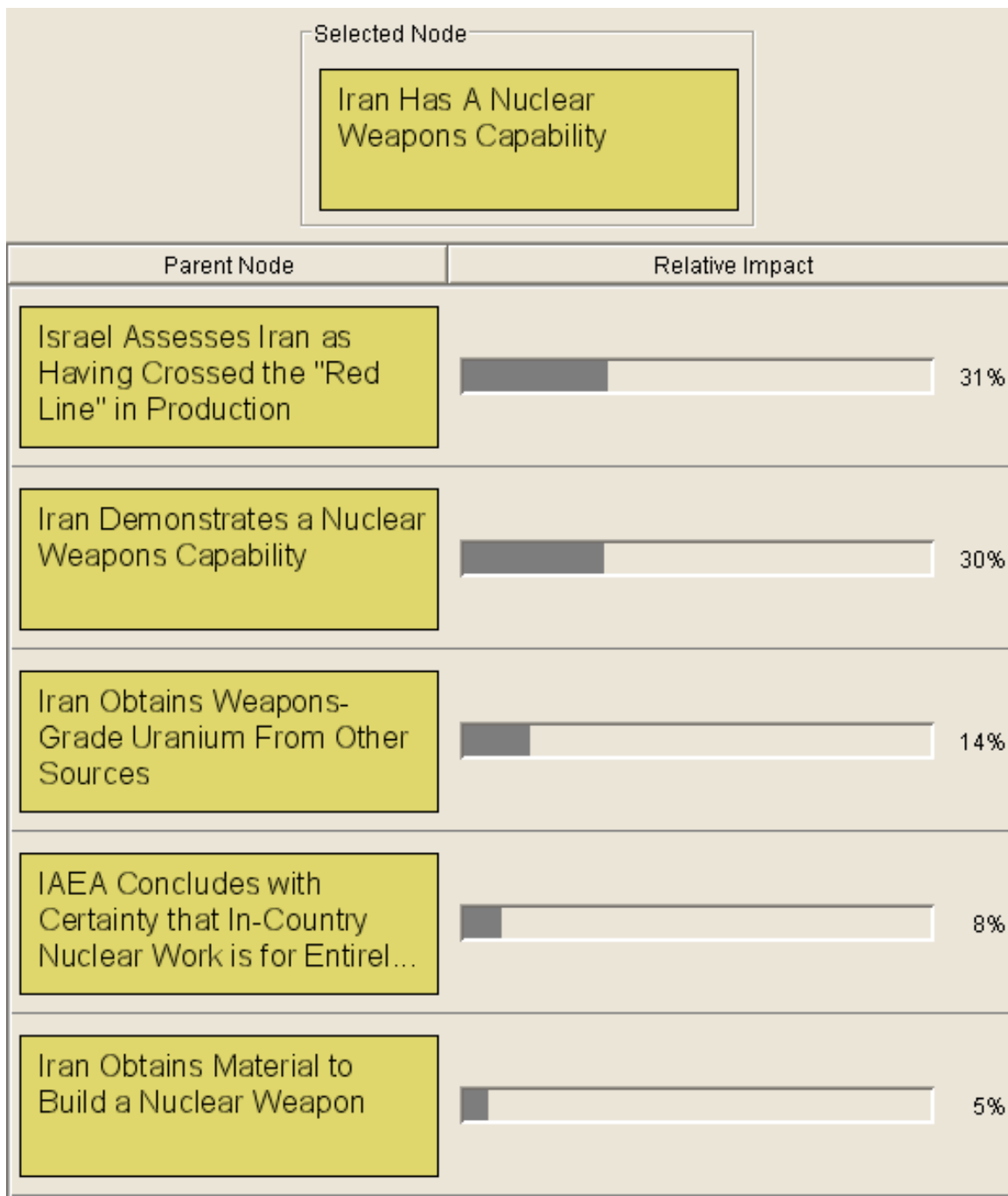
Figure 11.   Root Node Impact Analysis.

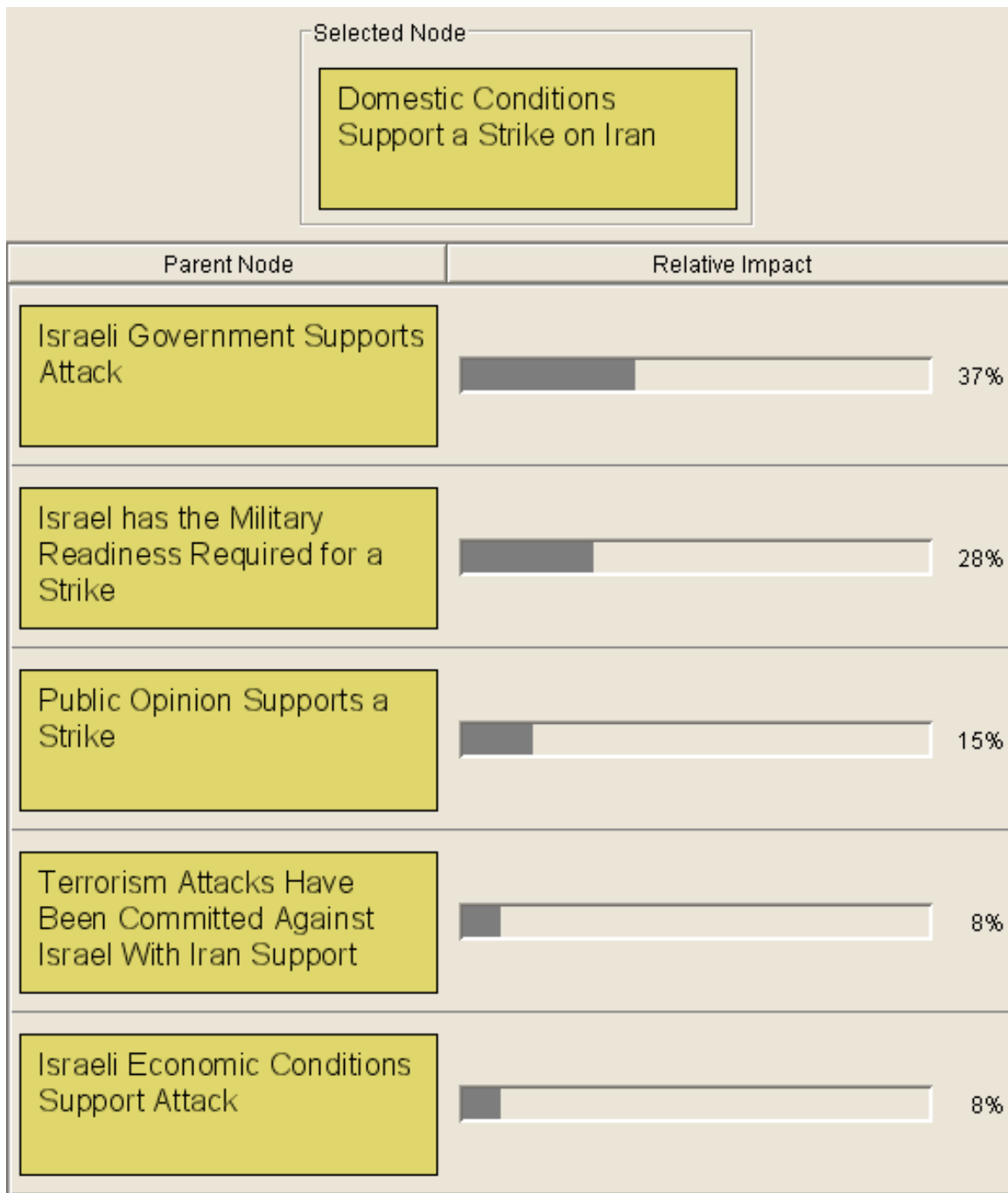Figure 12.   Nuclear Node Impact Analysis.

Figure 13.   Domestic Node Impact Analysis.

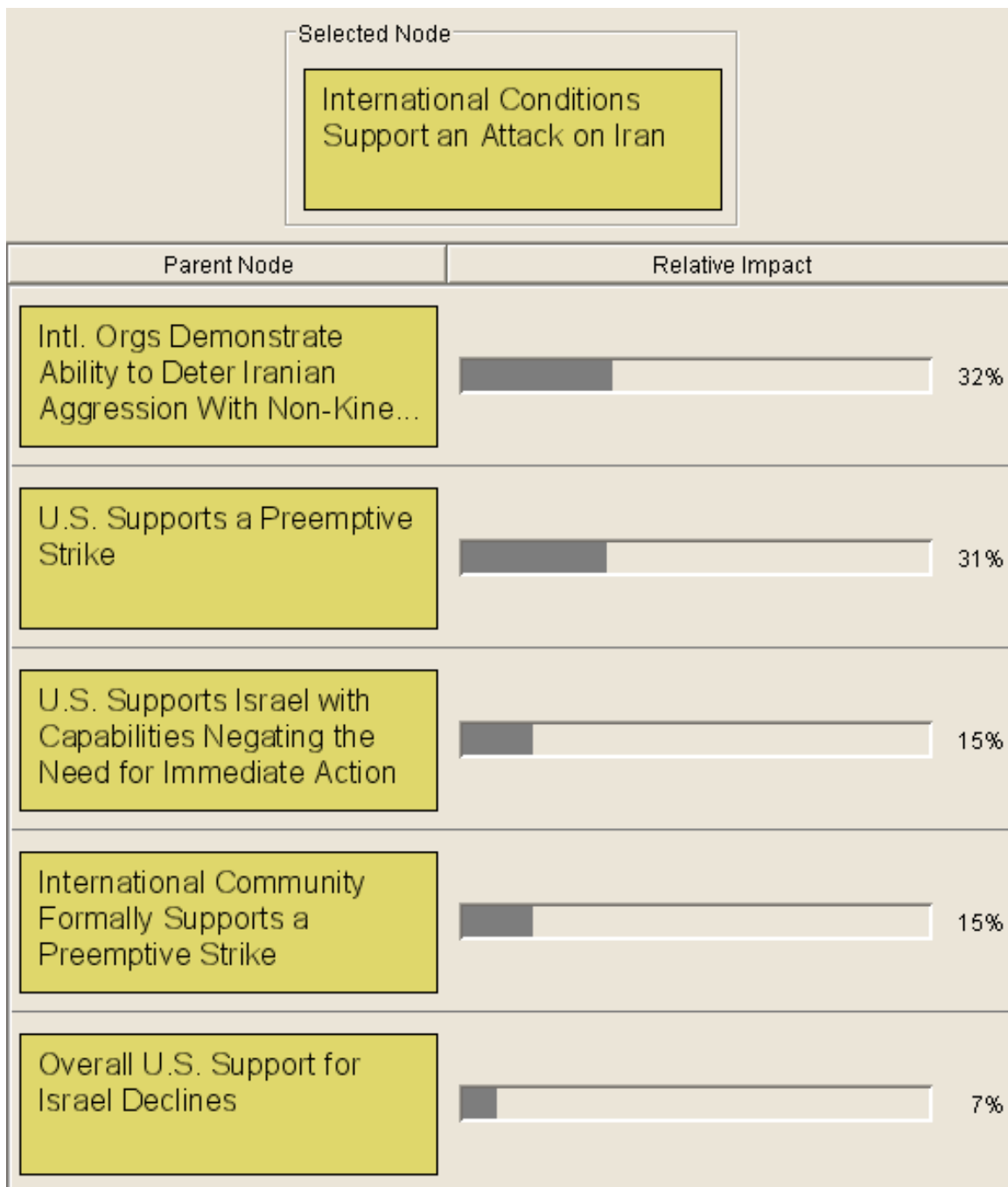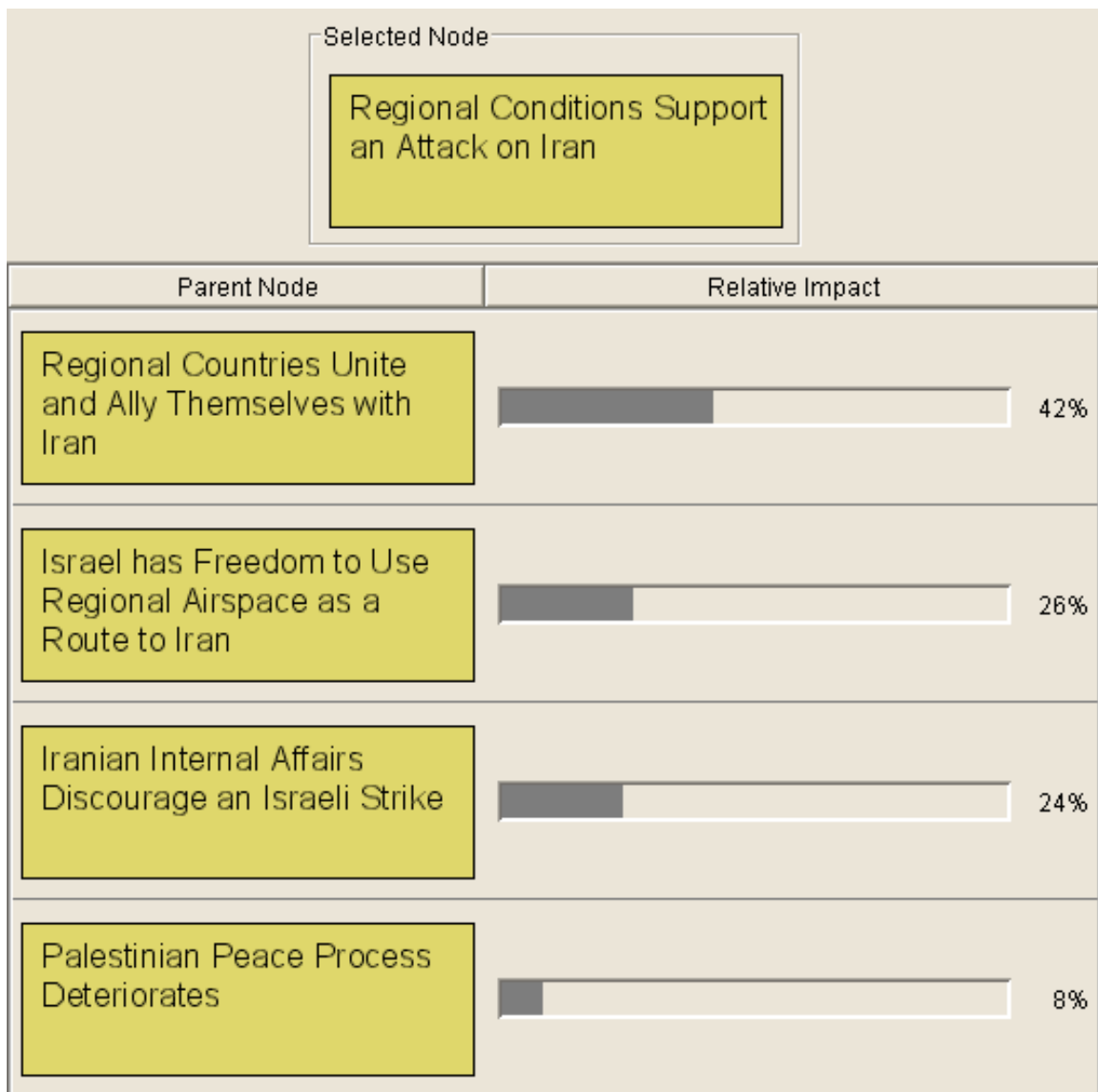Figure 14.   International Node Impact Analysis.

Selected Node

Regional Conditions Support an Attack on Iran

Parent Node	Relative Impact
Regional Countries Unite and Ally Themselves with Iran	42%
Israel has Freedom to Use Regional Airspace as a Route to Iran	26%
Iranian Internal Affairs Discourage an Israeli Strike	24%
Palestinian Peace Process Deteriorates	8%

Figure 15.   Regional Node Impact Analysis.
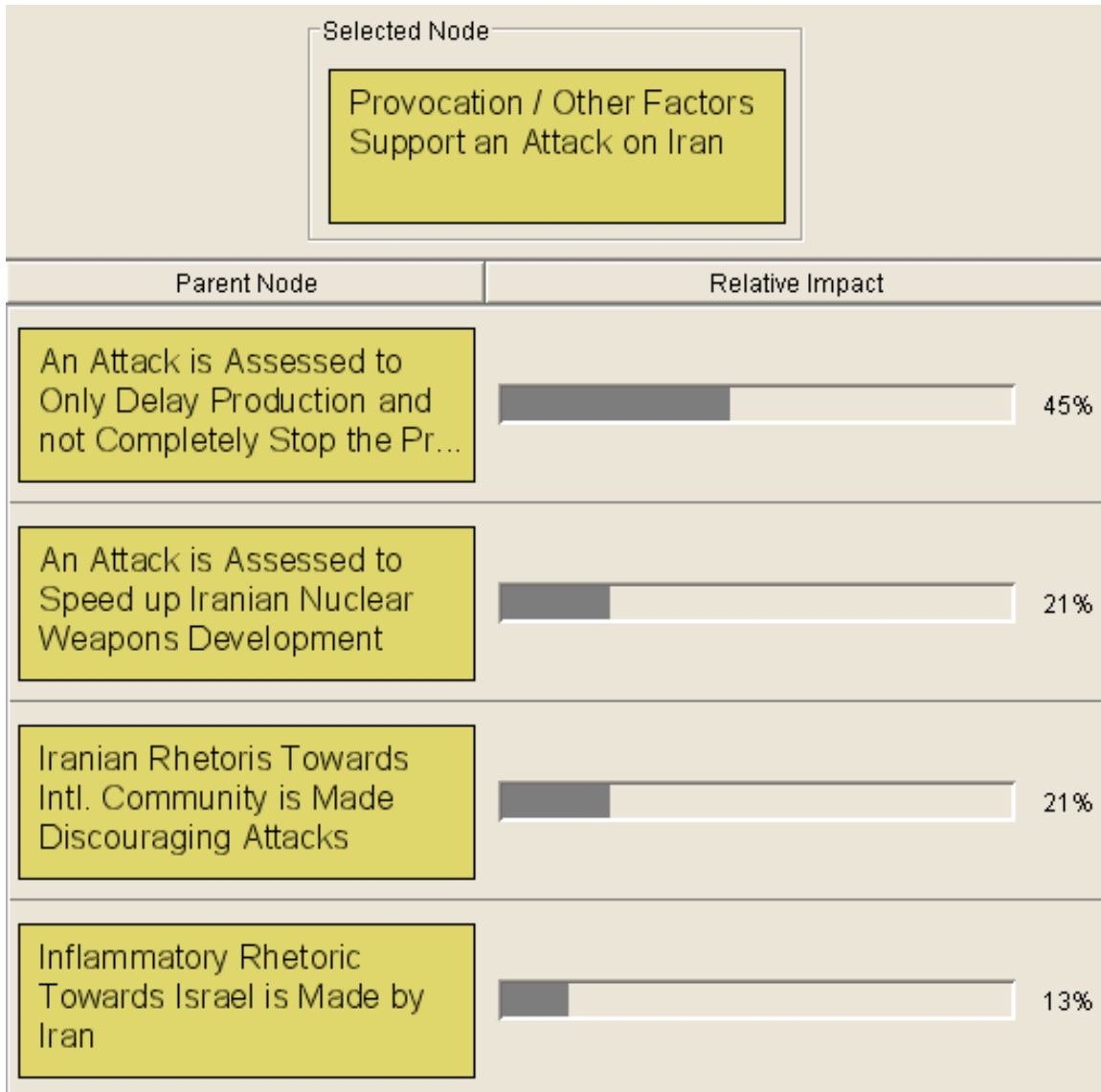
Figure 16.   Provocation/Other Node Impact Analysis.

2.   Sensitivity Analysis

In addition to impact analysis, SIAM also provides a set of sensitivity analysis methods that examine the potential to change the likelihood of a desired event's occurrence. Unlike impact analysis, sensitivity analysis considers both immediate cause–effect relationships and distant influences that may consist of multiple influencing chains.[129]

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[129] Ibid.

a.   *Pressure Parents*

Pressure Parents Analysis considers the potential for change in the user-selected event that is generated by the immediate causes of the selected event, i.e., the selected event's parent nodes in the same Influence Net. Pressure parent analysis for each node sorted by sensitivity, promoting potential, and inhibiting potential, is shown in Figures 17-34. The first three apply to the root node and the remaining figures are for each level two category.
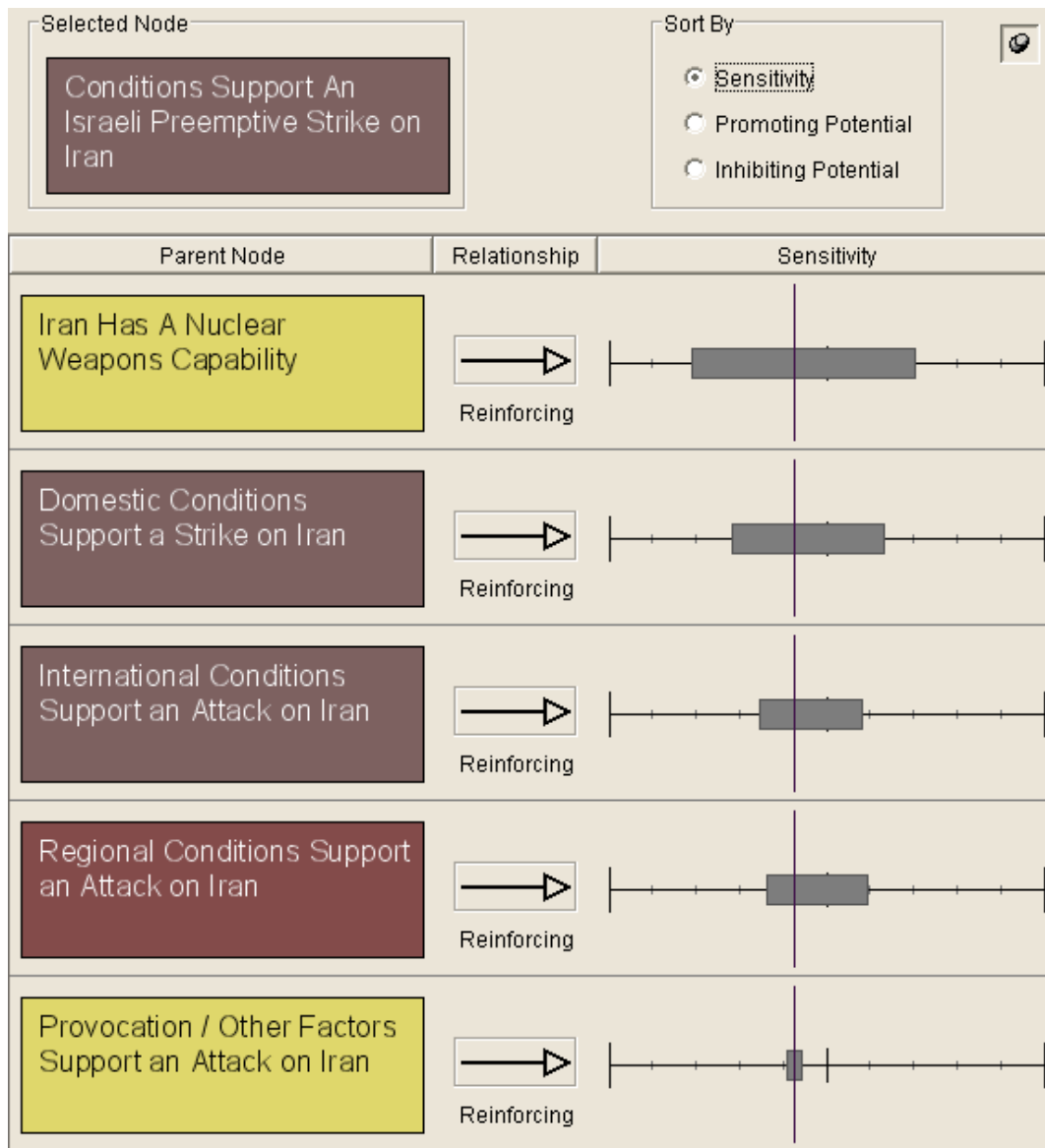

Figure 17.   Root Node Pressure Parent Sensitivity Assessment.
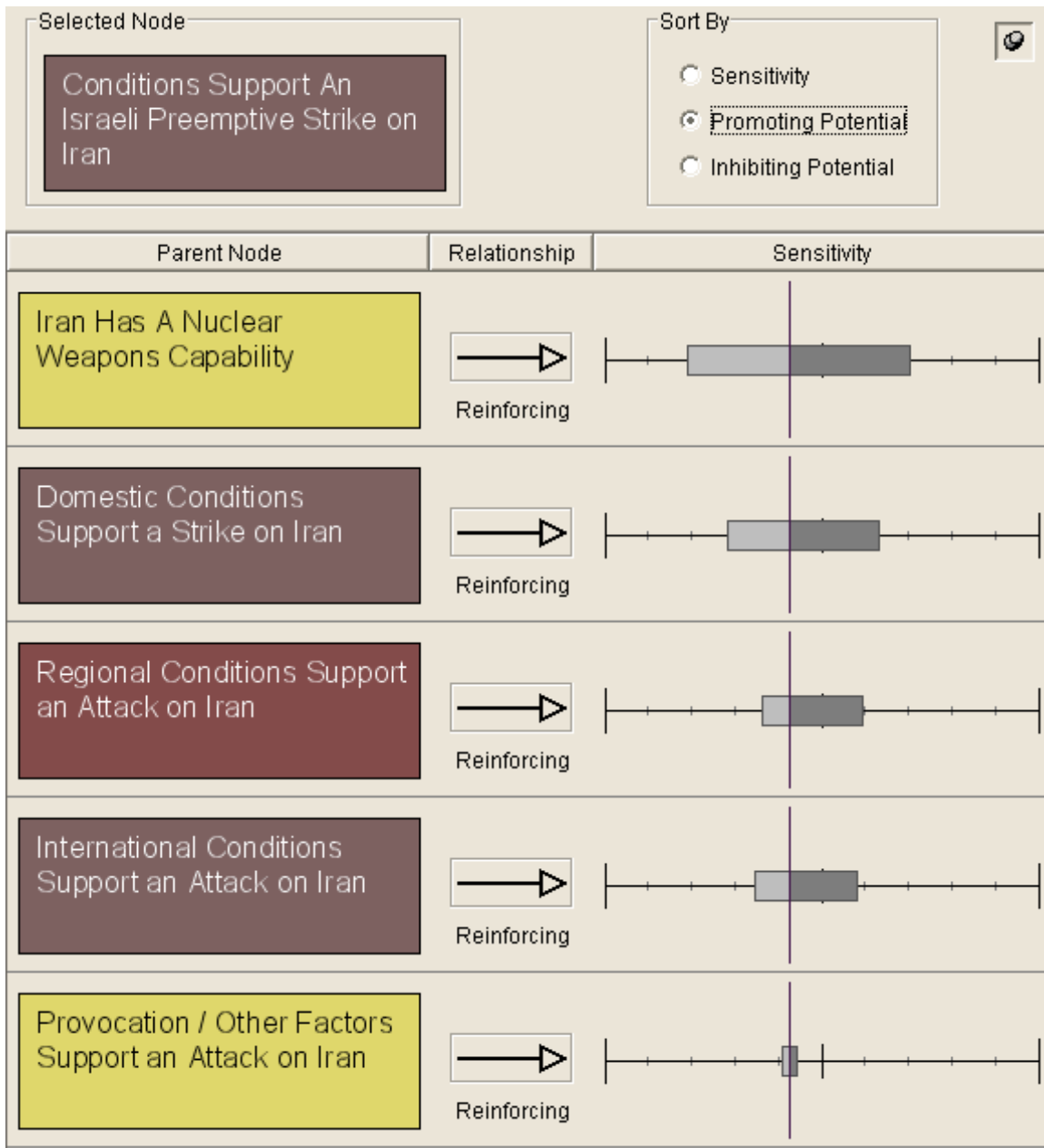
70

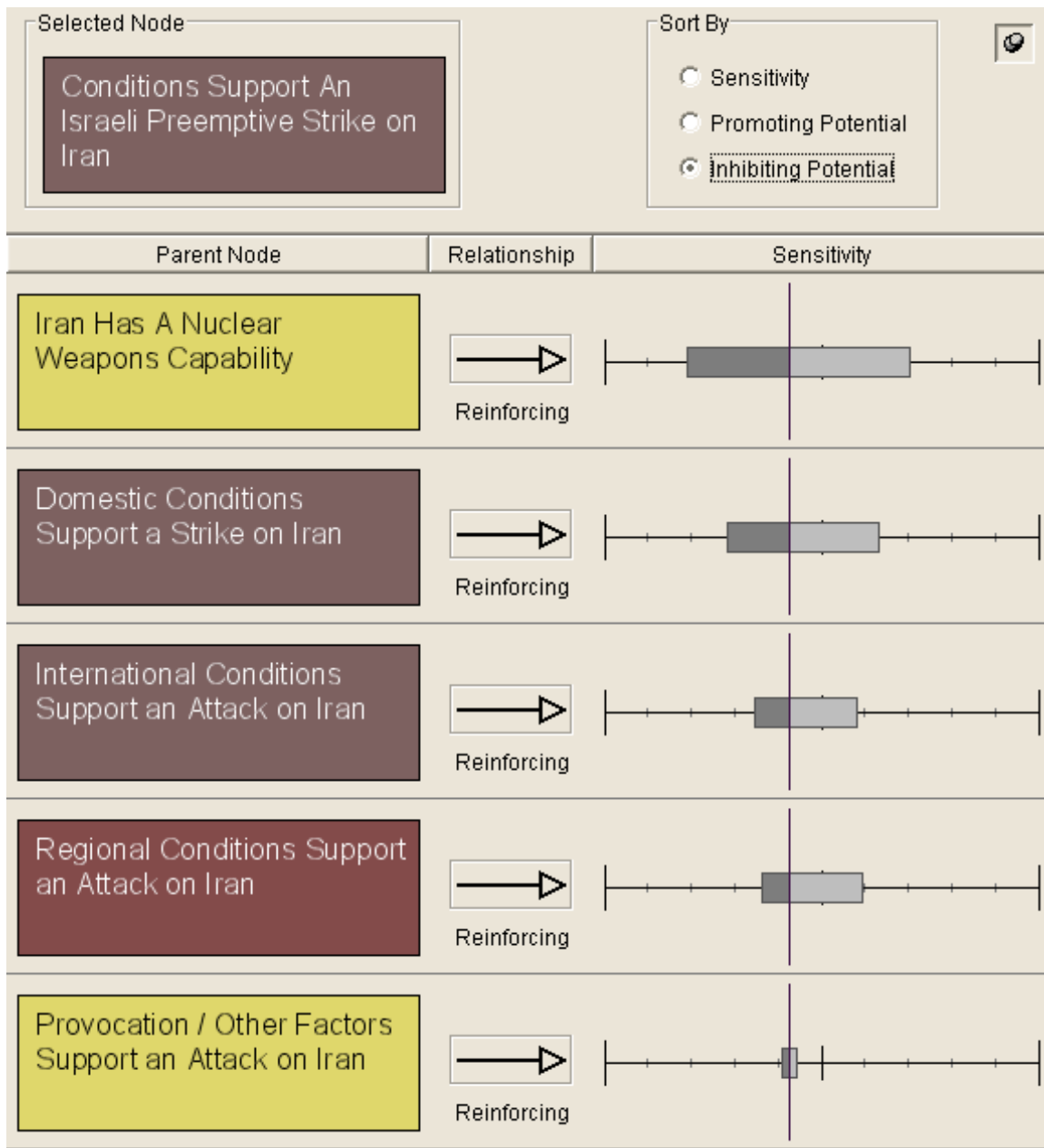Figure 18.   Root Node Pressure Parent Promoting Potential Assessment.

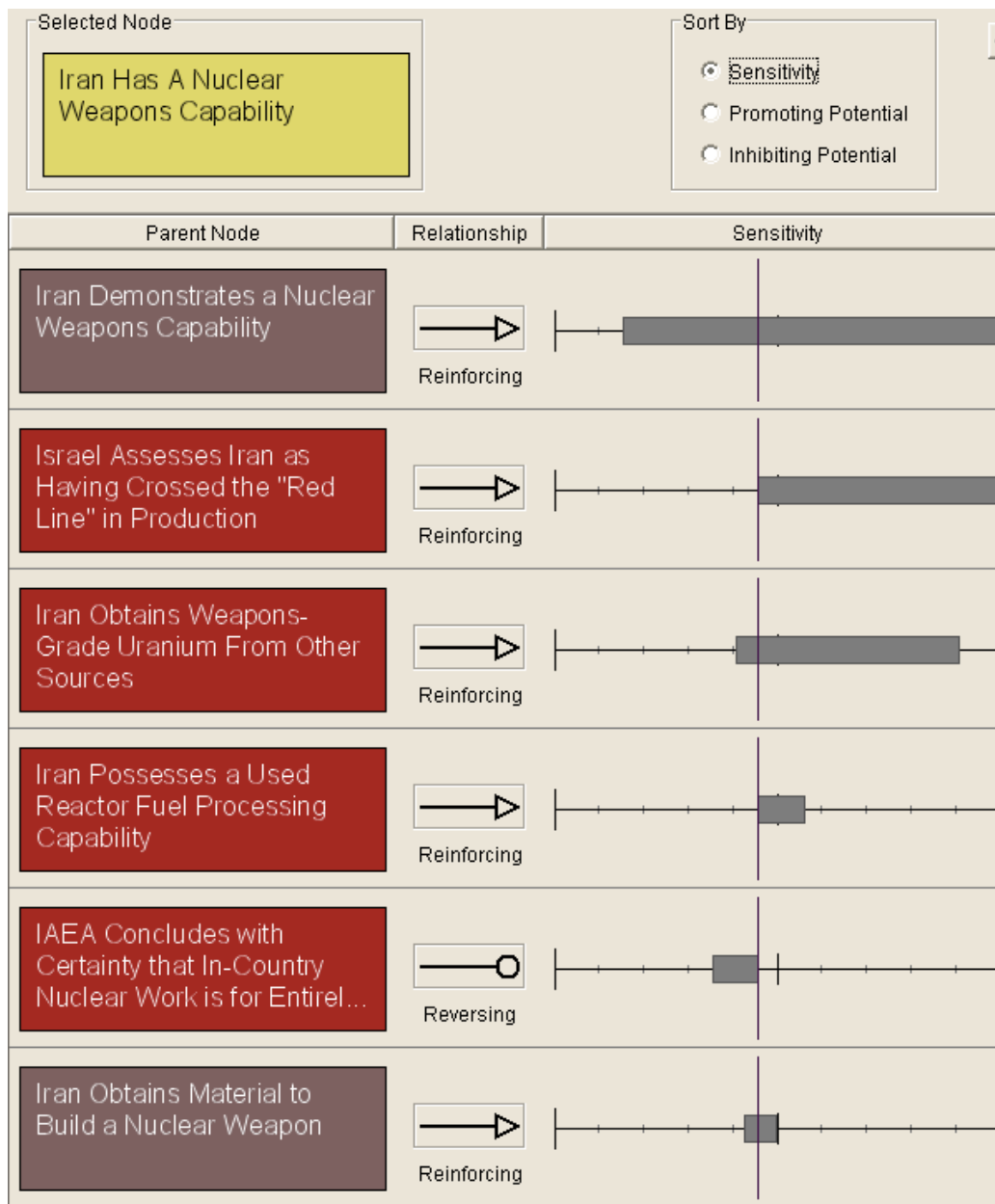Figure 19.   Root Node Pressure Parent Inhibiting Potential Assessment.

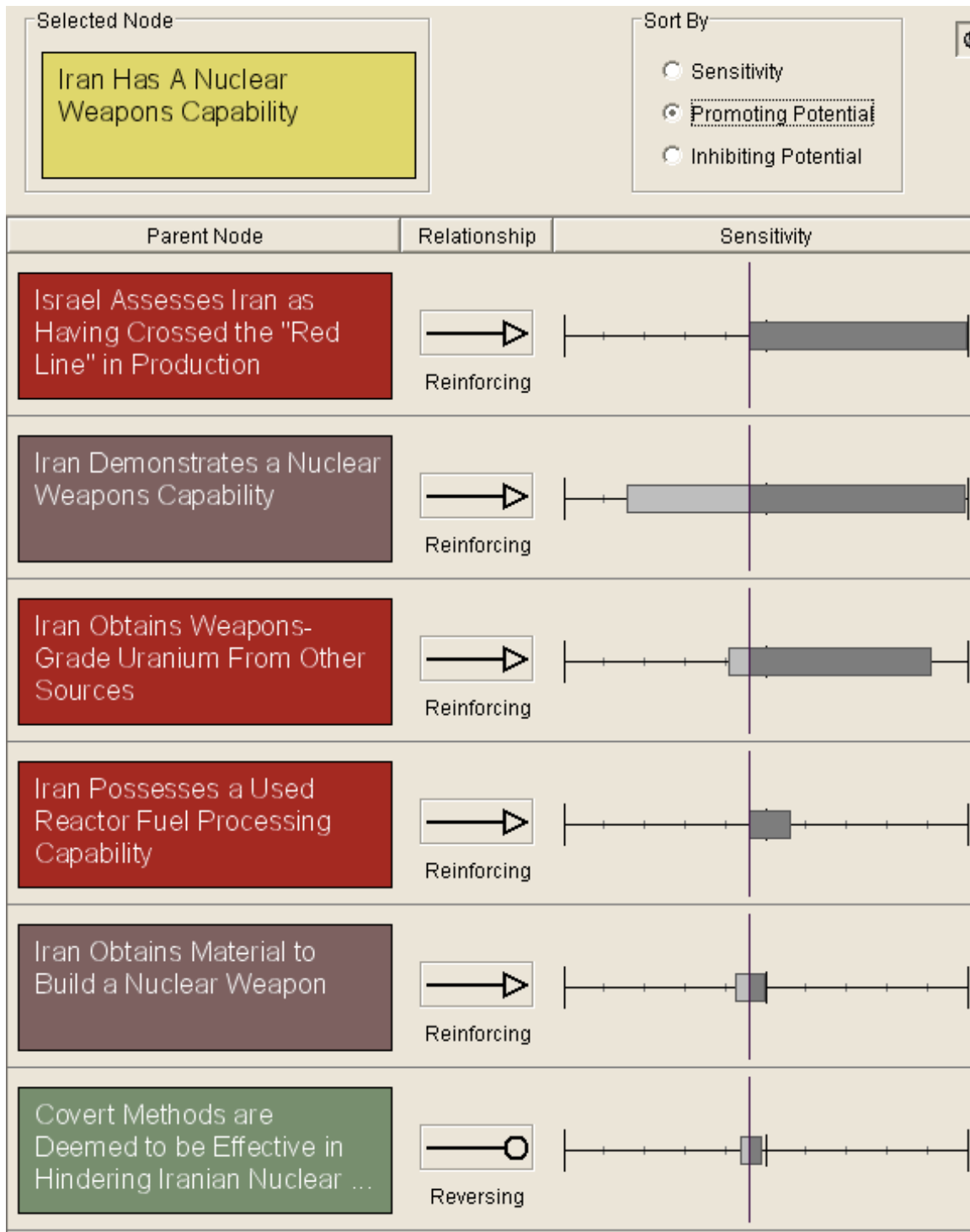Figure 20.   Nuclear Node Pressure Parent Sensitivity Assessment.

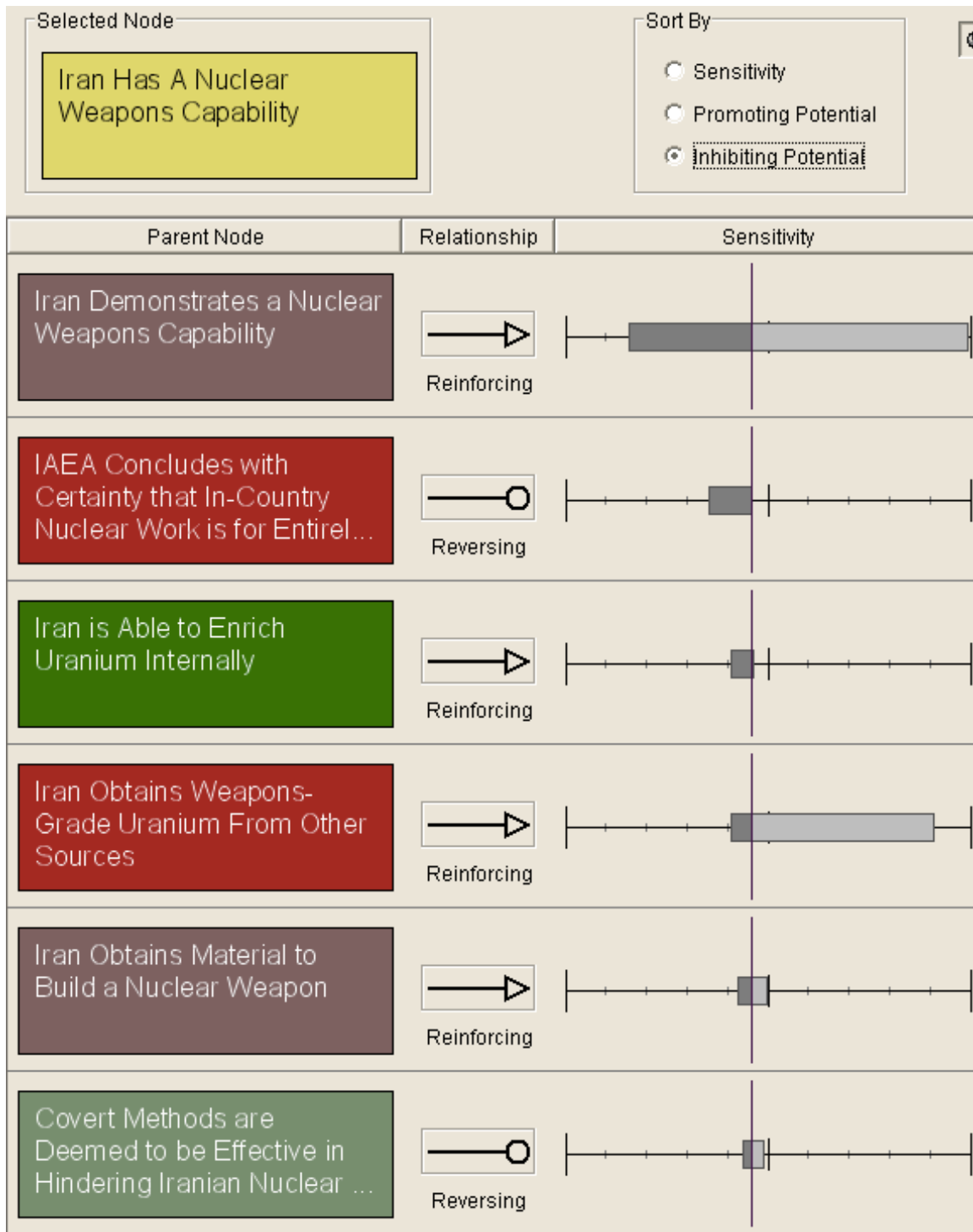Figure 21.   Nuclear Node Pressure Parent Promoting Potential Assessment.

Figure 22.   Nuclear Node Pressure Parent Inhibiting Potential Assessment.

Figure 23.   Domestic Node Pressure Parent Sensitivity Assessment.

Figure 24. Domestic Node Pressure Parent Promoting Potential Assessment.

Figure 25.   Domestic Node Pressure Parent Inhibiting Potential Assessment.

Figure 26.   International Node Pressure Parent Sensitivity Assessment.

Figure 27. International Node Pressure Parent Promoting Potential Assessment.
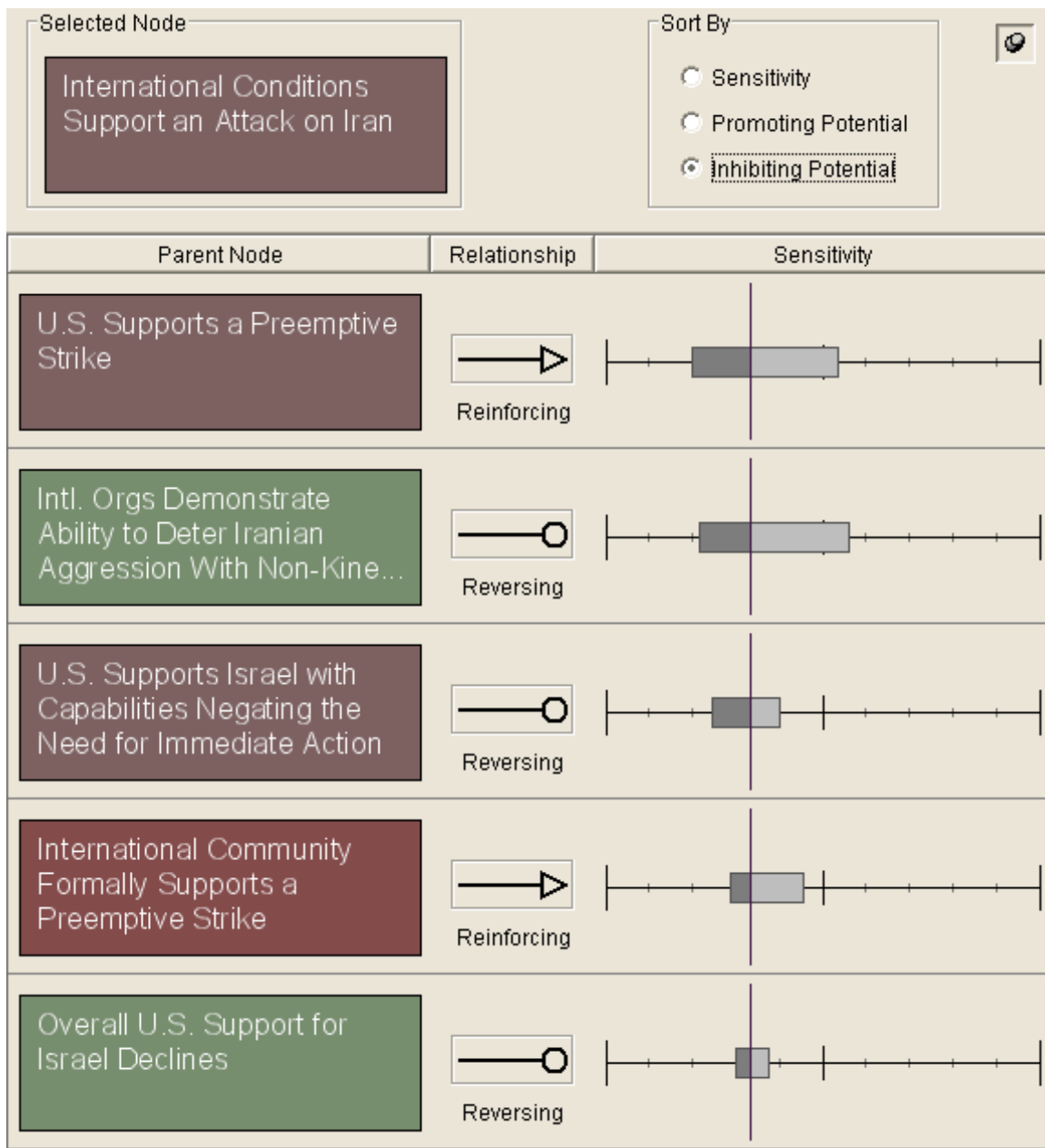
Figure 28.   International Node Pressure Parent Inhibiting Potential Assessment.
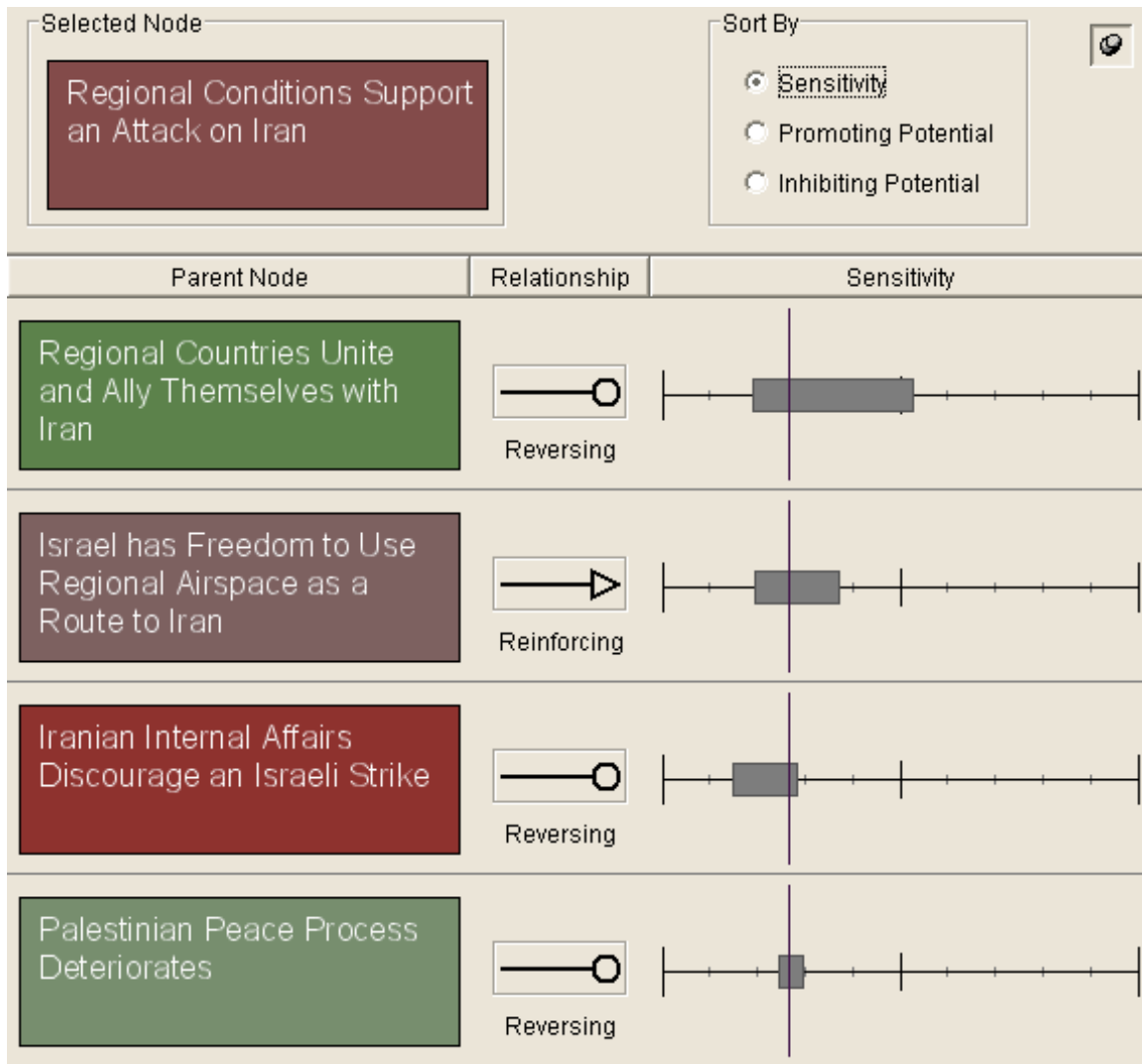
Figure 29.   Regional Node Pressure Parent Sensitivity Assessment.

Figure 30.   Regional Node Pressure Parent Promoting Potential Assessment.

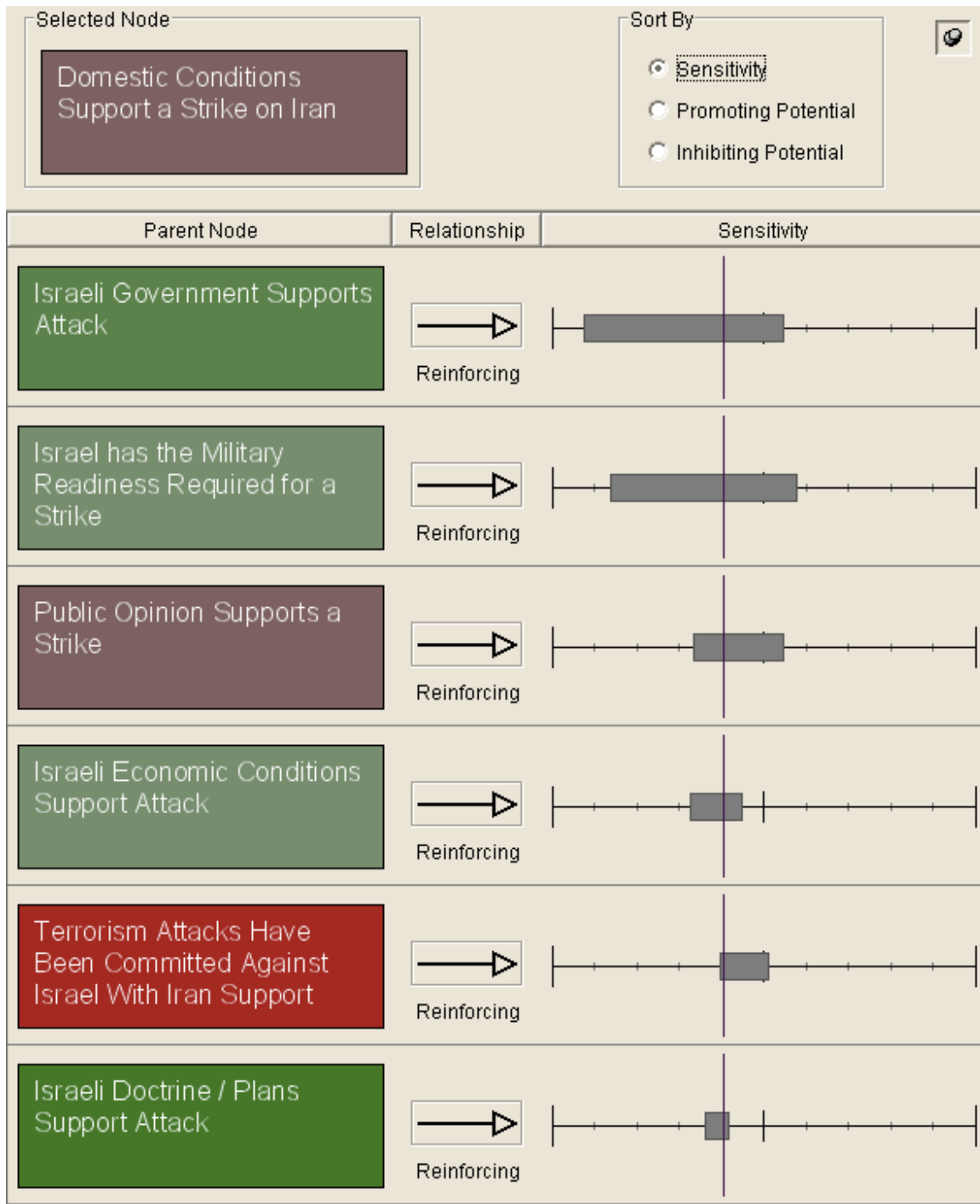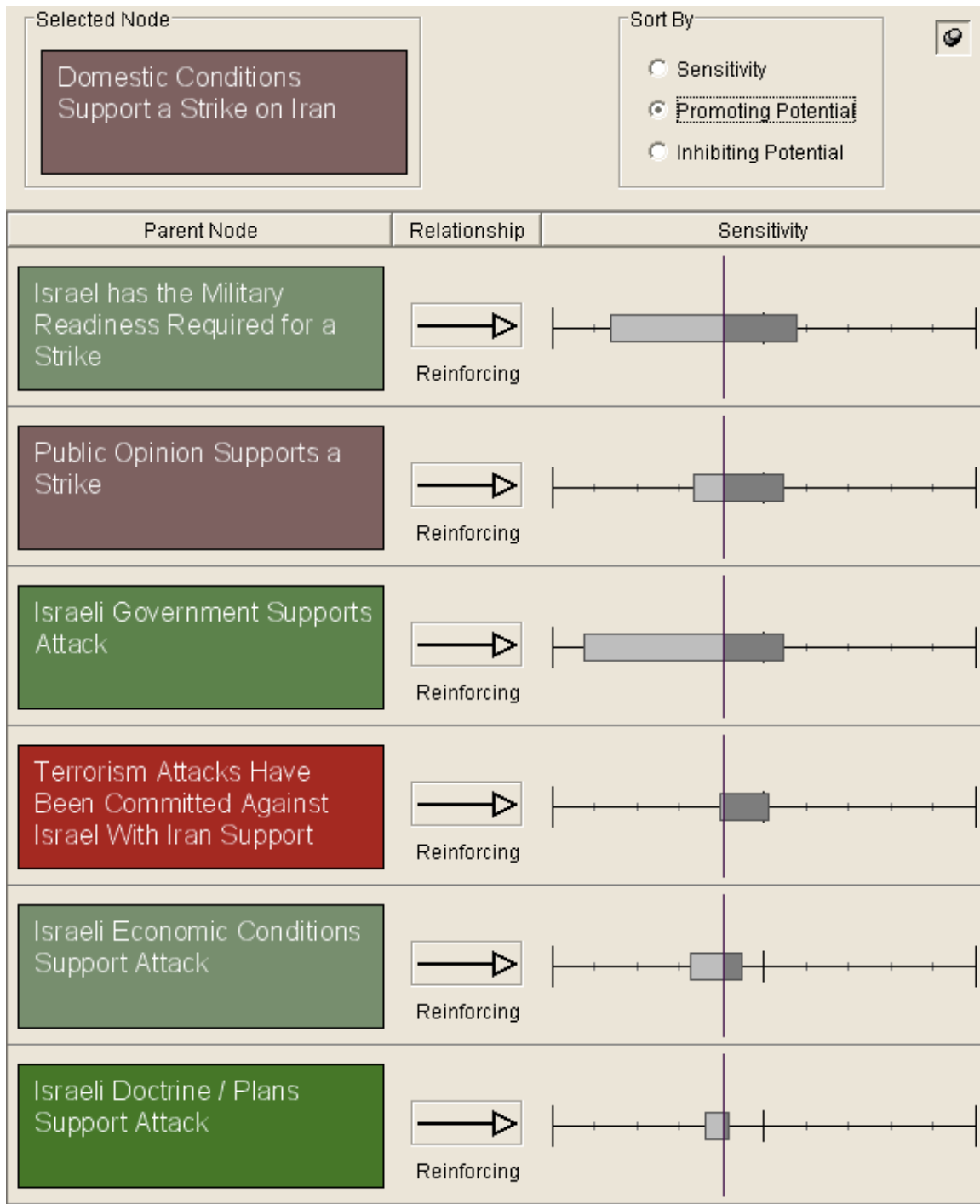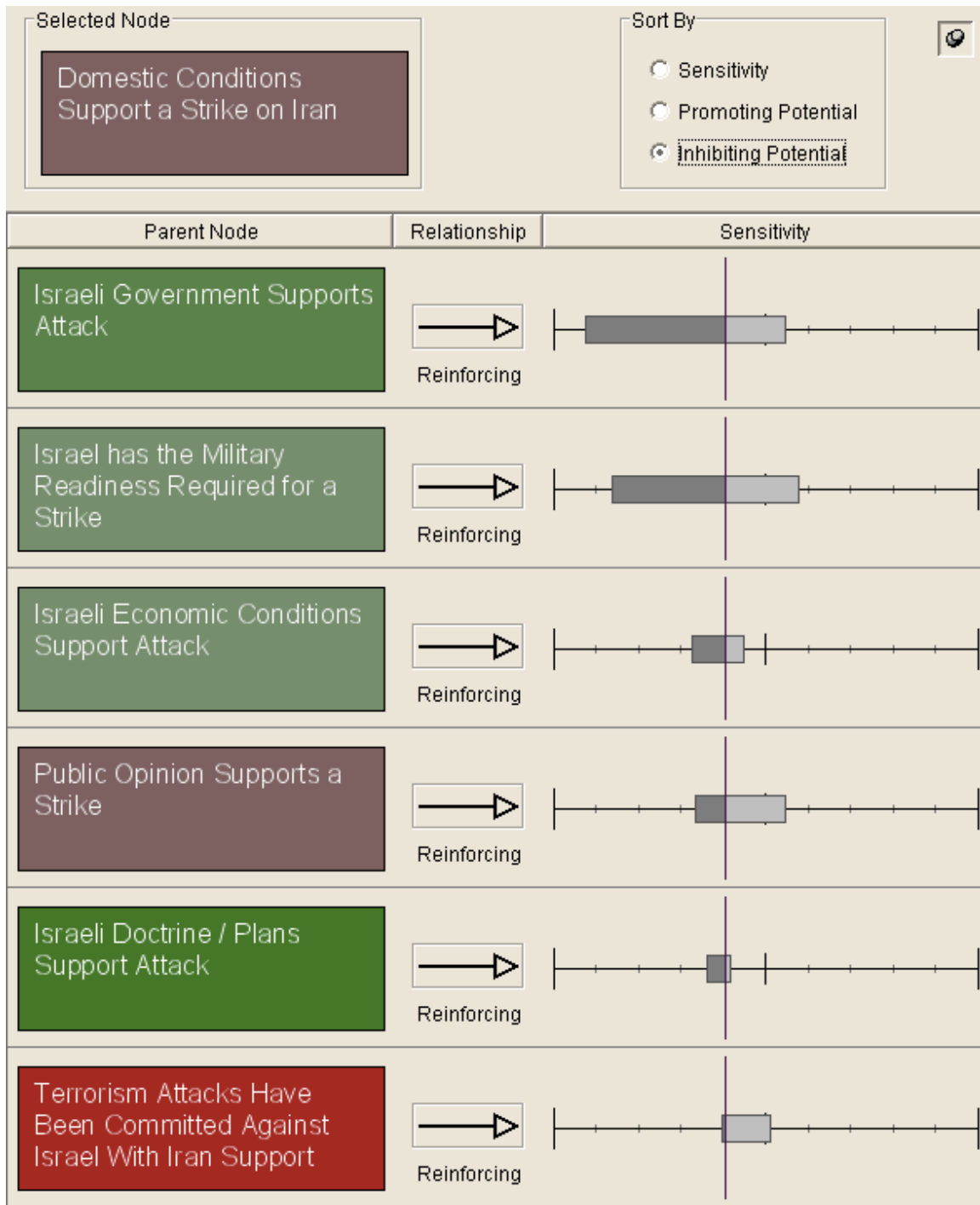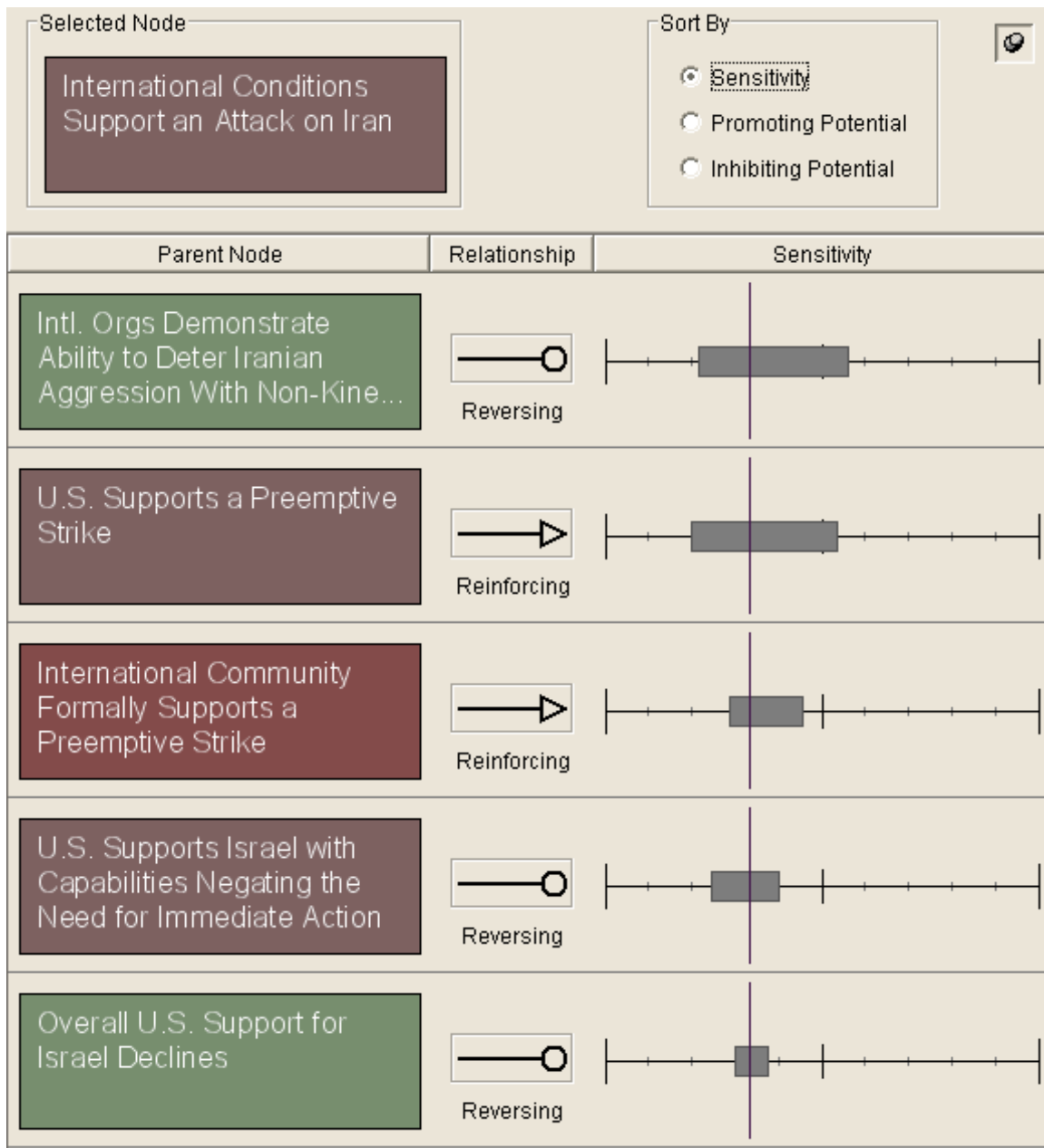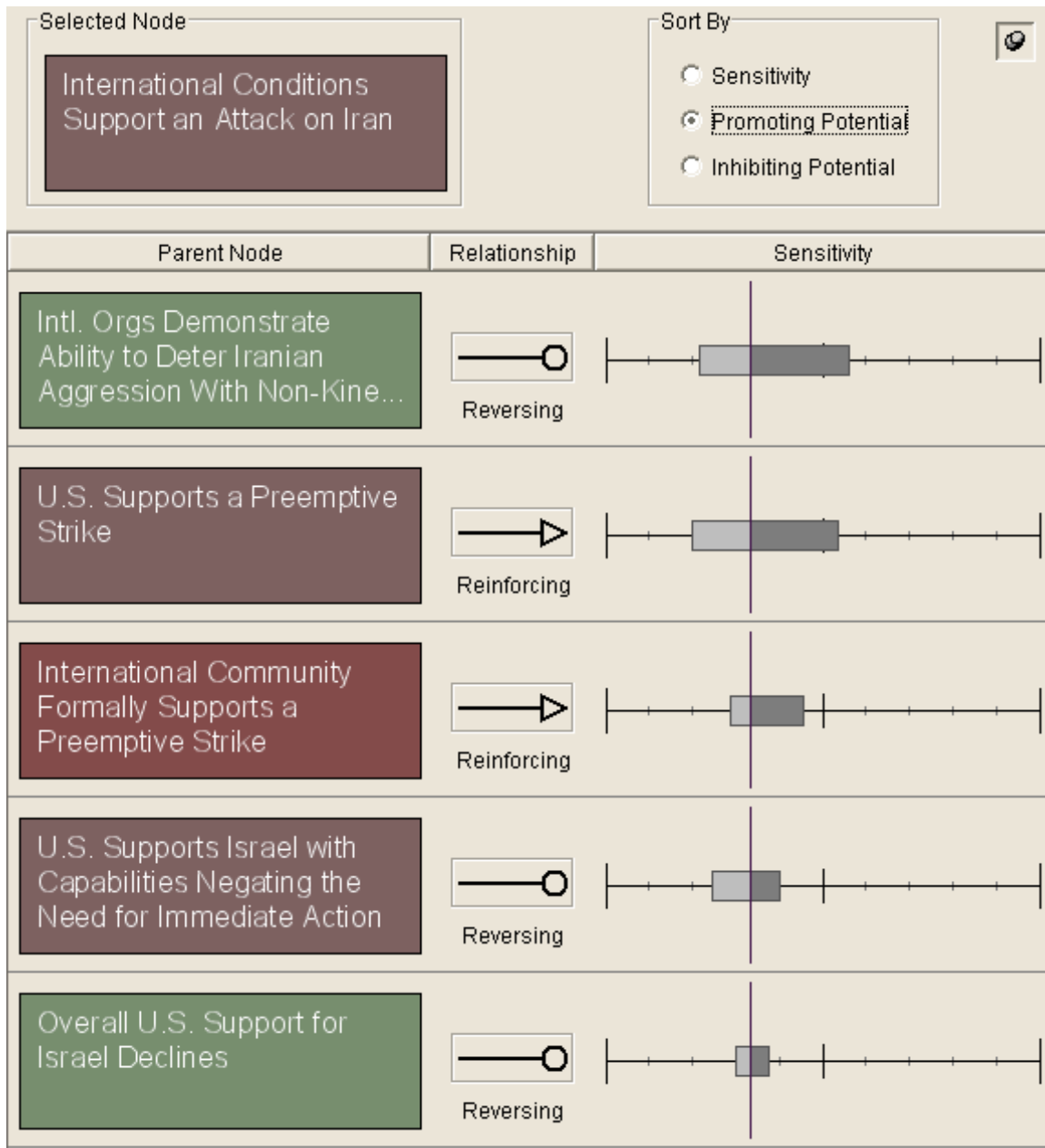Figure 31.   Regional Node Pressure Parent Inhibiting Potential Assessment.
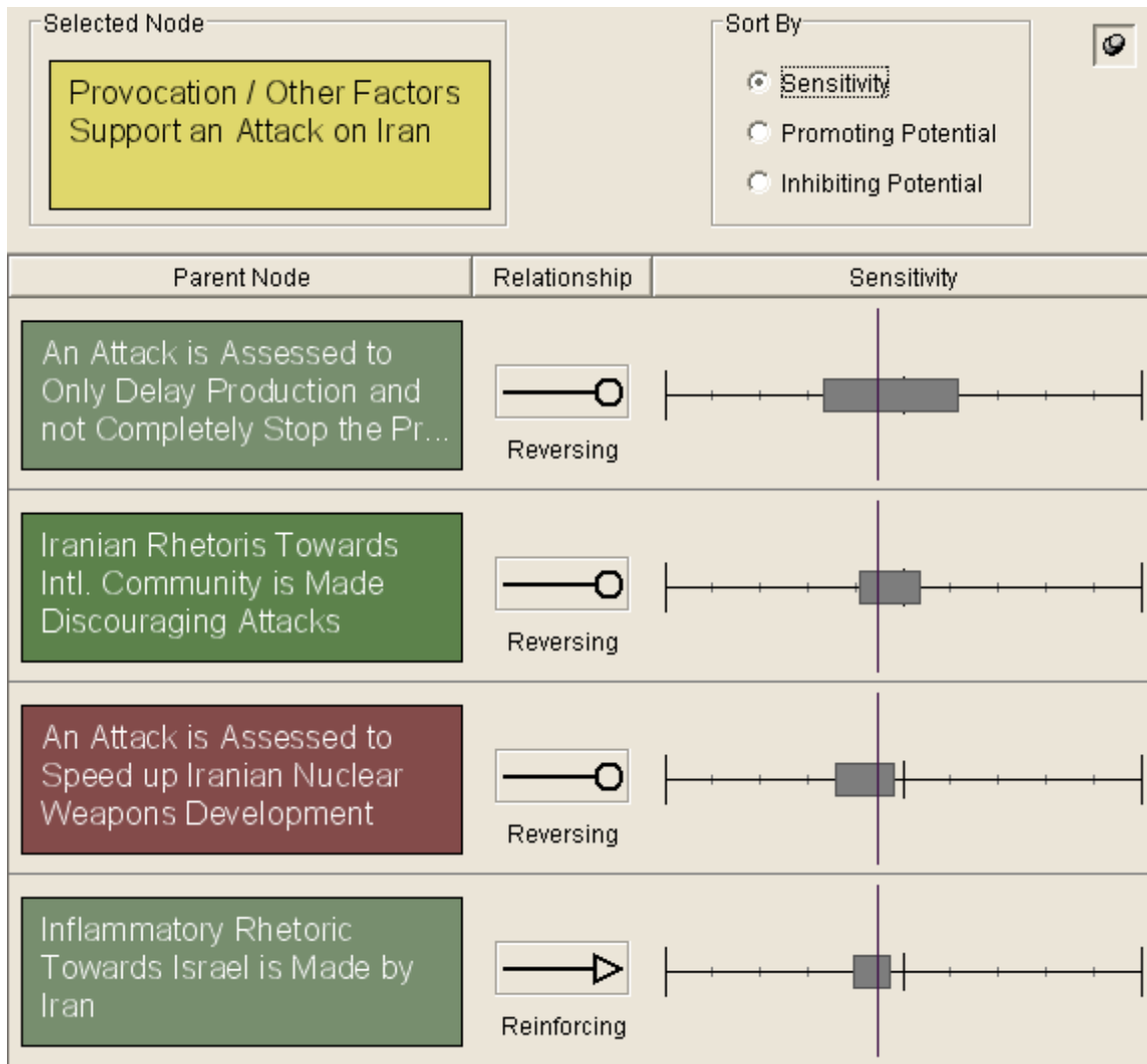
Figure 32.   Provocation/Other Node Pressure Parent Sensitivity Assessment.
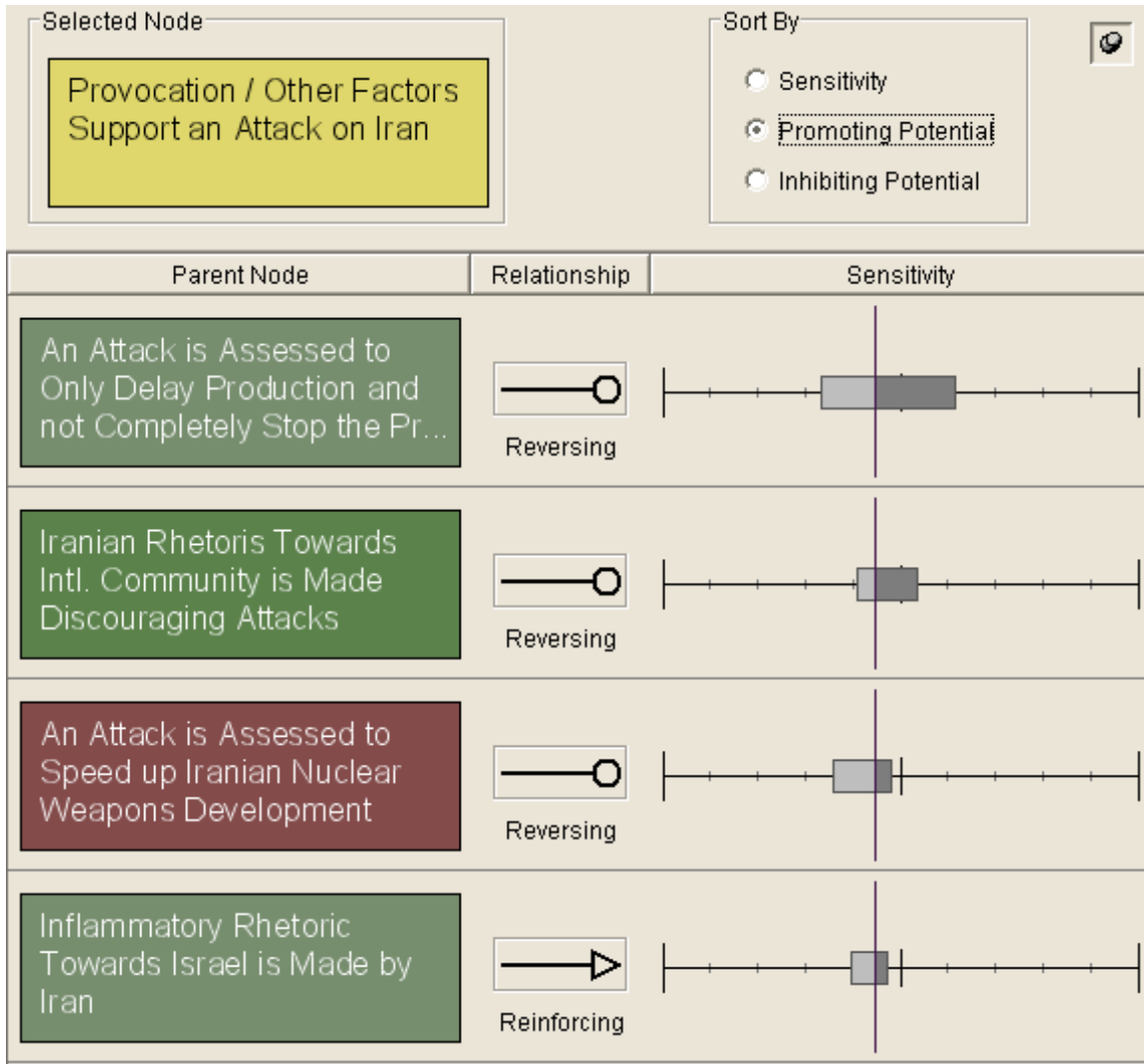
Figure 33.   Provocation/Other Node Pressure Parent Promoting Potential Assessment.

Figure 34.   Provocation/Other Node Pressure Parent Inhibiting Potential Assessment.

b.   *Pressure Points*

Pressure points analysis considers the potential for change in the user-selected event that is generated by the initial nodes, which are connected to the selected node via one or more influencing chains. Pressure point analysis, sorted by sensitivity, promoting potential, and inhibiting potential is shown in Figures 35–52. The first three figures show the pressure points for the root nodes, while the remaining figures address each of the categories.
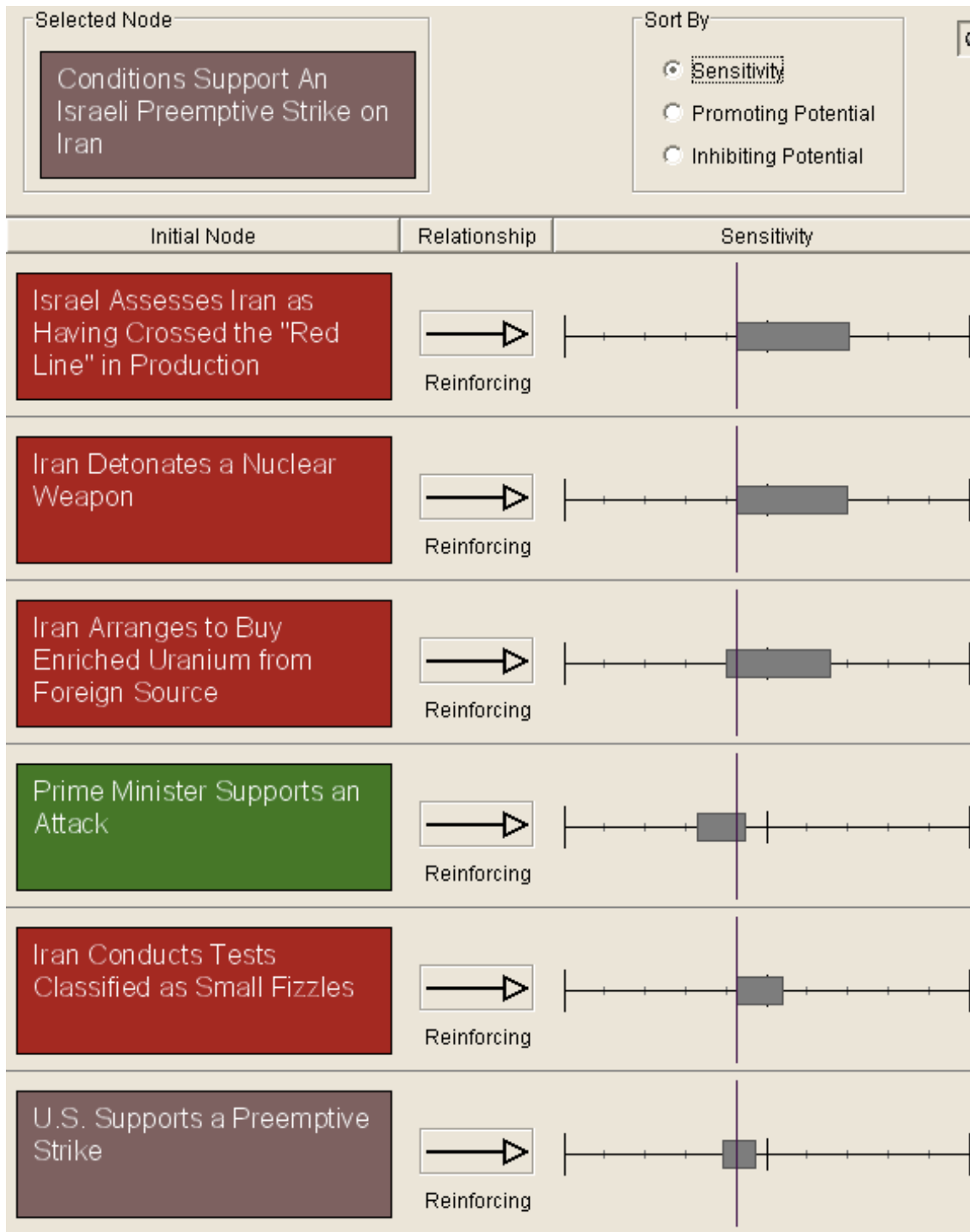
Figure 35.   Root Node Pressure Points Sensitivity Analysis.
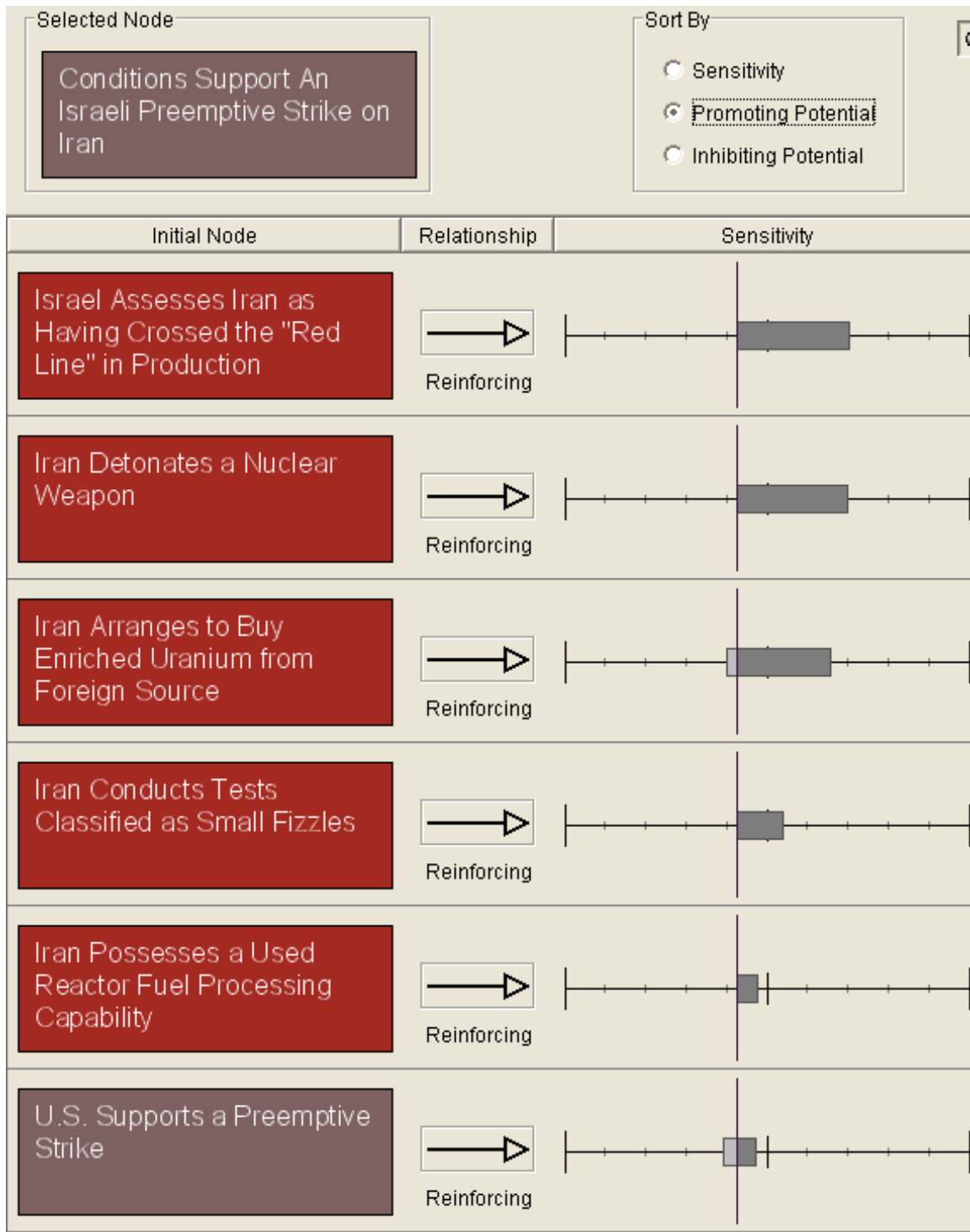
Figure 36.   Root Node Pressure Points Promoting Potential Analysis.
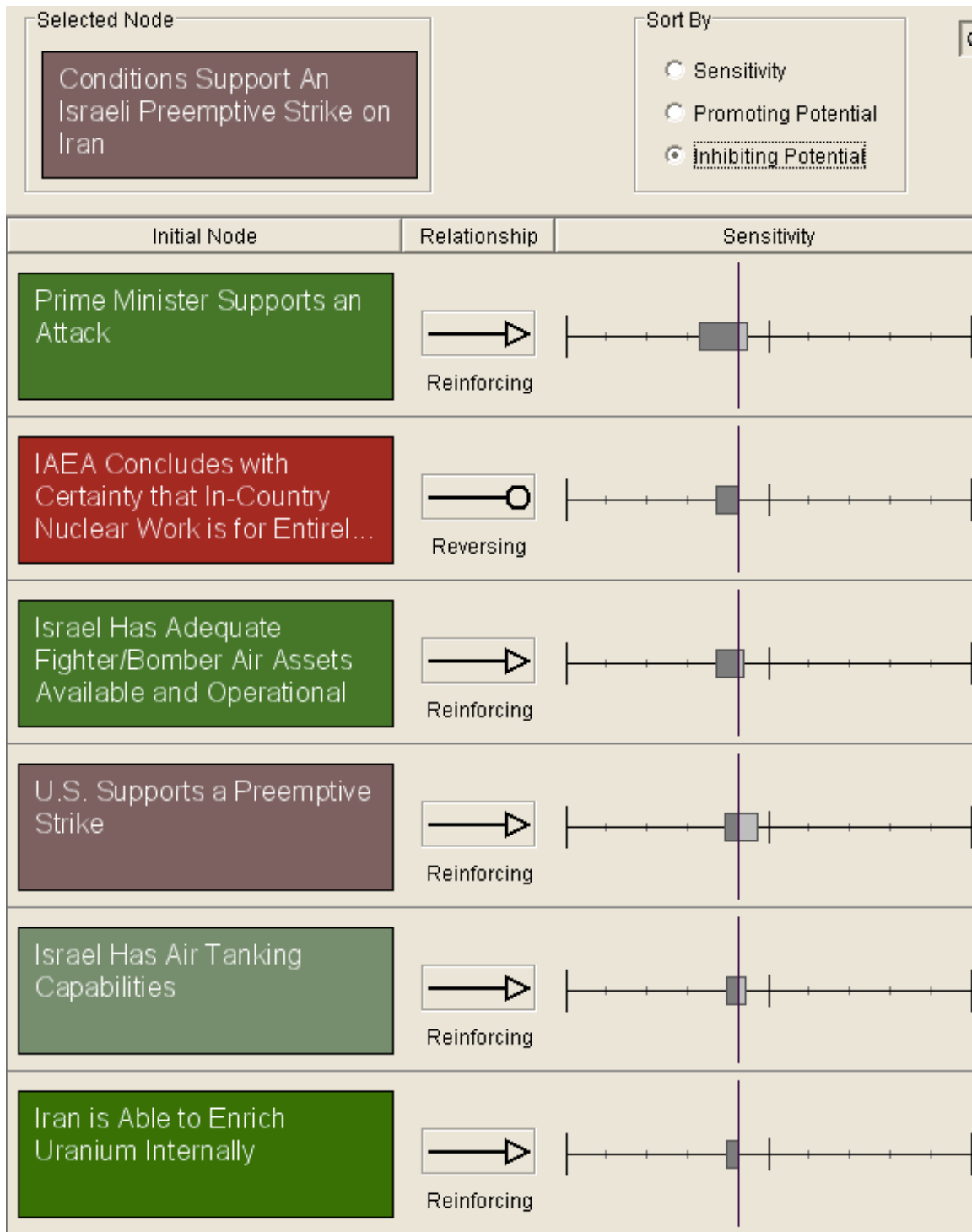
Figure 37.   Root Node Pressure Points Inhibiting Potential Analysis.
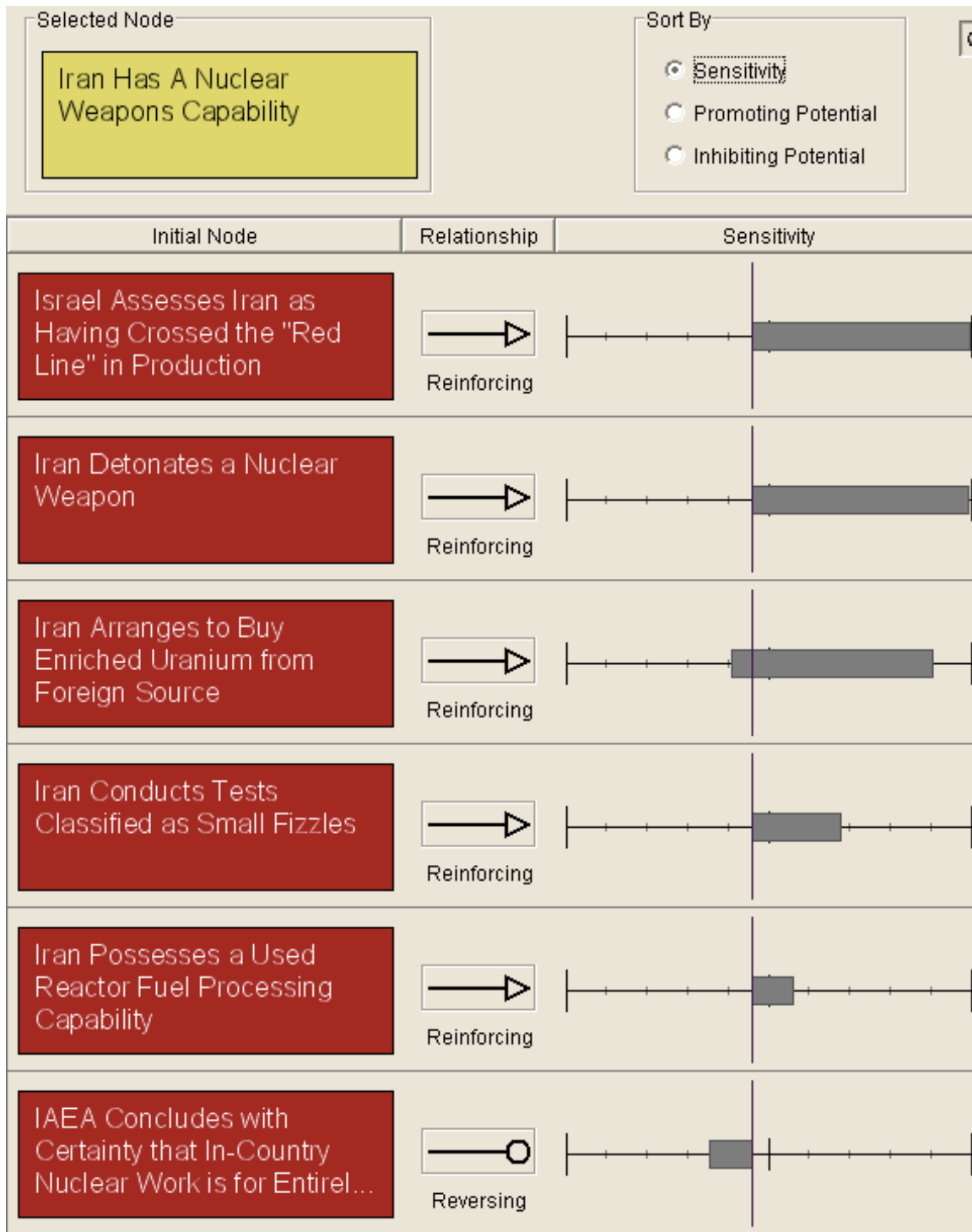
Figure 38.   Nuclear Node Pressure Points Sensitivity Assessment.

Figure 39. Nuclear Node Pressure Points Promoting Potential Assessment.
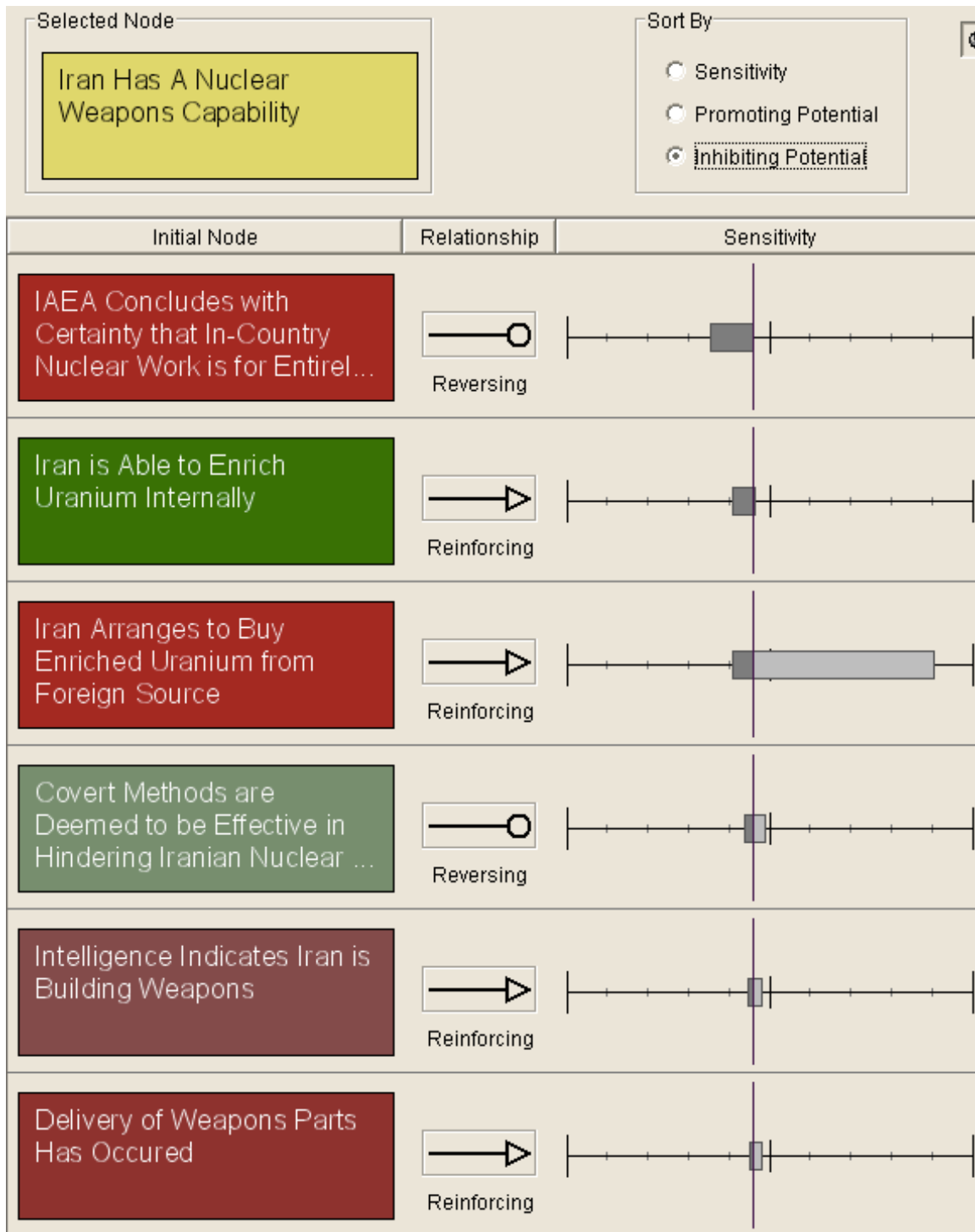
Figure 40.   Nuclear Node Pressure Points Inhibiting Potential Assessment.
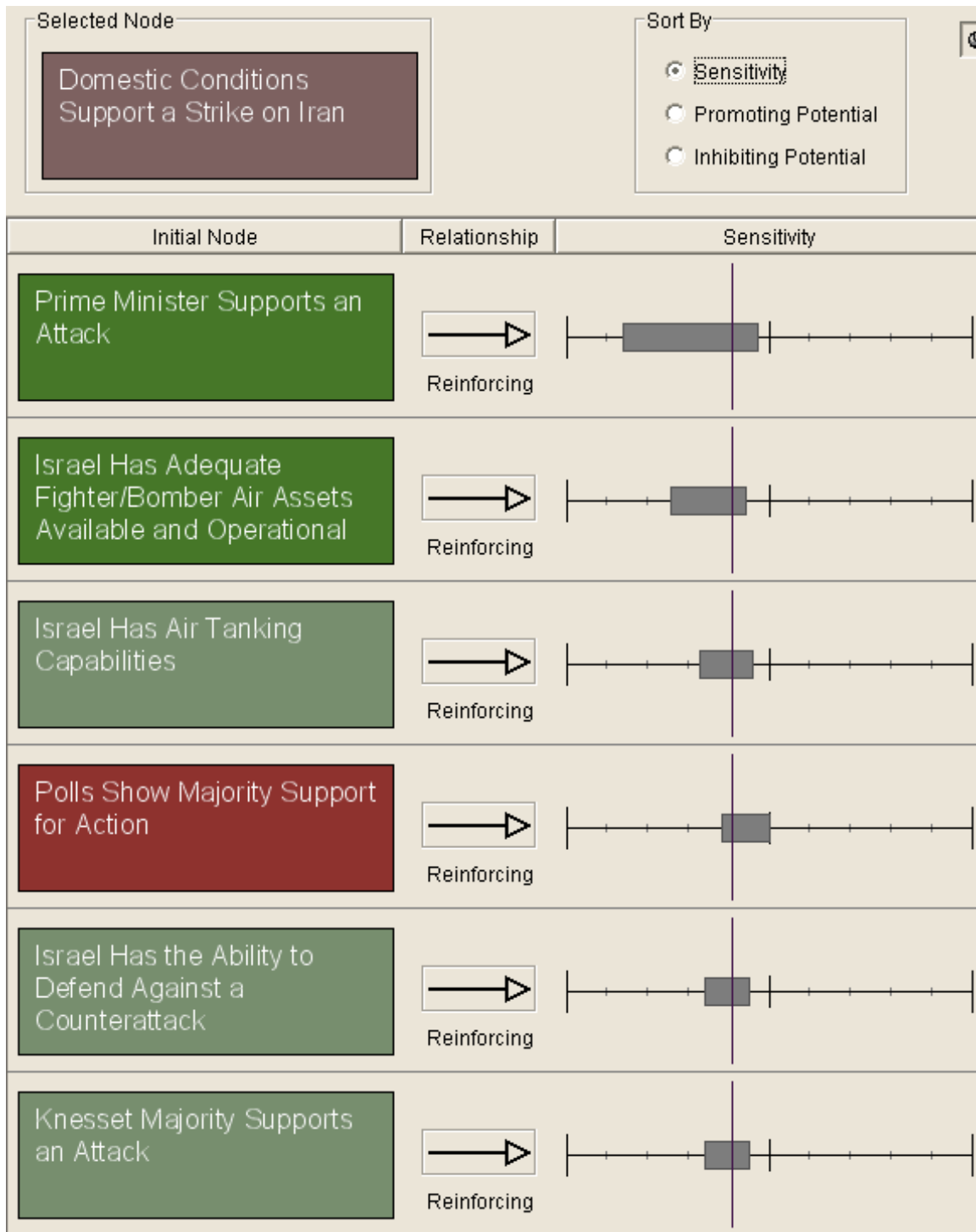
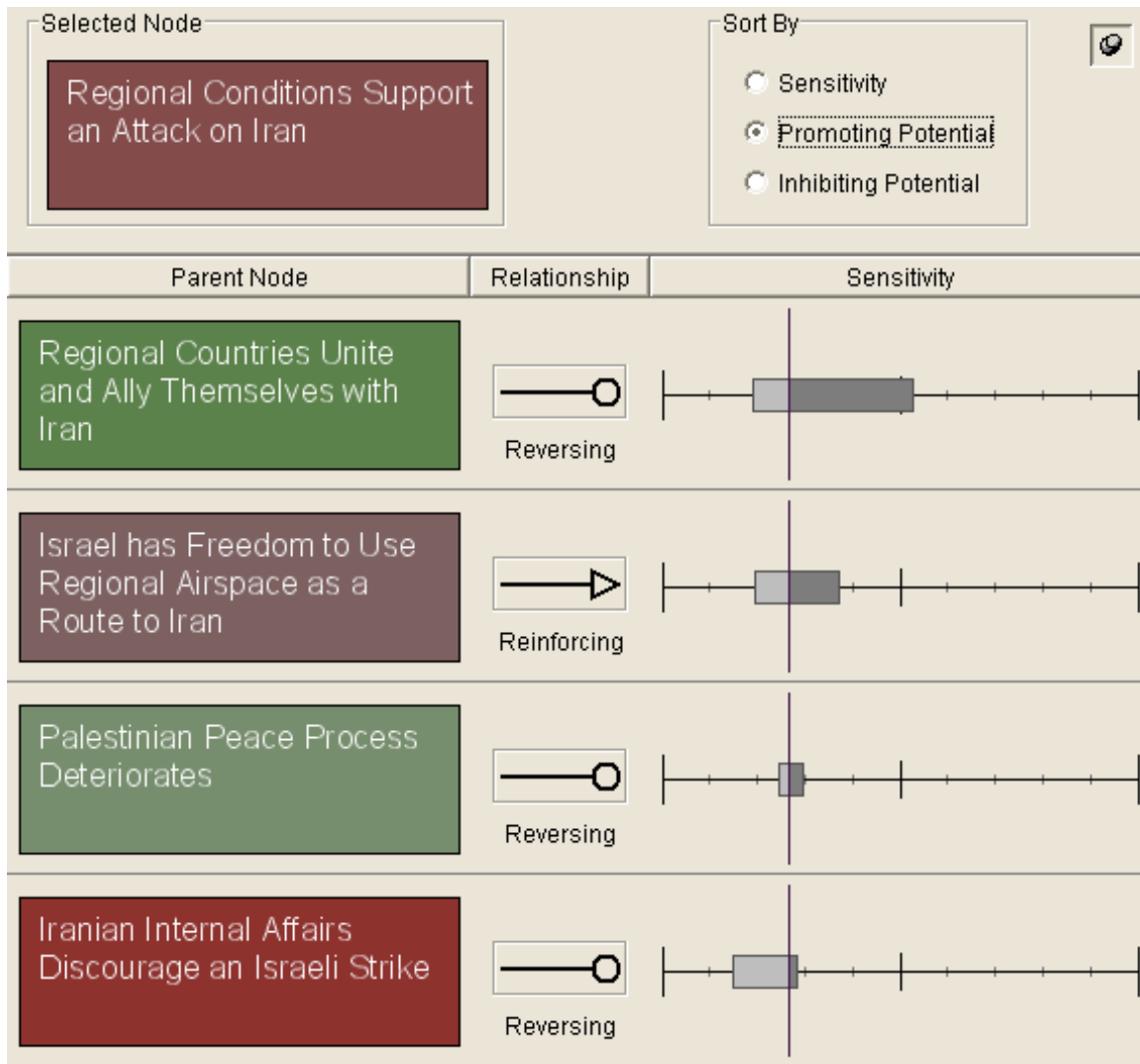Figure 41.   Domestic Node Pressure Points Sensitivity Assessment.
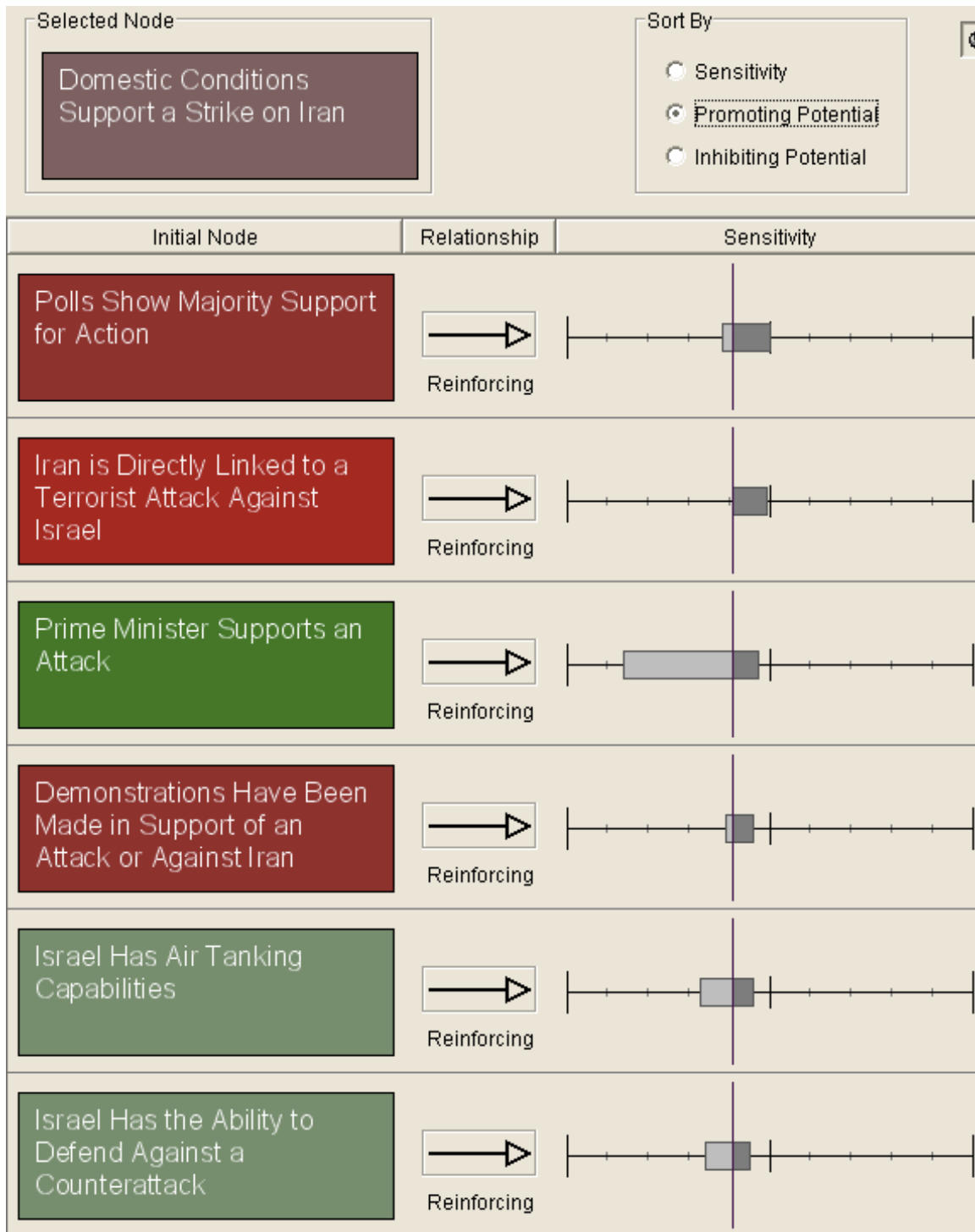
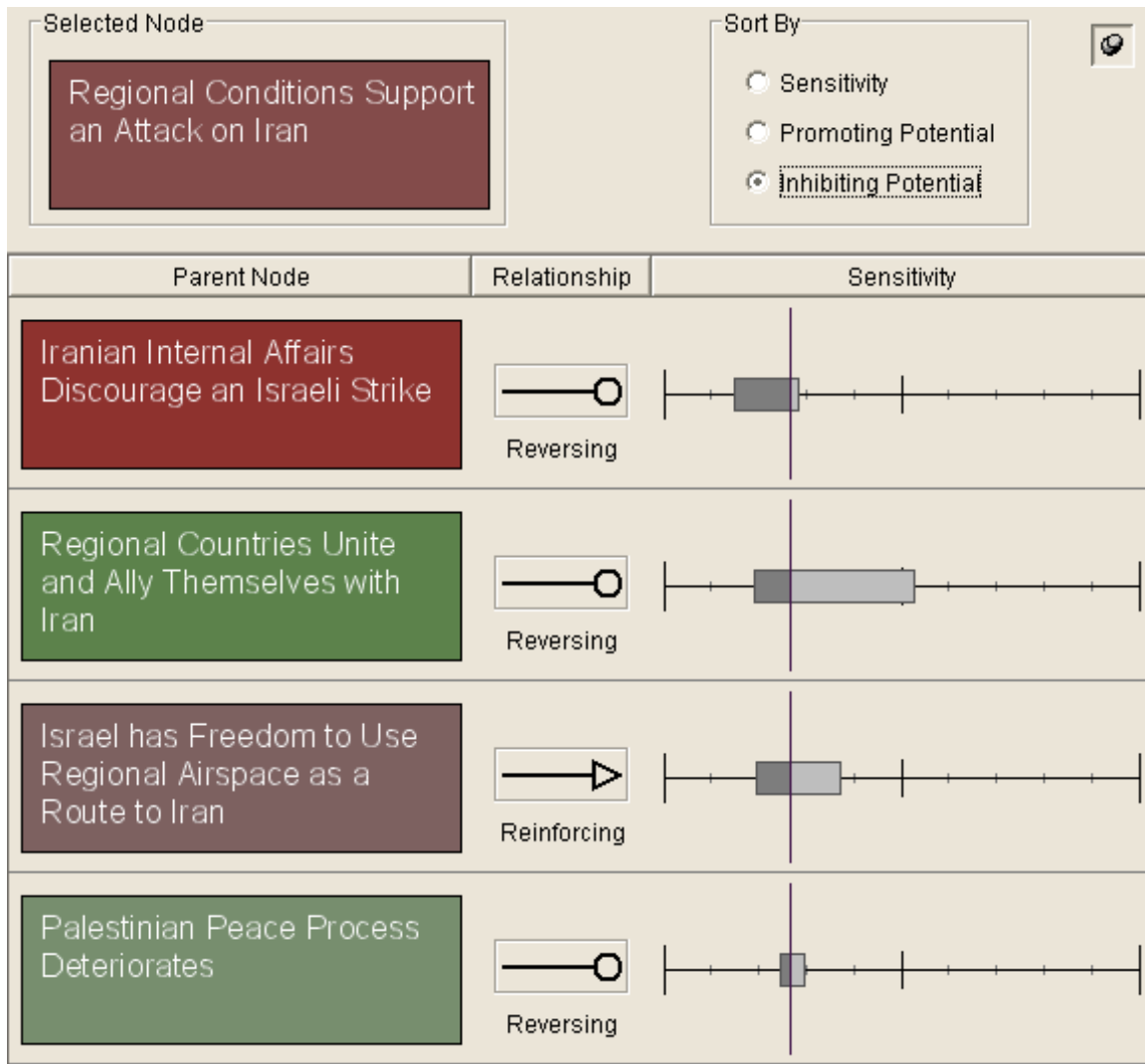Figure 42.   Domestic Node Pressure Points Promoting Potential Assessment.
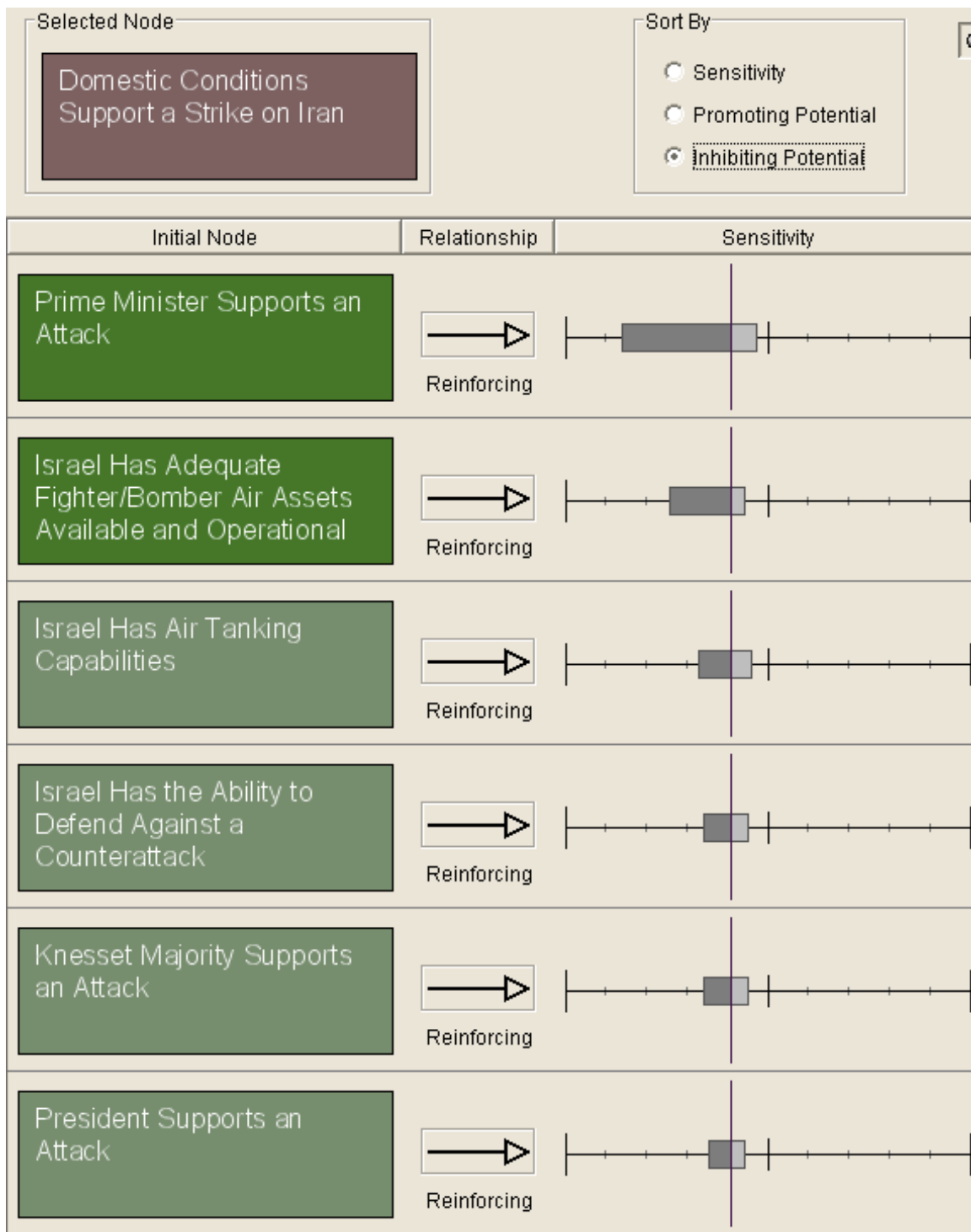
Figure 43.   Domestic Node Pressure Points Inhibiting Potential Assessment.
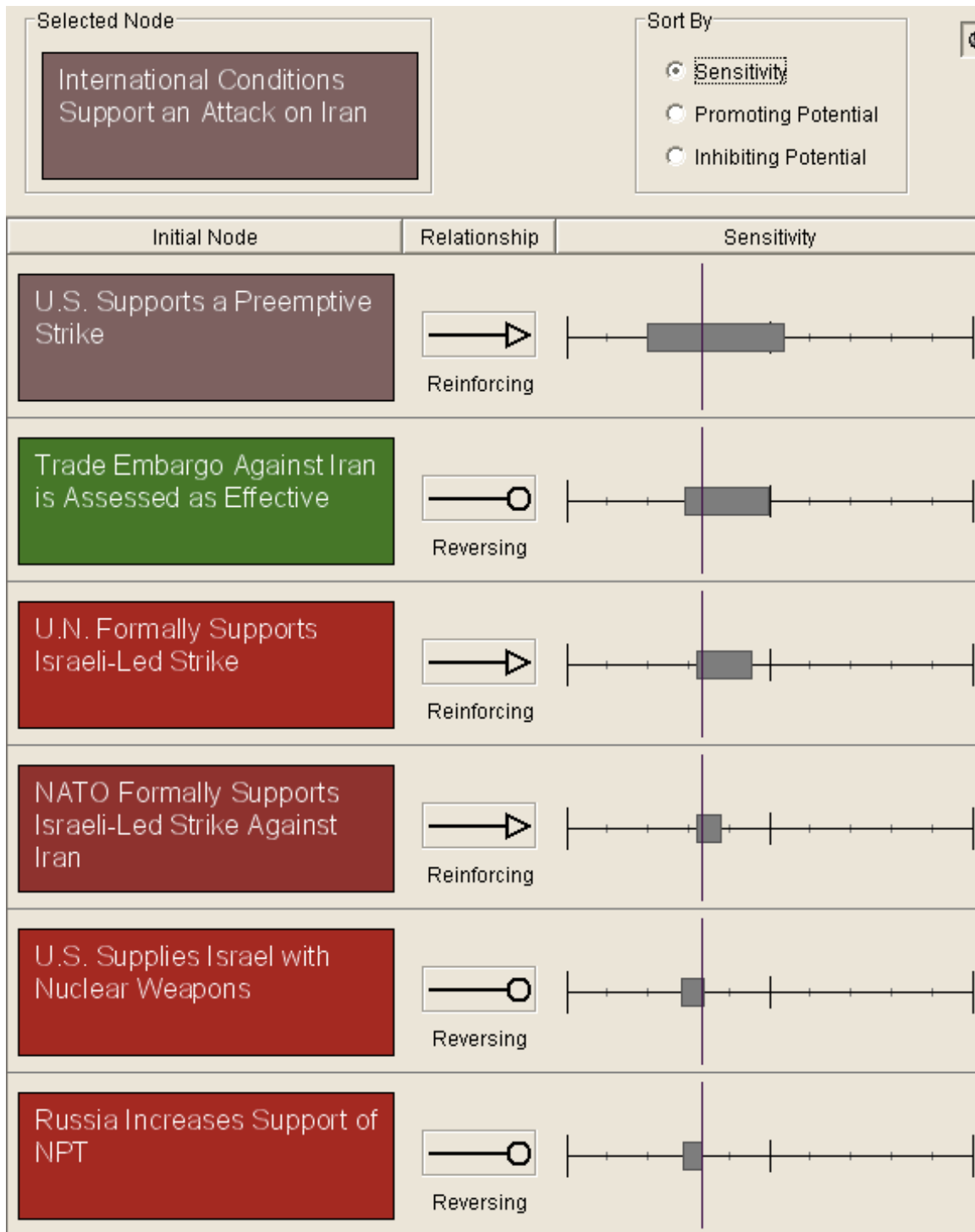
Figure 44.   International Node Pressure Points Sensitivity Assessment.

Selected Node

International Conditions
Support an Attack on Iran

Sort By
○ Sensitivity
⦿ Promoting Potential
○ Inhibiting Potential

Initial Node	Relationship	Sensitivity
U.S. Supports a Preemptive Strike	→▷ Reinforcing	
Trade Embargo Against Iran is Assessed as Effective	—○ Reversing	
U.N. Formally Supports Israeli-Led Strike	→▷ Reinforcing	
NATO Formally Supports Israeli-Led Strike Against Iran	→▷ Reinforcing	
U.S. Supplies Israel With Bunker-Buster Bombs	—○ Reversing	
U.N. Becomes More Involved in Syria	—○ Reversing	

Figure 45.   International Node Pressure Points Promoting Potential Assessment.

International Conditions
Support an Attack on Iran

Sort By

C Sensitivity

C Promoting Potential

⊙ Inhibiting Potential

Initial Node	Relationship	Sensitivity
U.S. Supports a Preemptive Strike	Reinforcing	
U.S. Supplies Israel with Nuclear Weapons	Reversing	
Russia Increases Support of NPT	Reversing	
Trade Embargo Against Iran is Assessed as Effective	Reversing	
Support Formally Withdrawn by the U.S.	Reversing	
U.S. Provides Israel with Additional BMD Hardware to Cover Entire Country	Reversing	

Figure 46.   International Node Pressure Points Inhibiting Potential Assessment.
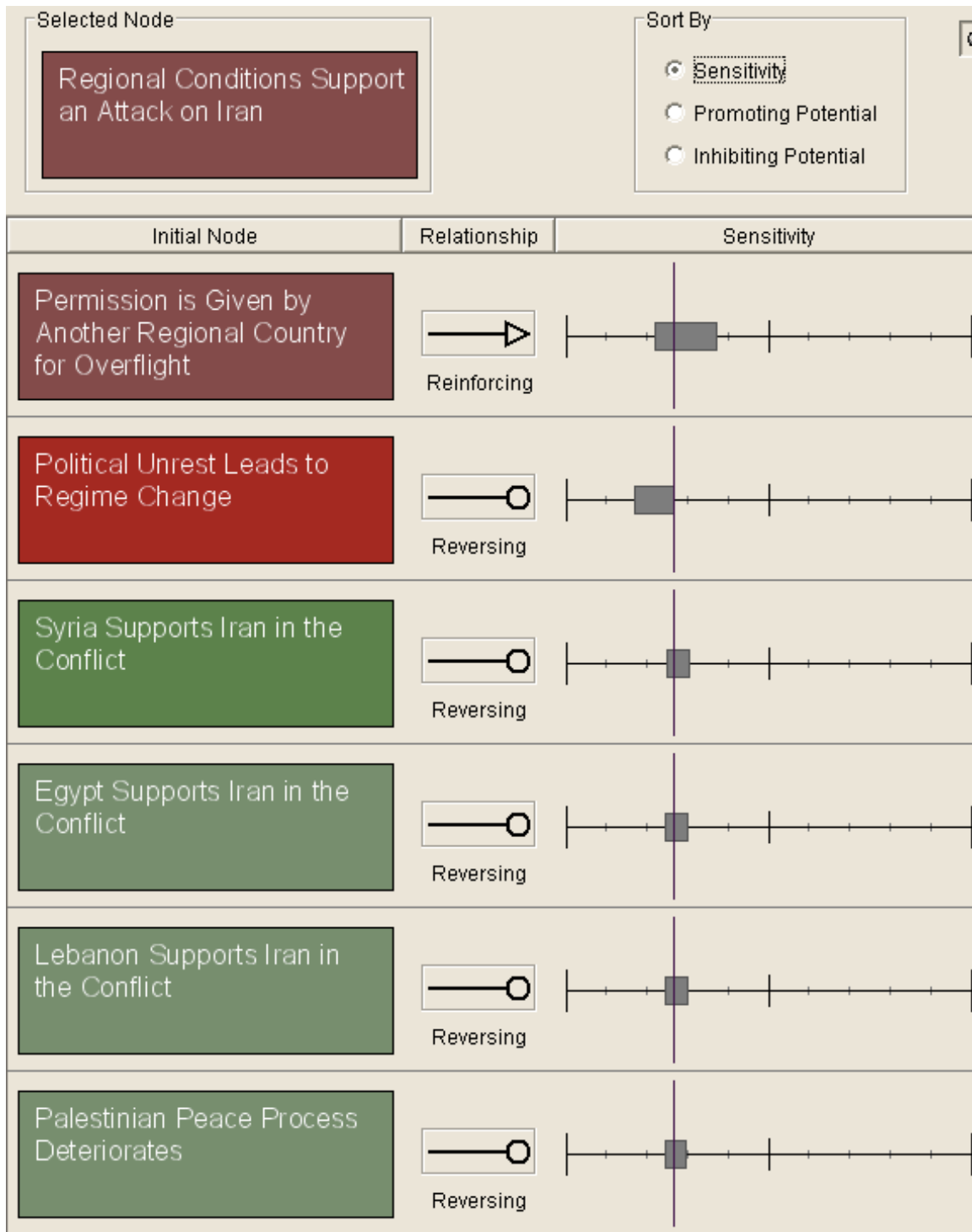
Figure 47.   Regional Node Pressure Points Sensitivity Assessment.
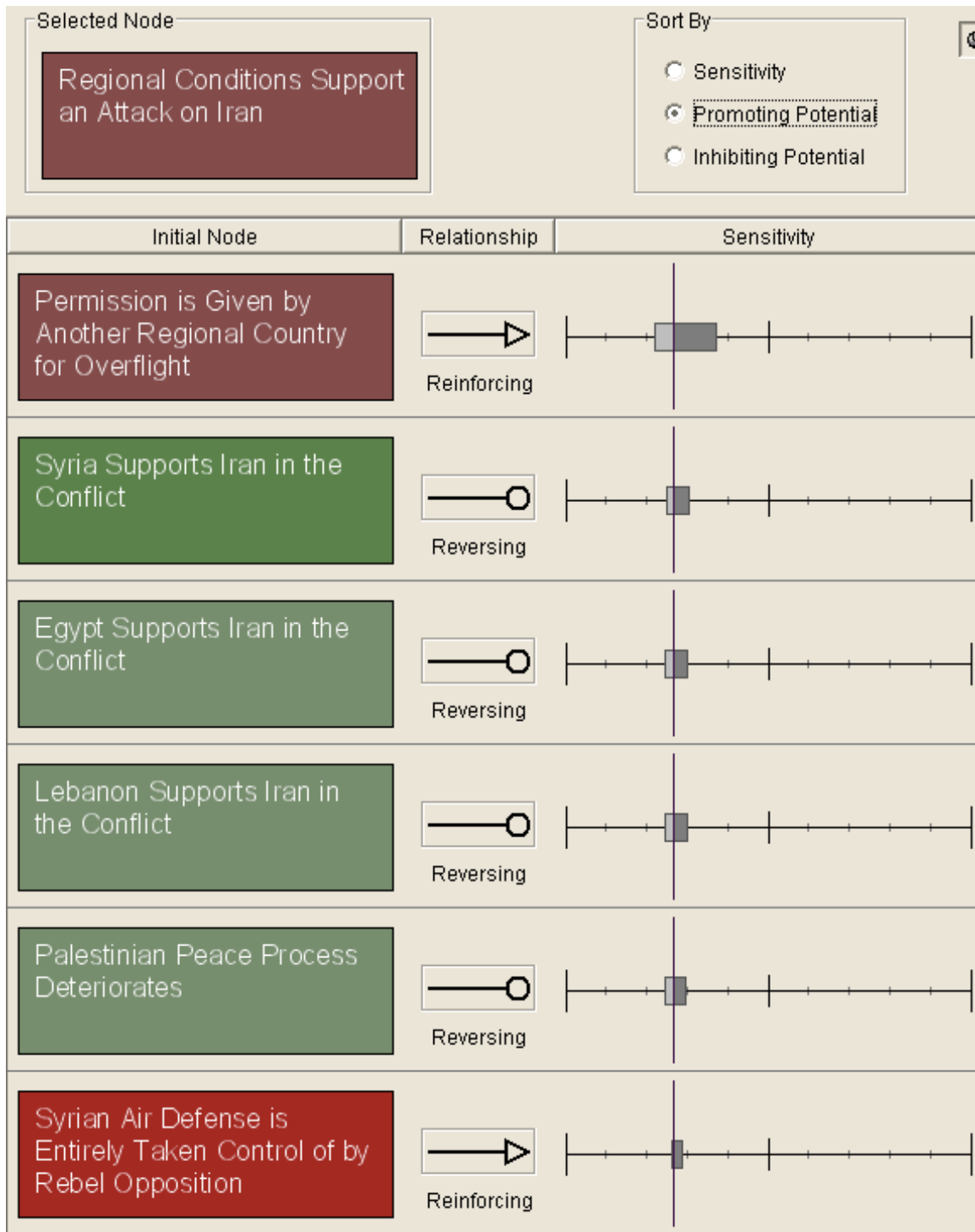
Figure 48.   Regional Node Pressure Points Promoting Potential Assessment.

Figure 49.   Regional Node Pressure Points Inhibiting Potential Assessment.
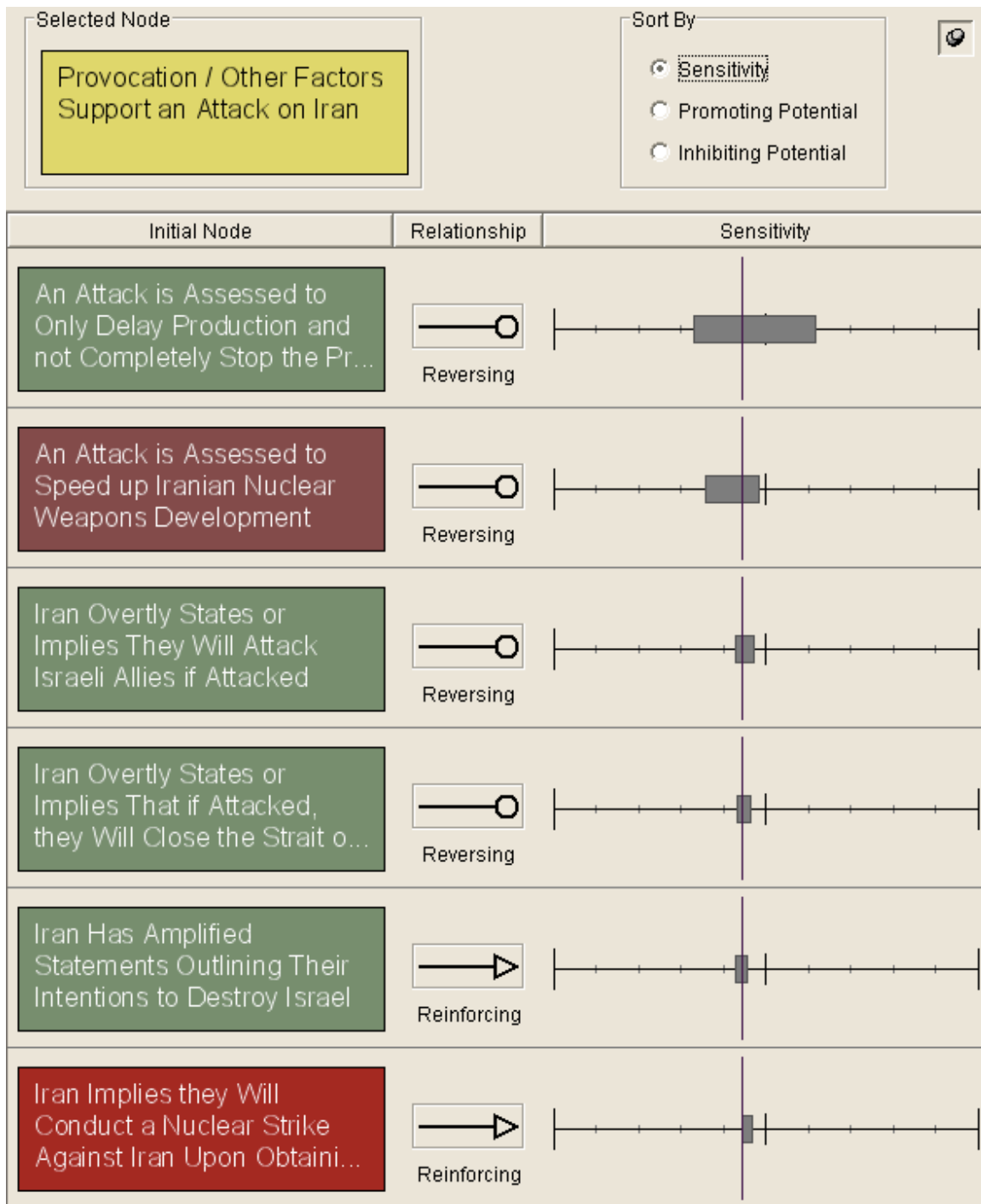
Figure 50.   Provocative/Other Node Pressure Points Sensitivity Assessment.

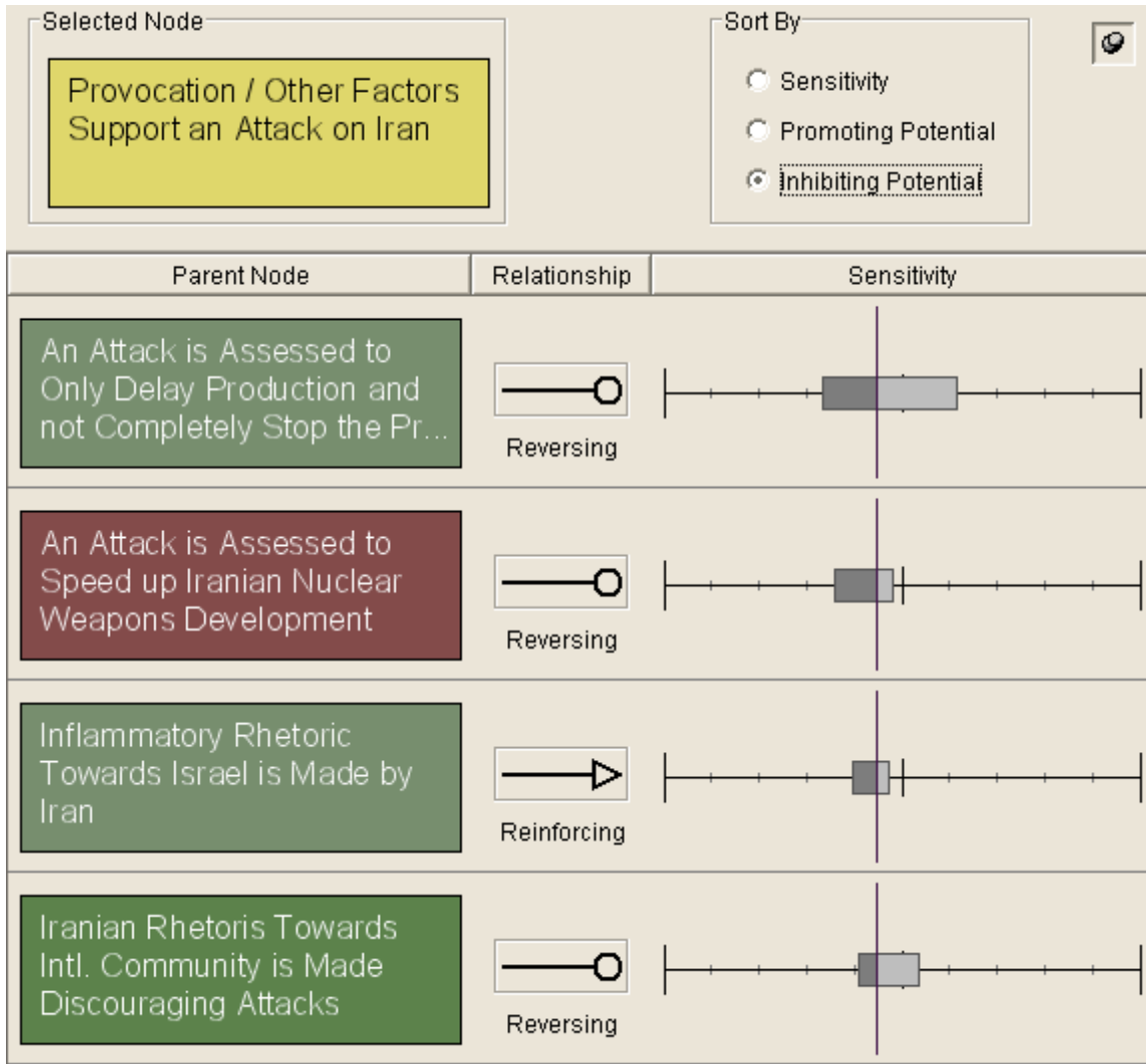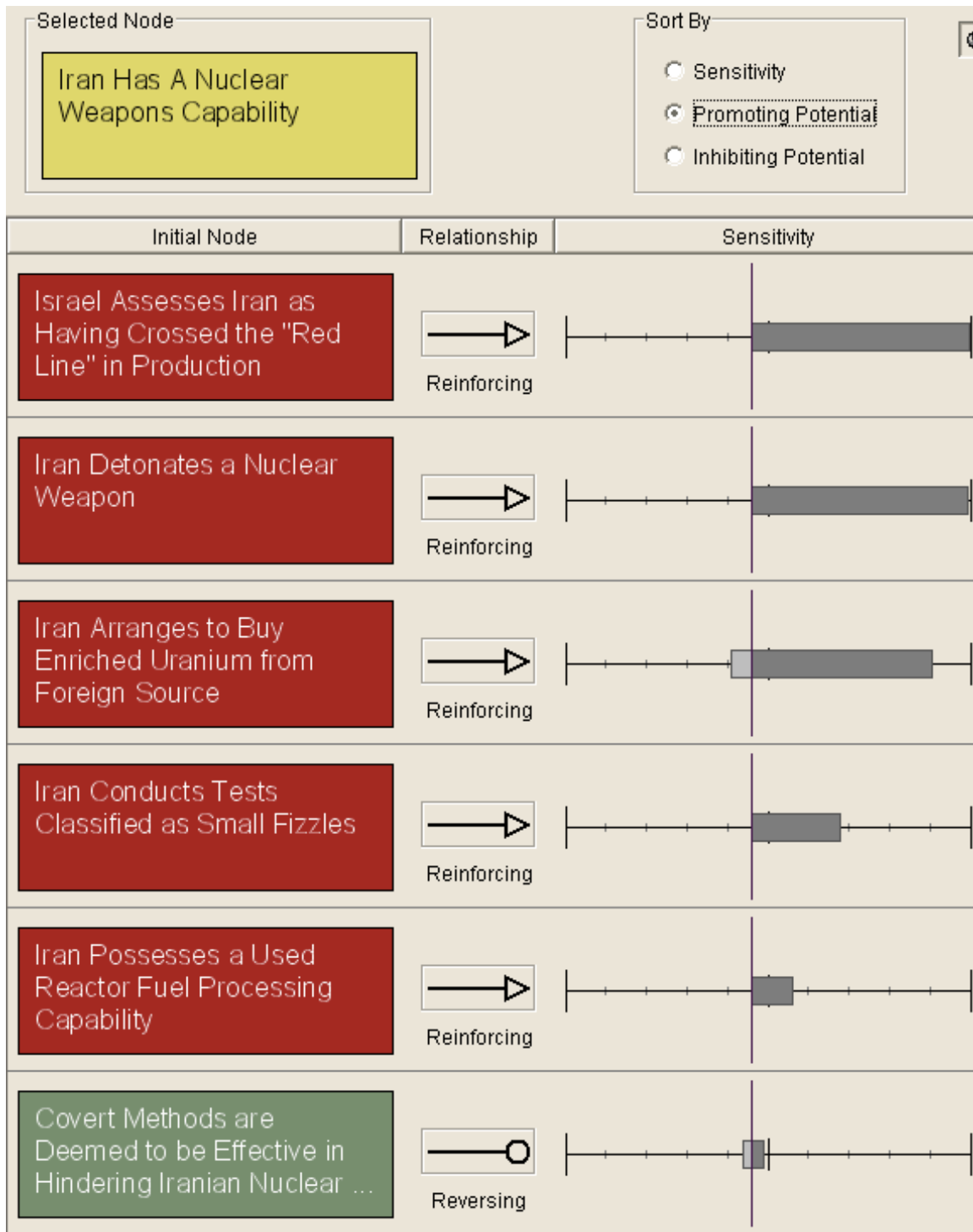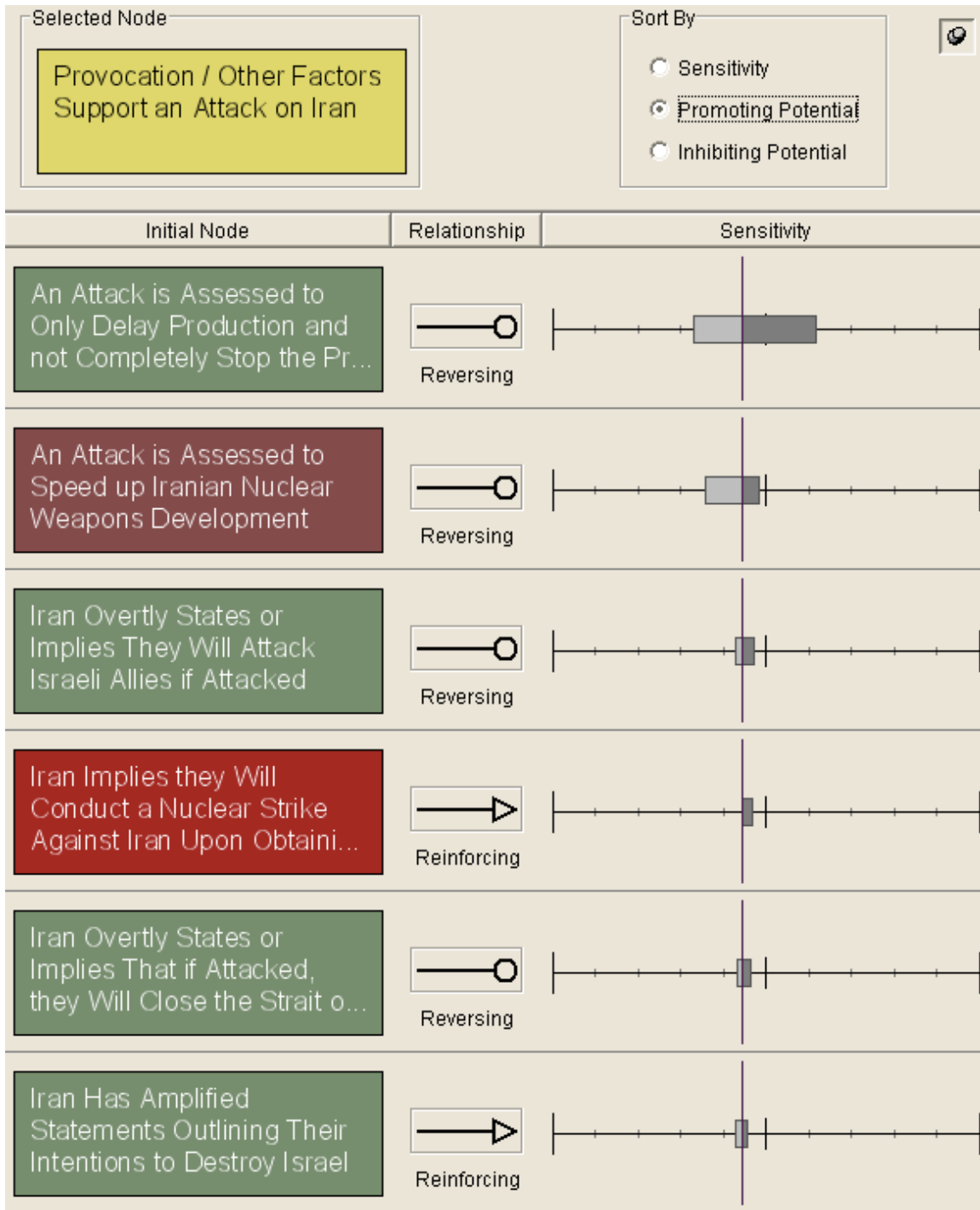Figure 51. Provocation/Other Node Pressure Points Promoting Potential Assessment.
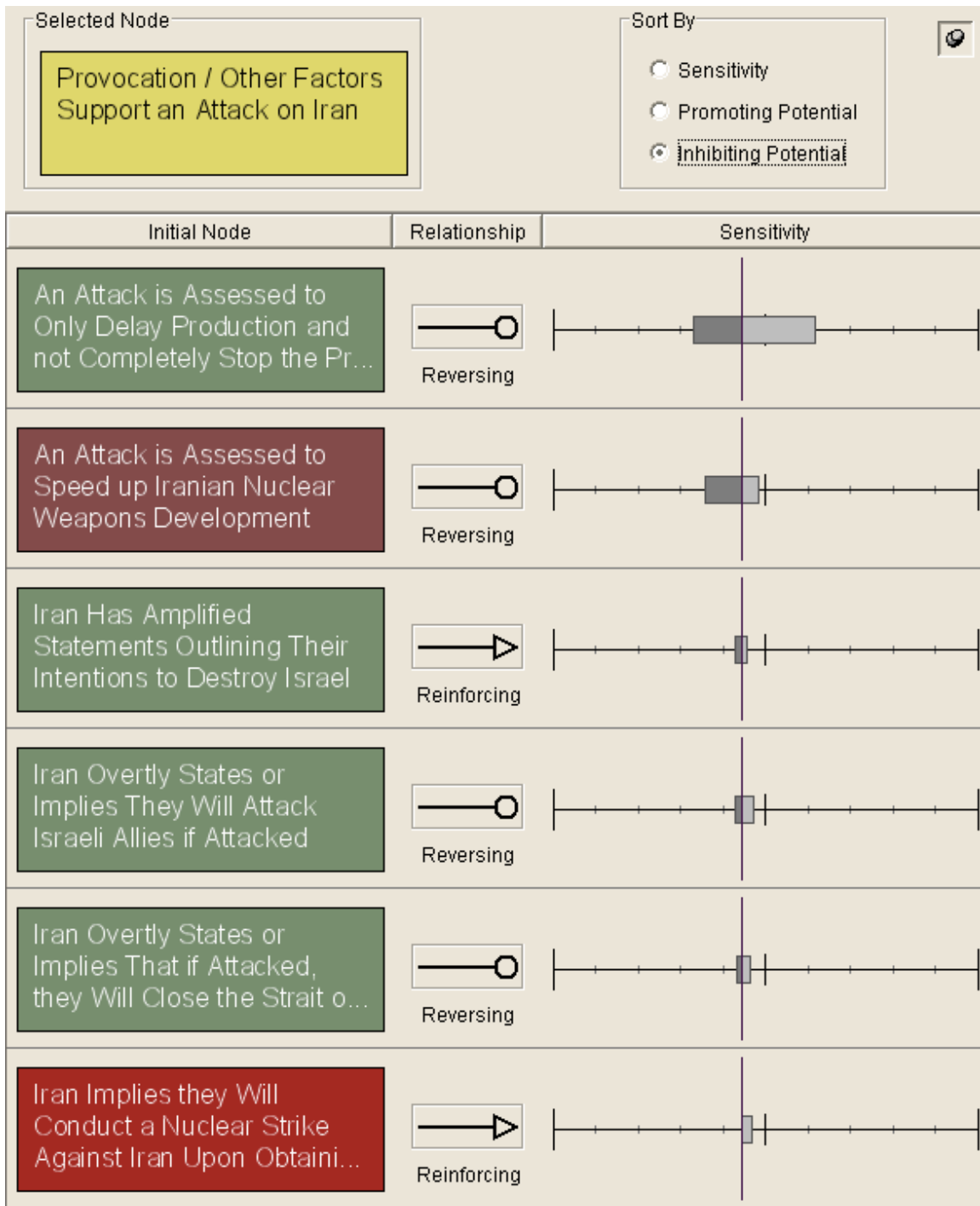
Figure 52.   Provocation/Other Node Pressure Points Inhibiting Potential Assessment.

3. Potential Excursions

The idea of true excursions in the model would involve changing link strengths to see how they affect outcomes. This would likely involve SME's who have differing opinions on one aspect of the model while all the impact statements remain the same. Since the first version of the model was created to assess a software solution to aid in decision-making, those kinds of changes will not be addressed in the thesis. Rather, the pseudo-excursions will be done to gauge the effects that changes in belief analysis may yield to see how the overall impact to the model changes. That is to say, based on the sensitivity analysis, for example, if the U.S. were to take action that prevented the Israeli Prime Minister from supporting a strike, what would the outcome be? Those types of what-ifs will be addressed in the next Chapter as the assessments are analyzed to generate plans of action.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The objective of this work was to produce a software model that was capable of estimating the impact of a wide range of factors to forecast the likelihood of conflict between two states. More importantly, the goal was also to assess both the efficacy of such a model as an aid to a decision-maker by being both a situational awareness tool and an instrument to assist with potential policy-making recommendations. The product was a significant step towards that goal and a substantial amount of data can be extracted to judge the success of the model in meeting those aims, especially with the use of the built-in SIAM assessment tools.

1. Analysis as a Decision-Making Tool

In evaluating this type of model as a decision-making tool, a leader will likely want to use the model to influence a situation or elicit a specific response based on a desired end-state. Commander's intent is key to use the model in this way, and while there is no step-by-step methodology in place to utilize the SIAM tools in this manner, the assessment functions can be used in somewhat of a systematic factor to decide which nodes to target with strategic decisions.

For example, assume the intent was to prevent an Israeli preemptive strike based on the beliefs by U.S. leadership that a strike would largely destabilize the region. The first step would be to look at the impact analysis to narrow down the most impactful branches of the model. Iran's nuclear capabilities and domestic factors account for a combined 50% of the impact on the root statement per the impact analysis tool. Essentially, those two factors have the ability to swing the outcome of the root statement completely if the parent nodes underneath both were completely true or false. By concentrating on those categories, one can pinpoint nodes within those branches that have the most pressure on the statements from the parents to the children. This is where the sensitivity analysis comes into play. In this case, we are looking to prevent conflict (make the root statement false), so the inhibiting potential of nodes under the dominant

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categories would be the most likely places to concentrate. Additionally, the most sensitive under the root node overall should be taken into account. In doing this, one should not just look for those are most sensitive, but also those that can potentially be controlled by the decision-maker. For example, while IAEA reports were listed near the top of potentially inhibiting statements, those wouldn't be areas that a COCOM or the U.S. State Department could control through policy or through other pressures. By evaluating the primary inhibiting factors, there are a few that were identified as potentially controllable: Support from the Israeli Prime Minister and air tanking abilities on the domestic side, and Iran's ability to enrich coupled with covert methods deemed to make their nuclear programs less effective on the nuclear side.

With these in mind, one could use a multi-pronged IO campaign to affect all of those areas by also evaluating cross-linked factors that impact the controllable nodes. On the domestic side, a military information support operation (MISO) campaign could be directed towards the Israeli public highlighting a lack of U.S. support (whether true or not) as there was assessed to be a link between public opinion and action from the governing body of Israel, which would influence the Prime Minister. That, in conjunction with Department of State dialog with the Israeli PM outlining reservations about a strike and withholding U.S. air tanking support for any number of reasons could impact the pinpointed domestic nodes. On the nuclear side, a computer network operations (CNO) campaign could be waged to attempt another disruption in centrifuge SCADA systems as was done with *Stuxnet*. The rationale that covert CNO campaigns were in play could also be an influence tool with the Israeli Prime Minister to promote deferring a strike.

Assuming those factors are successfully influenced, when the beliefs are adjusted in the model to reflect the potential changes and evaluated again, the likelihood of a strike goes down to 33% from 43%. On the other hand, if the U.S. wanted the exact opposite outcome and advocated a strike (with a MISO campaign pushed in support, tanking assistance, and no CNO campaign in place to allow the continued enrichment of uranium at the current rate), the likelihood of a strike goes up to 56%. Thus, assuming SME concurrence with the link strengths as a method of verification with the structure of the overall model, it appears that by pinpointing and attempting to influence key controllable

nodes that are deemed promoting or inhibiting, the forecast outcome of the root statement can be drastically swayed. In this case, it goes from a three in ten chance of a strike (with the model indicating no strike) up to more than one in two chance that a strike and a an indication that a strike is more likely occur based solely on somewhat controllable factors that a higher-level policy maker could direct action towards.

A model of this sort can successfully be used to isolate factors that would be useful in shaping the outcome of a conflict, especially in the IO realm where there are so many non-kinetic factors used in pre-crisis management that may affect an outcome. Additionally, *wargaming* can be done as different assumptions are made about link strengths or to assess what different COAs may look like with iterations of belief evaluations as decision-makers pose conditional scenarios. Thus, the model is assessed as being able to successfully model a conflict of this type and for use as a decision-making tool towards shaping a conflict. Furthermore, as more factors are realized, they can easily be incorporated into the model with new belief evaluations being done instantly, giving an IO or intelligence cell another useful tool in tracking a larger conflict.

2.   Analysis as a Situational Awareness Tool

One key consideration in using this type of model is the fact that it does not account for changes over time. Therefore, its use as a situational awareness tool may be questioned initially. It must be updated over time to reflect current beliefs and baseline values will be constantly changing. Once the model is created and SMEs agree on the link strengths, however, it becomes a tool that can be very easily updated by intelligence analysts on a watch-by-watch or daily basis. One of the fundamental data points the model yields after beliefs are calculated are quantitative outputs for each node. Most important of these of course is the number generated for the root statement. For example, when this model was first run, it gave a 43% likelihood that Israel would execute a preemptive strike on Iran given current assumptions and inputs, pointing to a false likelihood overall that action would be taken. Without showing the entire model or even the top two levels, a number like this can be tracked from day to day and trend analysis can be done. Developments in a situation can be tracked with percentage increases on a

briefing board and statistics similar to stock trackers can be kept, showing 52-week highs and lows, percentage changes, and graphs over time. Trip wires can be in place as commander's critical information requirements when the output goes over a certain level even and the process can easily be tracked with an excel spreadsheet.

As similar models are applied to other conflicts over longer periods, data over years may also glean key information about trends around annual events that may correspond to events that were not previously recognized as factors in the model. Thus, it appears that a SIAM model can be very useful in tracking the status of a conflict over time even if the model itself does not account for the passing of time. It is clear that a SIAM model can be used as both an effective briefing tool and a decision-making tool to assess problems surrounding conflict between two states.

B.   RECOMMENDATIONS

While a model of this fashion can be used successfully gauge the status of a conflict and to assist with high-level decision-making, this thesis did not evaluate its use by an intelligence or IO cell. Thus, usability in a real-world setting still needs to be tested in terms of manageability and in setting protocols for belief input and querying SMEs for link strength. A logical next step would be to expand the model on a number of levels, both with the nodes of the model itself and with the verification process for certain links and nodes. Notionally, each node could be assigned an SME that an intelligence analyst could consult if the one believed that link strengths needed to change. Seeking out and recording those personnel within the model would be a challenging project, but would validate the model and provide for accountability for sources if it were used as a more operational briefing tool. Furthermore, the model can be further expanded and more parent nodes generated to make input factors more detailed. The more nodes that are present, the better the product will be and the more likely that there will be more accuracy with the quantitative nature of the output.

Additionally, while the model generated for this thesis was based specifically on Israel conducting a strike against Iran, many factors present between the two nations in terms of provocation and domestic factors would be common to any two states that may

find themselves in conflict with each other. Thus expanding the model towards a general framework that can be applied towards other states would be a recommended avenue towards follow-on research. To narrow the scope of expanding towards a general model, this type on conflict model could be added to CONPLANs or OPLANs as part of the package to be used for Phase 0 or Phase 1 operations. It is certainly a useful tool to evaluate the effects that strategic and operational decisions may have on any number of situations.

Finally, once a general framework was validated, the data and calculations could be coded into a GUI interface and software package that was built specifically with intelligence cells in mind. This would take out the learning curve towards using the modeling software and would allow for easy inputs and adjustments to a preset model that was determined not to change in its basic structure. Modeling tools like this aim to simplify complicate projects and their use in the future will be invaluable to have in place as decision-making cycles speed up with the ever-increasing pace of warfare today.

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APPENDIX A

A.   LIST OF INITIAL NODE STATEMENTS

Below are the initial statements that need to be addressed to act as parent nodes to all the children above. All statements need to be assessed as true/false, to which degrees of certainty to the statement can be with the slider bars that were described in Chapter I. The respective level two category for each statement is listed in parentheses.

- Iran is able to enrich uranium internally.

- Israel assesses Iran as having crossed the *red line* in production.

- Iran outsources uranium enrichment to Russia or France or is able to obtain those materials through agreements with other countries.

- Weapons from the black market have been delivered.

- Parts to make weapons components have been delivered to Iran.

- Intelligence indicates Iran is building weapons materials.

- Iran detonates a nuclear weapon in a test.

- Iran conducts tests classified as small fizzles.

- Iran's command and control structure is adjusted to stand up a strategic nuclear command.

- Covert sites related to nuclear activities are discovered.

- Iran has a nuclear weapons air delivery platform capability.

- Iran has a nuclear weapon missile delivery capability.

- Iran has a nuclear weapon ground delivery capability.

- Covert methods (sabotage, cyber warfare, assassination) are assessed to be effective in hindering production efforts.

- IAEA concludes with certainty that in-country nuclear work is being conducted with entirely peaceful purposes as allowed by the NPT.

- Iran possesses a used reactor fuel reprocessing capability.

- It is assessed that Israel can absorb a reduction of 5% of GDP for wartime efforts.

- Unemployment is above 11%.

- Doctrine and plans support attack on Iran.

- Israel has the ability to defend against a counterattack.

- Israel has bunker-buster munitions.

- Israel has air-tanking capabilities.

- Israel has adequate fighter/bomber air assets available and operational.

- Iran has been linked to a terrorist attack against Israel.

- Iran has been linked to a terror attack on Israel through a proxy organization.

- A non-Iranian linked organization has been linked to an attack on Israel.

- Israeli Prime Minster supports an attack on Iran.

- Israeli President supports an attack on Iran.

- Knesset majority supports an attack on Iran.

- Mossad Chief supports attack on Iran

- IDF leadership supports an attack on Iran.

- U.N. formally supports Israeli-led strike against Iran.

- U.S. formally supports an Israeli-led strike against Iran.

- NATO formally supports an Israeli-led strike against Iran.

- Russia increases support of NPT.

- U.N. becomes more involved in Syrian conflict.

- Trade embargo against Iran is assessed as effective.

- U.S. supplies Israel with nuclear weapons.

- U.S. provides Israel with additional missile defense hardware to shield entire country.

- U.S. increases ballistic missile defense assets in the region.

- U.S. supplies Israel with bunker buster munitions

- U.S. support for Israel has been formally withdrawn.

- U.S. support for Israel has declined based on a change of cabinet-level U.S. leadership (or higher) and their respective views.

- Internal U.S. distractions have shifted the political focus away from Israel.

- External distractions have shifted U.S. political focus away from Israel.

- The Arab League supports Iran in the conflict.

- Egypt supports Iran in the Israel-Iran conflict.

- Syria supports Iran in the Israel-Iran conflict.

- United Arab Emirates supports Iran in the Israel-Iran conflict.

- Saudi Arabia supports Iran in the Israel-Iran conflict.

- Iraq supports Iran in the Israel-Iran conflict.

- Jordan supports Iran in the Israel-Iran conflict.

- Lebanon supports Iran in the Israel-Iran conflict.

- Pakistan supports Iran in the Israel-Iran conflict.

- Turkey supports Iran in the Israel-Iran conflict.

- The Palestinian peace process has deteriorated (or is deteriorating).

- Syrian air defense has been entirely taken control of by rebel opposition.

- Syrian dictator Al Assad and his regime are overthrown.

- Permission is given by another regional country for overflight.

- Iranian political unrest is assessed as leading to a regime change in the near future.

- Iran makes statements implying they will conduct a nuclear strike against Iran upon obtaining a nuclear weapon.

- Iran has amplified statements outlining their intentions to destroy Israel.

- Iran overtly states or implies that if attacked, they will close the Straits of Hormuz.

- Iran overtly states or implies that if attacked, they will attack Israeli allies.

- An attack on Iran is assessed to speed up nuclear weapons production within the country.

- An attack is assessed to only delay production and not to completely stop nuclear weapons aspirations based on current strike capabilities.

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APPENDIX B

A.   CONSOLIDATED LINK STRENGTH MATRIX

Below is a complete list of link strengths in the model, organized by node levels and the by level two category. The link strengths are listed in parentheses in the same format used in Chapter III. Initial nodes are in gray and appear primarily in the lower levels.

Root - 1	Node Level 2	Node Level 3	Node Level 4	Node Level 5
Israel executes a preemptive strike on Iran				
↳	Iran has nuclear weapons capability (+0.8 / -0.7)			
	↳	Iran obtains weapons grade enriched uranium from other sources (+0.9 / -0.8)		
		↳	Iran outsources uranium enrichment to Russia or France (+0.6 / -0.8)	
		↳	Iran arranges to buy enriched uranium from a foreign source (+1.0 / -0.8)	
	↳	Iran is able to enrich uranium internally (+0.3 / -0.6)		

		↳ Israel assesses Iran as having crossed the "red line" in production (+1.0 / -0.8)		
		↳ Iran obtains material to build a nuclear weapon (+0.7 / -0.2)		
			↳ Delivery of weapons from black market (+0.4 / 0)	
			↳ Delivery of parts to make weapons (+0.6 / -0.4)	
			↳ Intelligence indicates Iran is building weapons material (+0.6 / -0.4)	
		↳ Iran demonstrates nuclear weapons capability (+1.0 / -0.1)		
			↳ Iran detonates a nuclear weapon (+1.0 / -0.2)	
			↳ Iran conducts tests classified as small fizzles (+0.4 / -0.1)	
		↳ Other indicators of Iran's nuclear activities are observed (+0.2 / -0.1)		

			↳ Iran's C2 structure stands up a strategic nuclear command (+0.4/ -0.2)	
			↳ Covert sites related to nuclear activities are discovered (+0.6 / -0.1)	
			↳ Iran has the ability to employ/deliver nuclear weapons (+0.6 / -0.4)	
				↳ Iran has air delivery capability (+1.0 / 0)
				↳ Iran has missile delivery capability (+1.0 / 0)
				↳ Iran has ground delivery capability (+1.0 / -0.4)
		↳ Covert methods (sabotage, cyberwarfare, etc.) are deemed to be effective in hindering Iranian nuclear efforts (-0.6 / 0)		

		↳ IAEA concludes with certainty that in-country nuclear work is for entirely peaceful purposes as allowed under the NPT. (-0.8 / +0.6)		
		↳ Iran possesses a used reactor fuel reprocessing capability (+0.7 / 0)		
	↳ Israeli Domestic Conditions Support Attack on Iran (+0.7 / -0.6)			
		↳ Economic conditions support Israeli attack on Iran (+0.2 / -0.4)		
			↳ Israeli economy can absorb a reduction of 5% of GDP for wartime efforts (+0.8 / -0.6)	
			↳ Unemployment is above 11% (-0.4 / +0.2)	
		↳ Doctrine / Plans support attack on Iran (+0.1 / -0.2)		

		↳	Israel has the military readiness required for a strike (0 / -0.9)	
			↳	Israel has the ability to defend against a counterattack (+0.5 / -0.6)
			↳	Israel has the ability to destroy Iranian nuclear facilities (+0.8 / -0.6)
				↳ Israel has bunker-buster munitions (+0.6 / -0.7)
				↳ Israel has air tanking capabilities (+0.8 / -0.8)
				↳ Israel has adequate fighter/bomber air assets available and operational (+0.8 / -1.0)
		↳	Terrorism attacks have been committed against Israel (+0.5 / 0)	
			↳	Iran linked to a terrorist attack against Israel (+0.8 / -0.8)
			↳	Iran linked through a proxy organization (+0.6 / -0.4)

		↳	Non-Iran organization linked to attack (-0.6 / +0.2)	
		↳ Public opinion supports an attack on Iran (+0.5 / -0.5)		
			↳ Demonstrations in support of attack (+0.6 / -0.2)	
			↳ Polls show majority support for action (+0.6 / -0.6)	
		↳ Current Israeli govt is supportive of attack on Iran (+0.7 / -0.8)		
			↳ Prime minister supports attack (+0.9 / -0.8)	
			↳ President supports attack (+0.4 / -0.6)	
			↳ Knesset majority supports attack (+0.6 / -0.6)	
			↳ Mossad Chief supports Attack (+0.4 / -0.4)	
			↳ IDF leadership supports attack (+0.4 / -0.4)	

↳	International Climate is conducive to an immediate attack by Israel (+0.5 / -0.5)			
	↳	Intl community formally supports an Israeli-led strike against Iran (+0.4 / -0.2)		
		↳	U.N. formally supports Israeli-les strike against Iran (+1 / -0.6)	
		↳	NATO formally supports Israeli-led strike against Iran (+0.6 / -0.4)	
	↳	Intl organizations demonstrate the ability to deter Iranian aggression towards Israel with non-kinetic means (-0.6 / +0.4)		
		↳	Russia inccreases support of nuclear non-proliferation treaties (+0.4 / -0.2)	
		↳	U.N. becomes more involved in Syrian conflict (+0.2 / 0)	

			↳ Trade embargo against Iran is assessed as effective (+0.6 / -0.6)	
		↳ U.S. supports Israel with capabilities negating the need for immediate action (-0.4 / +0.2)		
			↳ U.S. supplies Israel with nuclear weapons (+0.6 / -0.2)	
			↳ U.S. provides missile defense (+0.4 / -0.4)	
				↳ U.S. provides Israel with additional missile defense hardware to cover entire country (+0.6 / -0.6)
				↳ U.S. increases BMD assets in region (+0.6 / -0.4)
			↳ U.S. supplies Israel with bunker buster bombs (+0.2 / -0.2)	
		↳ United States supports a preemptive strike (+0.6 / -0.4)		
		↳ Overall U.S. support for Israel declines (-0.3 / 0)		

			↳ Support formally withdrawn by the U.S. (+1.0 / 0)	
			↳ Support declines based on change of cabinet-level (or higher) leadership (+0.2 / 0)	
			↳ Support indirectly declines due to distraction (+0.3 / -0.3)	
				↳ Internal distractions shift political focus away from Israel (+0.4 / 0)
				↳ External distractions shift political focus away from Israel (+0.6 / 0)
	↳ Regional actions reinforce an Israeli strike on Iran (+0.3 / -0.2)			
		↳ Regional countries unite and ally themselves publicly with Iran (-0.6 / +0.2)		
			↳ The Arab League supports Iran in the conflict (+0.6 / -0.2)	

			↳ Egypt made statement supporting Iran in the conflict (+0.5 / -0.2)	
			↳ Syria made statement supporting Iran in the conflict (+0.5 / -0.2)	
			↳ UAE made statement supporting Iran in the conflict (+0.5 / -0.2)	
			↳ Saudi Arabia made statement supporting Iran in the conflict (+0.5 / -0.2)	
			↳ Iraq made statement supporting Iran in the conflict (+0.5 / -0.2)	
			↳ Jordan made statement supporting Iran in the conflict (+0.5 / -0.2)	
			↳ Lebanon made statement supporting Iran in the conflict (+0.5 / -0.2)	
			↳ Pakistan made statement supporting Iran in the conflict (+0.5 / -0.2)	

		↳	Turkey made statement supporting Iran in the conflict (+0.5 / -0.2)	
		↳ Palestinian peace process deteriorates (-0.2 / 0)		
		↳ Israel has freedom to use regional airspace as a strike route to Iran (+0.4 / -0.2)		
			↳ Syrian Air Defense entirely take control of by rebel opposition (+0.5 / -0.2)	
			↳ Syrian Dictator Al Assad and his regime are overthrown (+0.4 / -0.2)	
			↳ Permission is given by another regional country for overflight (+1.0 / -0.6)	
		↳ Iran internal affairs encourages an Israeli attack (-0.5 / 0)		
			↳ Political unrest leads to regime change (+0.8 / -0.6)	

			↳ There is a change in Iranian leadership (+0.6 / -0.4)	
↳ Provocation / Other independent factors from Iran support a strike (+0.2 / -0.2)				
		↳ Inflammatory rhetoric towards Israel is made by Iran (+0.2 / 0)		
			↳ Iran implies they will conduct a nuclear strike against Iran upon obtaining a nuclear weapon (+0.8 / 0)	
			↳ Iran has amplified statements outlining their intentions to destroy Israel (+0.6 / -0.2)	
		↳ Iranian rhetoric towards the international community is made concerning attacks (-0.3 / 0)		
			↳ Iran overtly states or implies that if attacked, they will close the Straits of Hormuz (+0.6 / -0.2)	

		↳	Iran overtly states or implies that if attacked, they will attack Israeli allies (+0.6 / -0.4)	
		↳ An attack is assessed to speed up nuclear weapons development within Iran (-0.3 / 0)		
		↳ An attack is assessed to only delay production and will not completely stop nuclear weapons aspirations based on current strike capabilities (-0.2 / +0.4)		

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APPENDIX C

A.   MODEL DIAGRAM

The SIAM screenshots give a visual depiction of the model. In addition to seeing the model in a different way, this appendix also accounts for cross-links between nodes that were not given in the overview link strength matrix. The following is the model as it was run for Chapter V and VI outputs and assessments:
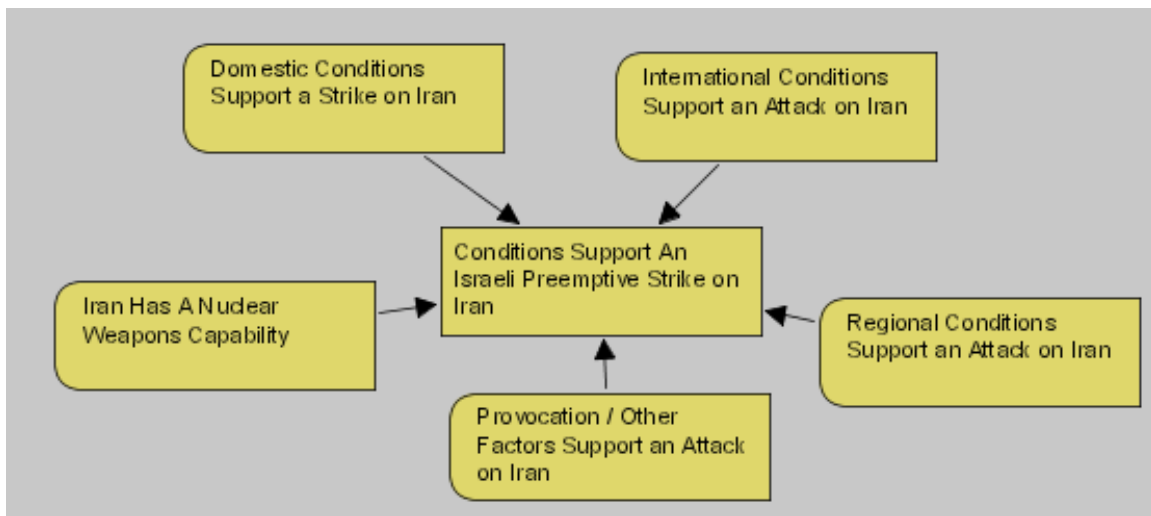

Figure 53.   SIAM Model Root Node Screenshot.
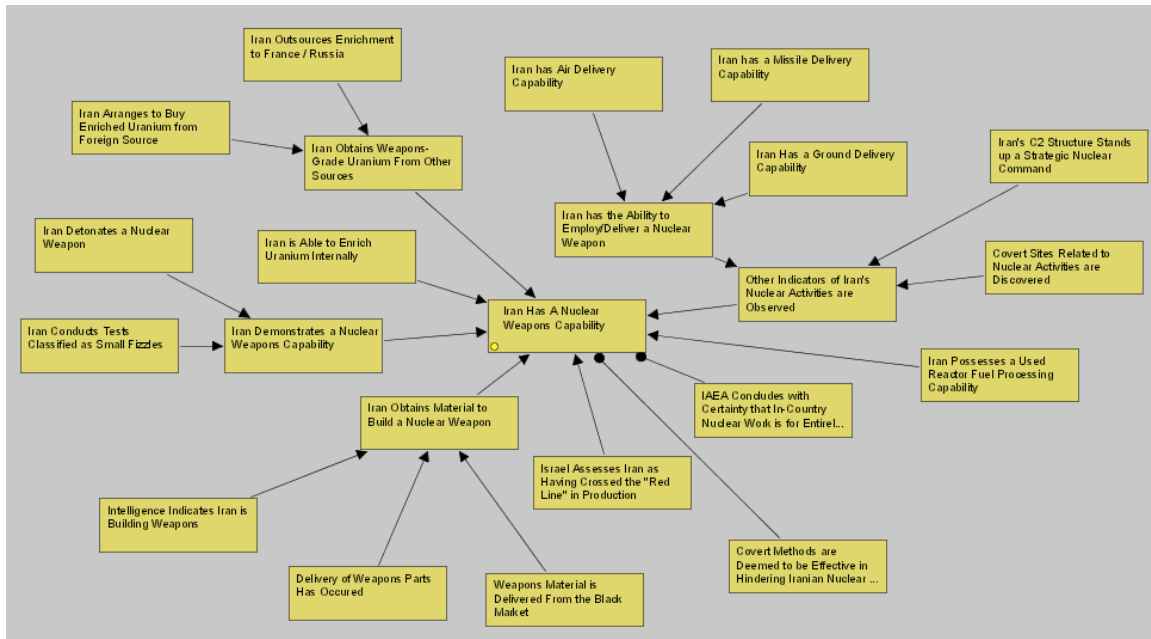
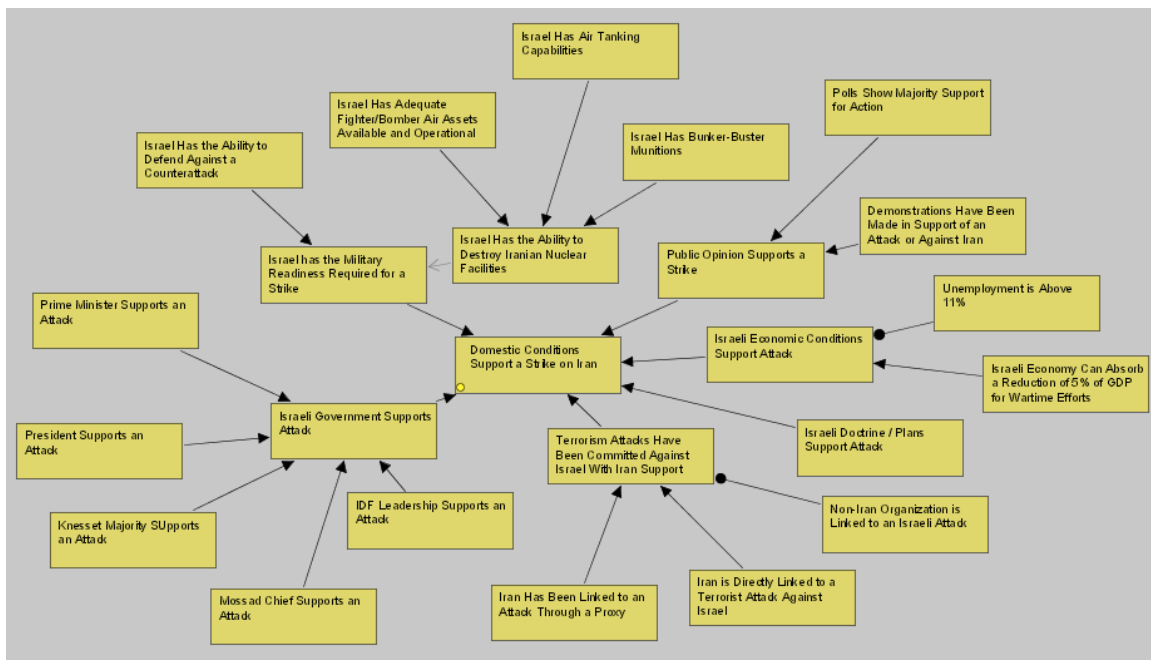Figure 54.   SIAM Model Nuclear Branch Screenshot.

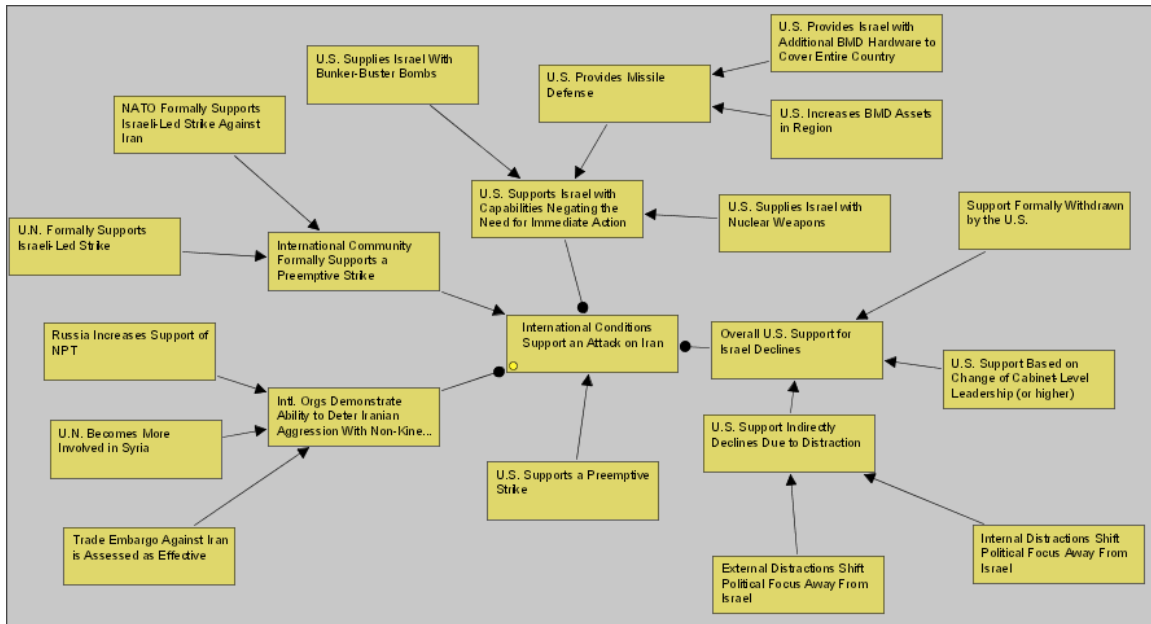Figure 55.   SIAM Model Domestic Branch Screenshot.

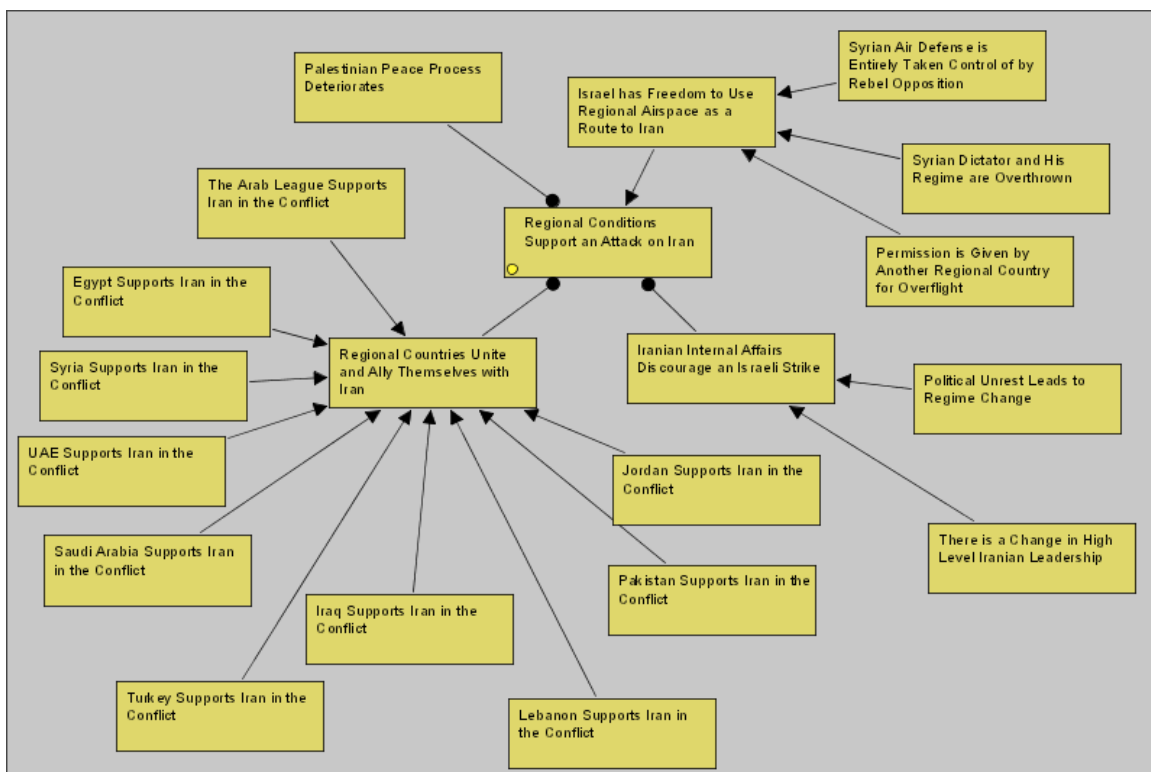Figure 56.   SIAM Model International Branch Screenshot.
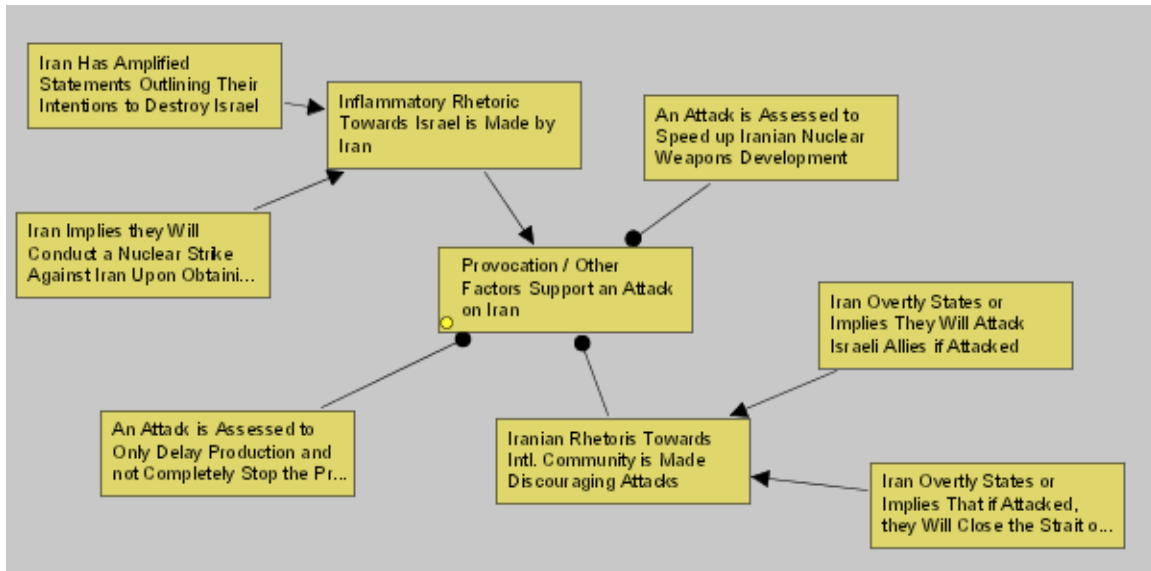

Figure 57.   SIAM Model Regional Branch Screenshot.

Figure 58.   SIAM Model Provocation / Other Factor Branch Screenshot.

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