

AgenaRisk: Hints and Tips

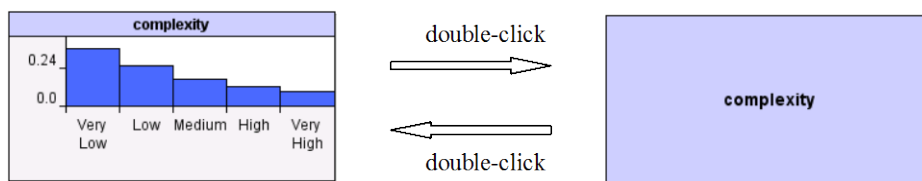
Last updated: 26 November 2008

Click on the link for the relevant tip

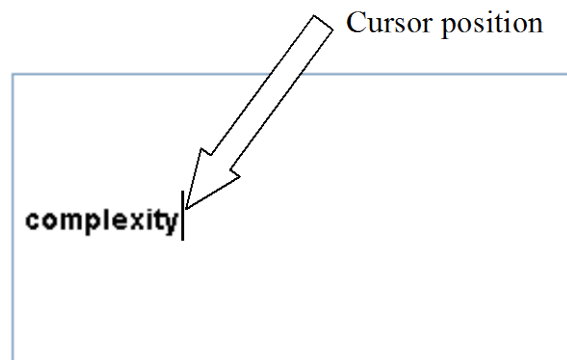
- Changing a node name without having to edit the node properties
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Changing a node name without having to edit the node properties

Version 5.0 introduces a new 'slow' double-click to do this. In previous versions double clicking a node had the effect of displaying/hiding the node's graph:



This functionality remains in the new version, but requires a 'fast' double-click (which is considered to be the standard Windows double-click). A 'slow' double-click will result in the node labelling being directly editable.



This enables you to immediately start editing the label text. It is significantly easier than the previous alternative way of doing this (which involved right clicking on the node, selecting "Properties", then "Details" and then editing the Node label text box). It will revert back to its default view once you have finished editing the text and clicked anywhere outside the node.

Using numeric nodes

One of the most powerful features of AgenaRisk, compared with other BN and simulation packages, is the way it enables you to include numeric nodes and numeric functions in your models without loss of accuracy. For maximum accuracy a numeric node should be declared as a simulation node. Although you can change this setting in any node's properties it is strongly recommended that when you first create a node you create it as a simulation node by selecting the simulation node icon:



That way a set of sensible default properties for the associated graphs will be automatically created for you.

For users new to the tool, there are a number of things you need to be aware of before using numeric nodes. It is therefore strongly advised that you first go through the tutorial in Chapter 7 of the user manual (“Working with numeric nodes and simulation”). In particular this will help to explain:

Why you need to change the simulation settings when you are developing a large model

Why you need to switch off the auto-calculate function

Why you should not have numeric nodes with more than two numeric parents (and how to work around the problem if you need to).

Why you should not normally need to manually define large NPTs (node probability tables)

One of the most common mistaken assumptions made by people building Bayesian Net models is that they have to manually enter each entry of the node probability table (NPT). If, for example, you have a node X with 5 states and this node has three parent nodes each of whom also has 5 states then the NPT for node X will have 625 entries. You cannot complete these manually without enormous effort and inevitable inconsistencies. Even if you have a node X with 3 states and just two parents with 3 states, the NPT for X will still have 27 entries. While this is not an impossible number to complete, it is still a significant and error prone task.

It turns out that in many situations you can avoid having to complete NPT entries manually:

If the node states are on something like an 'ordinal scale', meaning that they go from something like 'low' to 'high' or 'poor' to 'good'. Then inevitably the node can be defined as a ranked node in AgenaRisk and there are simple ways of generating sensible NPTs for such nodes in seconds. Chapter 20 of the User Manual ("Ranked nodes") explains how to do this.

If the nodes are numeric then in most cases you can define the NPT directly using a pre-defined statistical or mathematical expression. Chapter 4 of the user manual explains this in detail.

If the node is numeric and one or more of the parents is not then you can often use a partitioned expression (see Section 4.2.3 of the user Manual).

If you use a method such as that for ranked nodes to generate the NPT it is still possible to directly edit individual entries of the NPT. All you have to do is set the "NPT editing mode" to "manual". You will then see the full generated NPT which you can edit directly to tweak to your particular requirements.

Handling Inconsistent evidence

The method of probability calculation carried out in AgenaRisk aims to make the overall risk model consistent with the assumptions made and the observations entered. However on occasions you might create a model that is inconsistent by doing one or more of the following:

Creating a node containing a probability assignment that depends on another node that contradicts this assumption.

Selecting a state value as an observation when the probability of observing that state is actually zero (or so close to zero that the model interprets it as zero)

Entering observations on two state values on different nodes each of which have non-zero probabilities but which when calculated actually have zero joint probability of occurring together.

In these cases AgenaRisk will attempt to diagnose the cause of the problem and will display the issue in an error message like the one shown here.

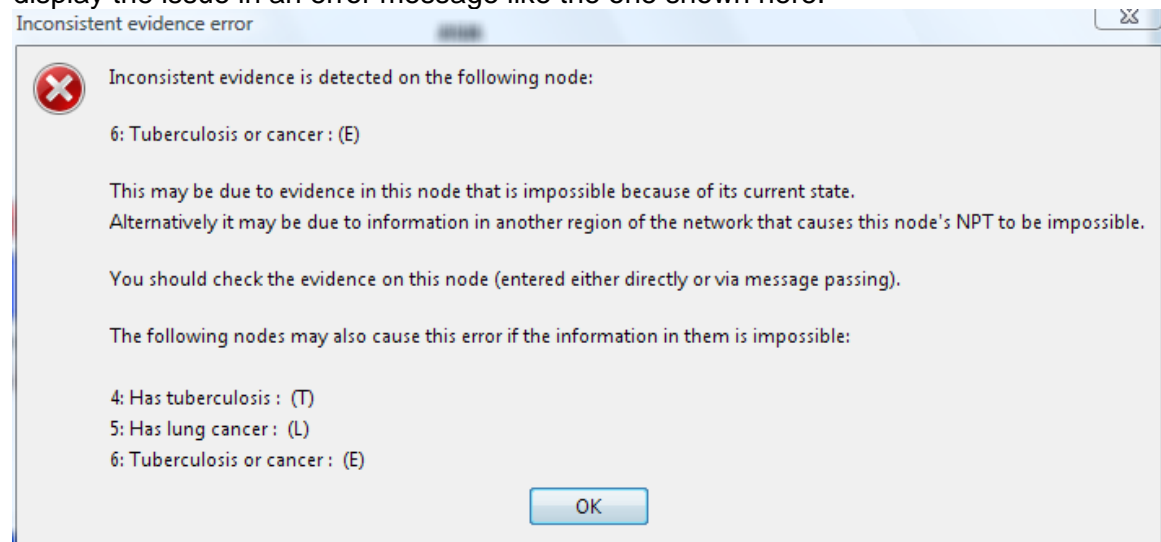


Figure 1 Inconsistent error message

AgenaRisk will then “roll-back” the calculation made and display the last consistent state of the risk model. If this happens you will have to remedy the model by either withdrawing contradictory or impossible observations or amending the probabilities accordingly.

The problem is especially acute for numeric nodes where, although the probability of a particular state is theoretically non-zero, the probability is treated as zero by the model. For example suppose a numeric node is defined as having a Normal distribution of mean 300 and variance 1000. Then, theoretically, there is a non-zero probability that this node can have a value within any range no matter how large or small. So the probability that this node has a value between, say 10,000 and 10,000.1 is non-zero. However, in practice almost all of the probability mass lies between 200 and 400. The probability of a value lying somewhere around 10,000 is so small that it is treated as zero. So if you enter the value 10,000 as an observation for this node you will get an inconsistent evidence message. In most cases these problems occur when users set unreasonably restrictive prior distributions for the NPT of a node. To avoid the problem you should ensure that the both the range and variance are very large if you really believe such wide-ranging values are possible.

Entering observations that seem (illogically) to have no effect on the outcome

Sometimes you enter observations that appear to have no effect on the model. This occurs when observations are entered that block the flow of information through the model. Typically this occurs when observations are entered on nodes whose child node already has an observation on it. Given that the child is set as a fact any change to its parent nodes will not affect its ancestors in any way (unless there is an available unblocked path through the risk map).