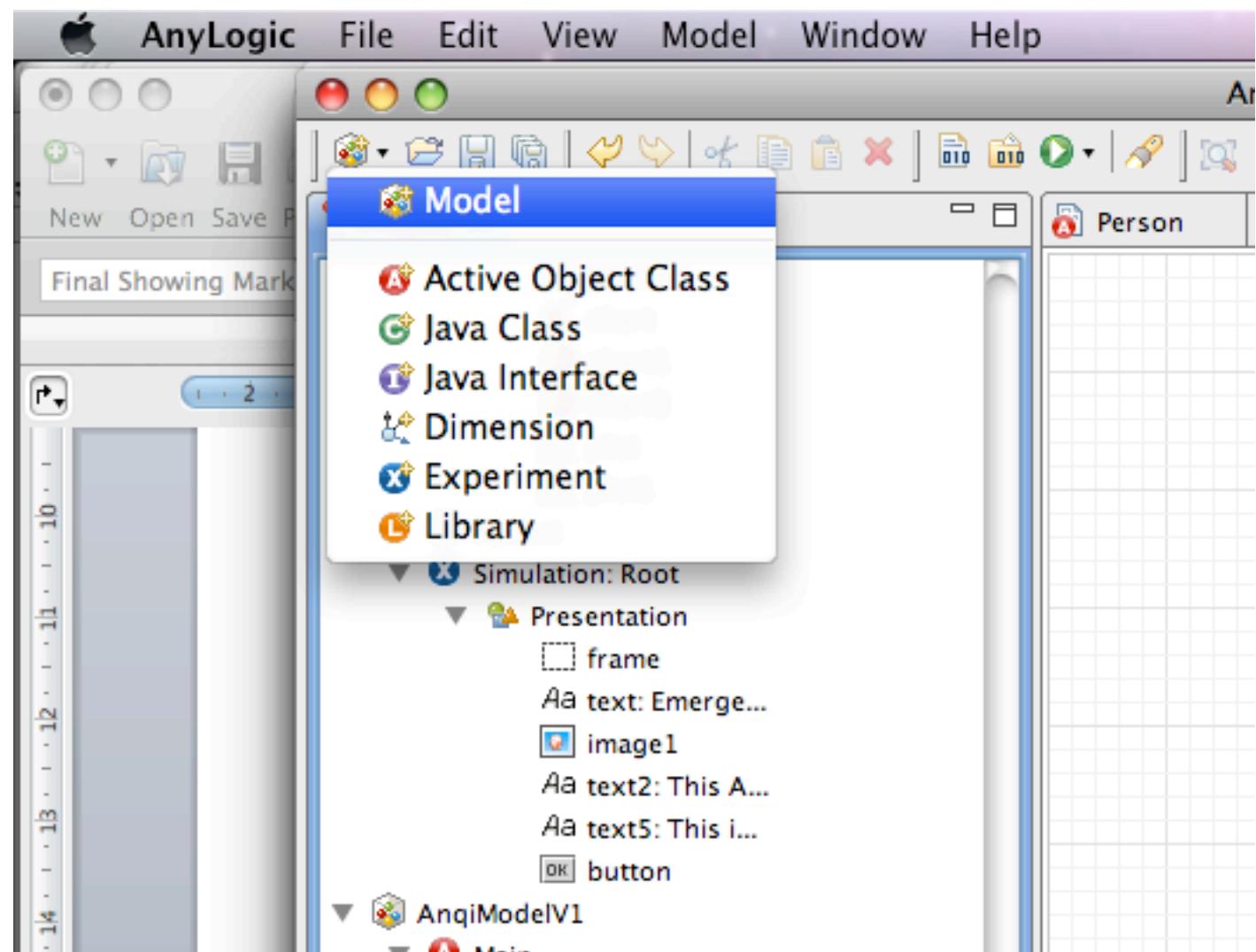


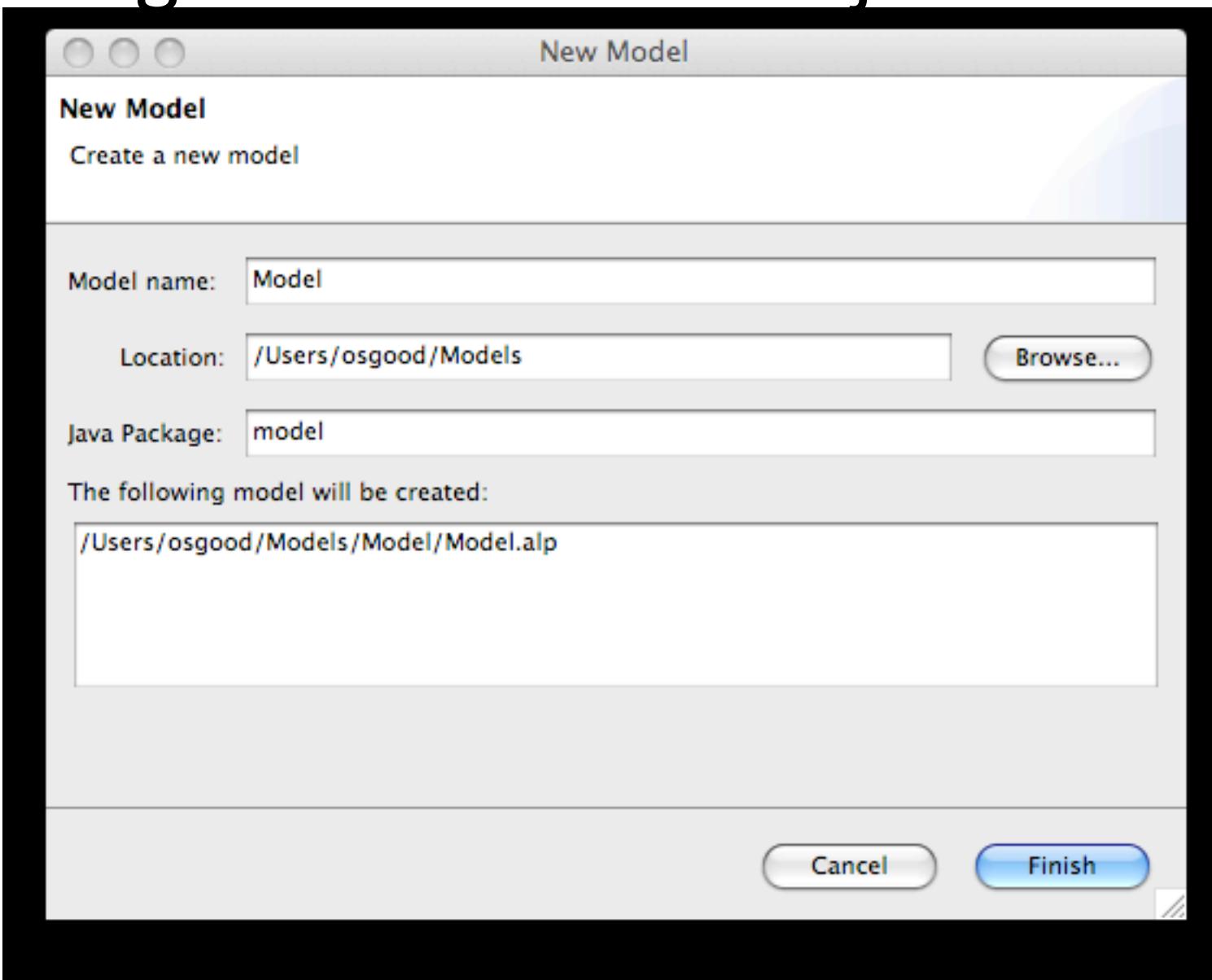
Building Up a Simple Agent-Based Model: The Manual Technique

Nathaniel Osgood

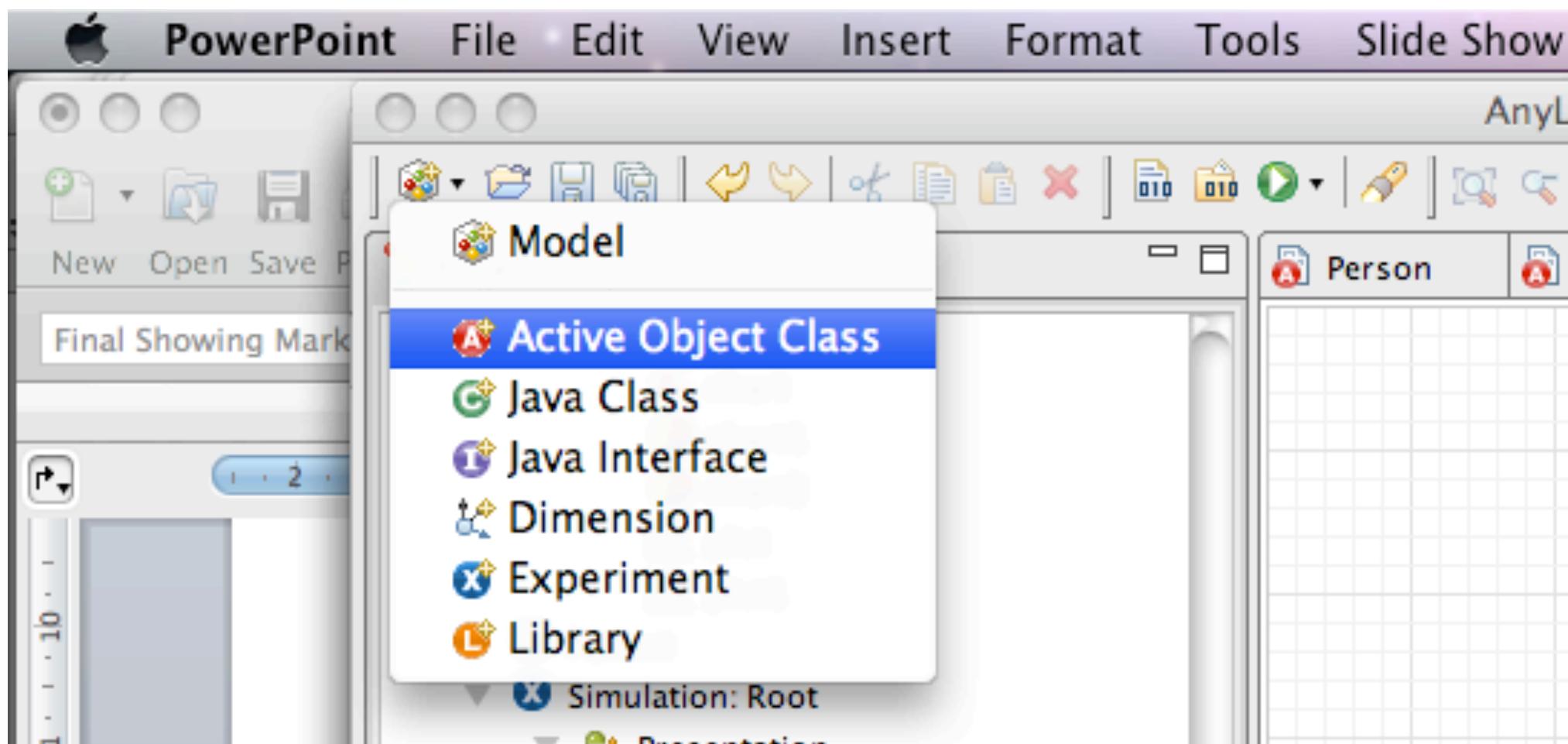
Add a New Model Project



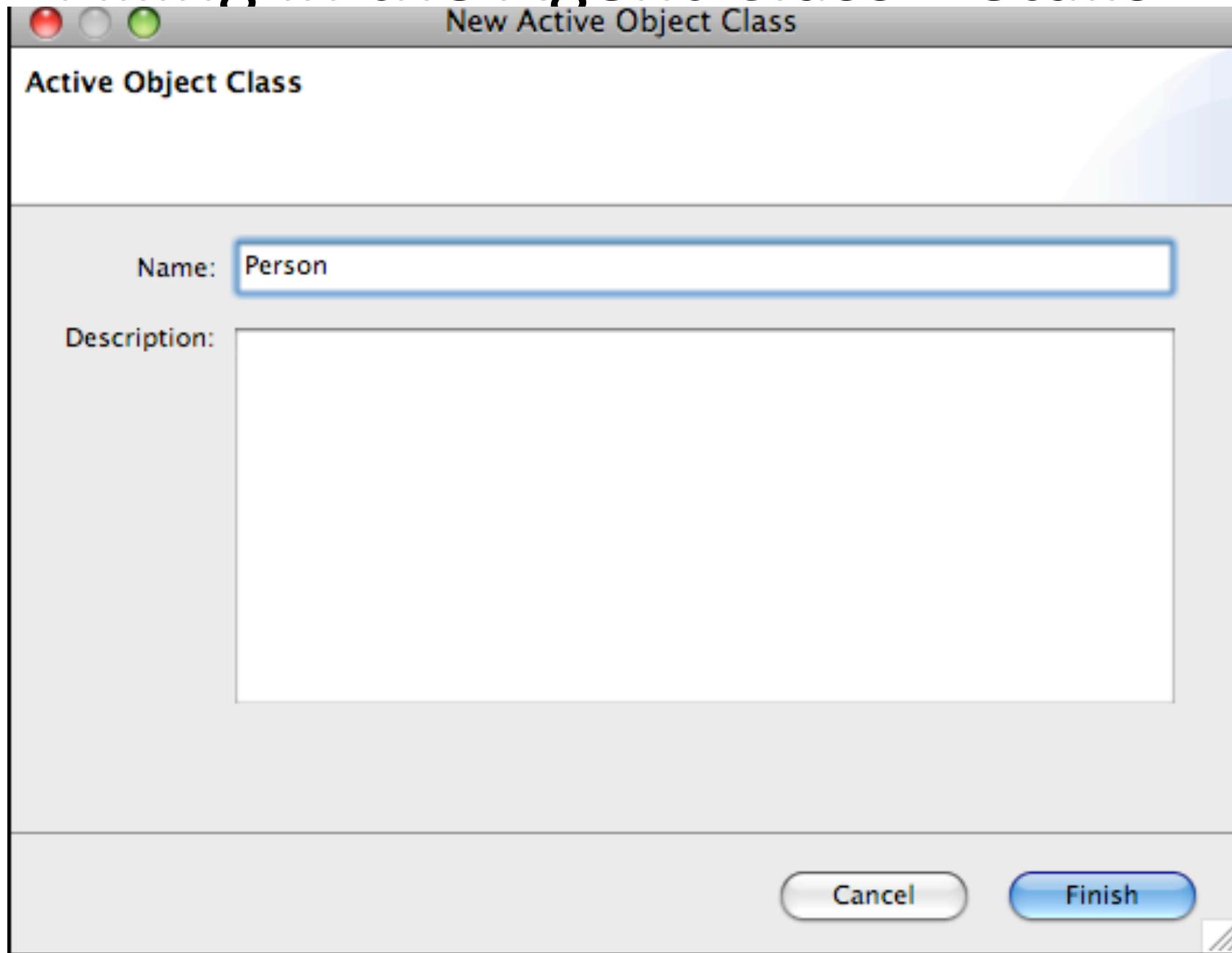
Filling in the Model Project Details



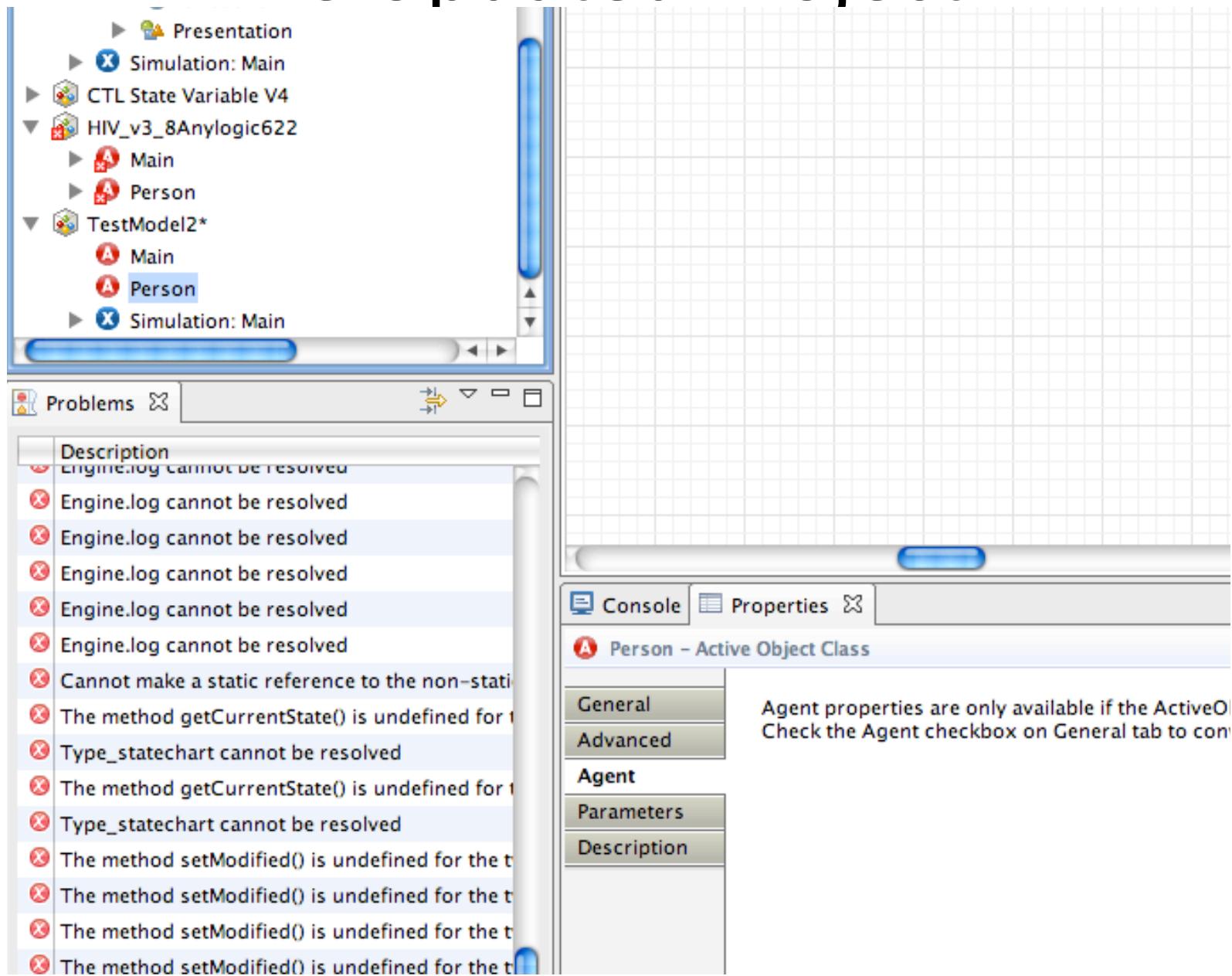
Add an Active Object Class



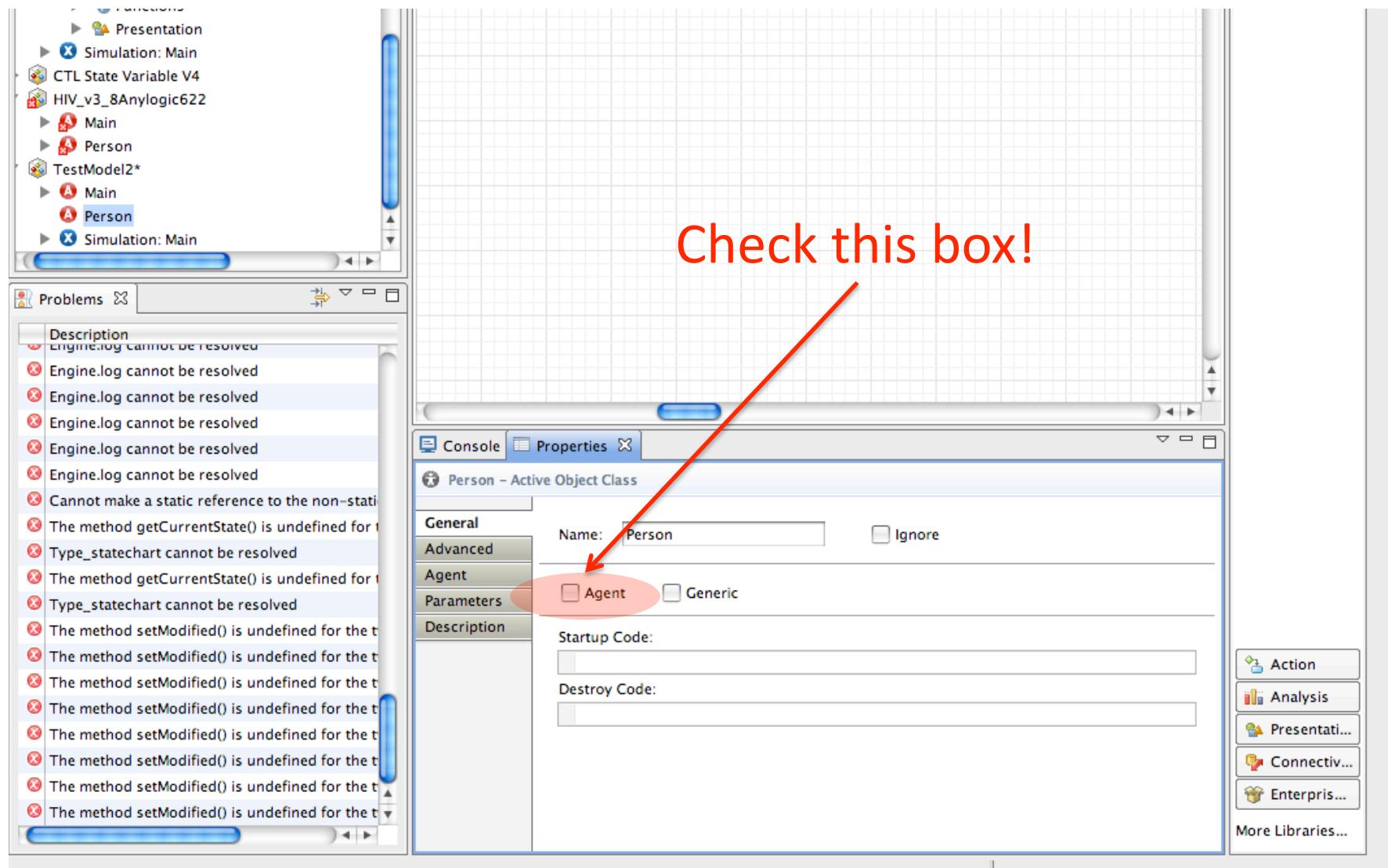
Filling in the Agent Class Details



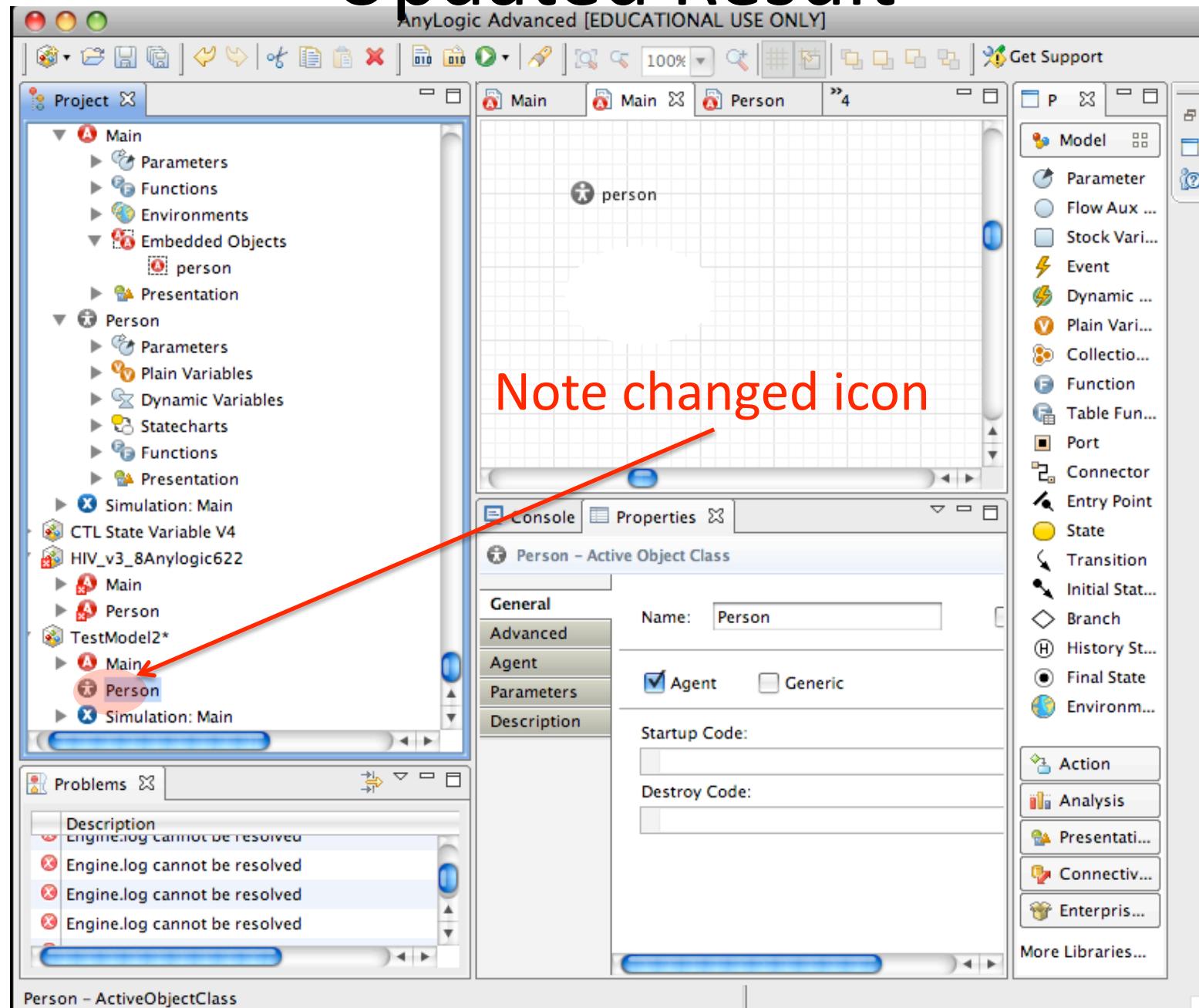
The Updated Project



Declaring “Person” as an Agent

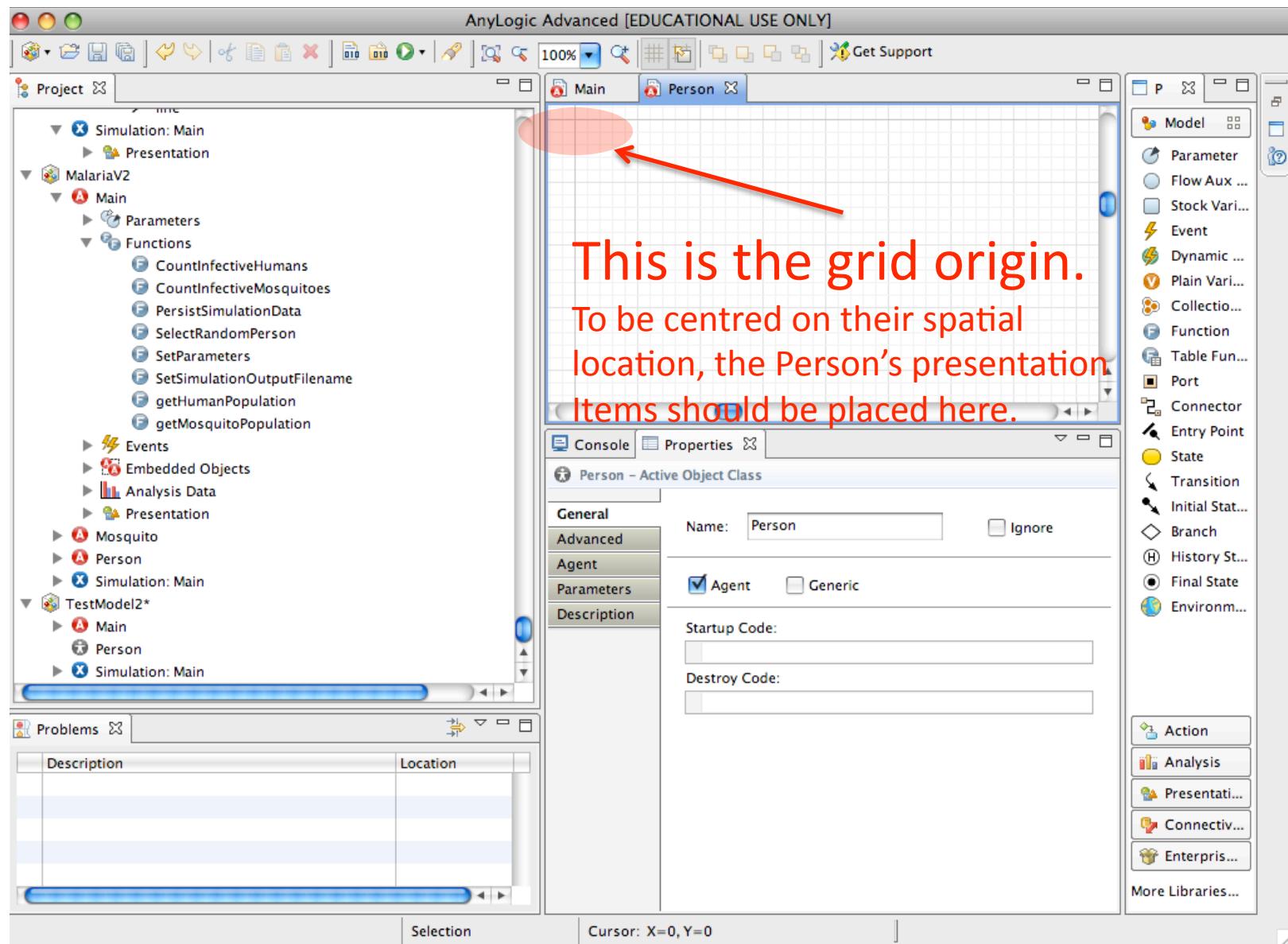


Updated Result

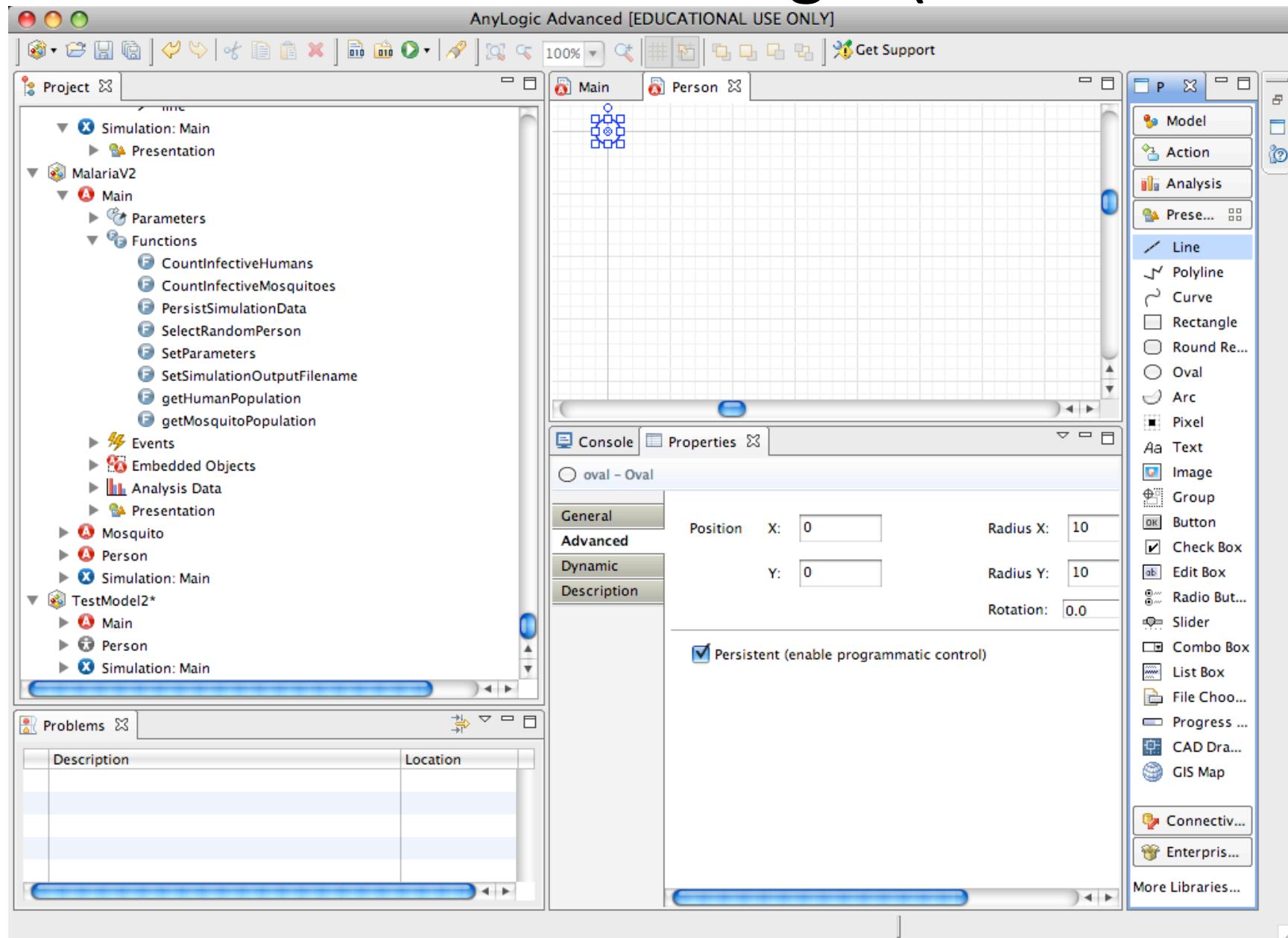


Note changed icon

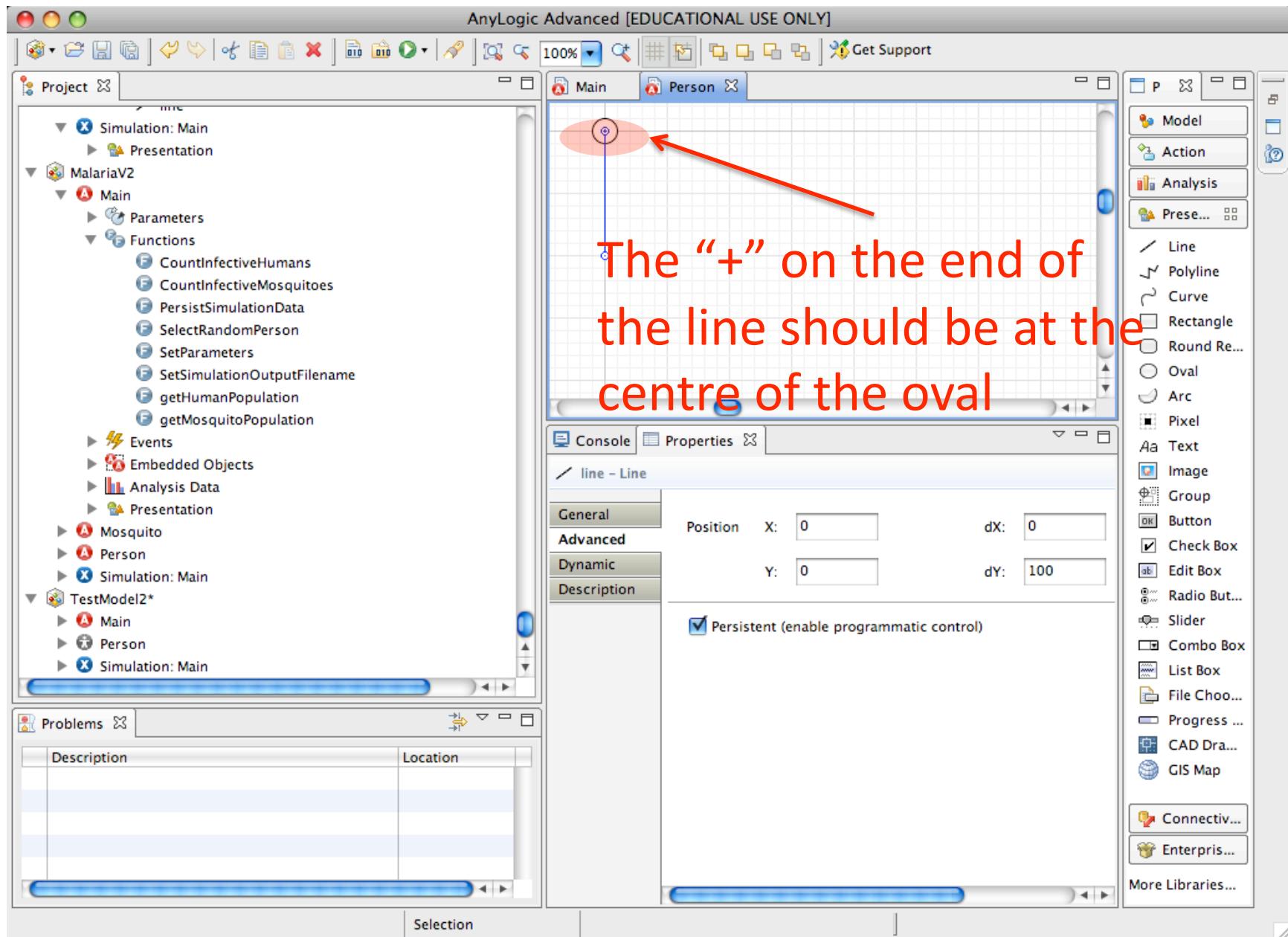
Double-Click on “Person” & Scroll Until you See The Cross-Hairs



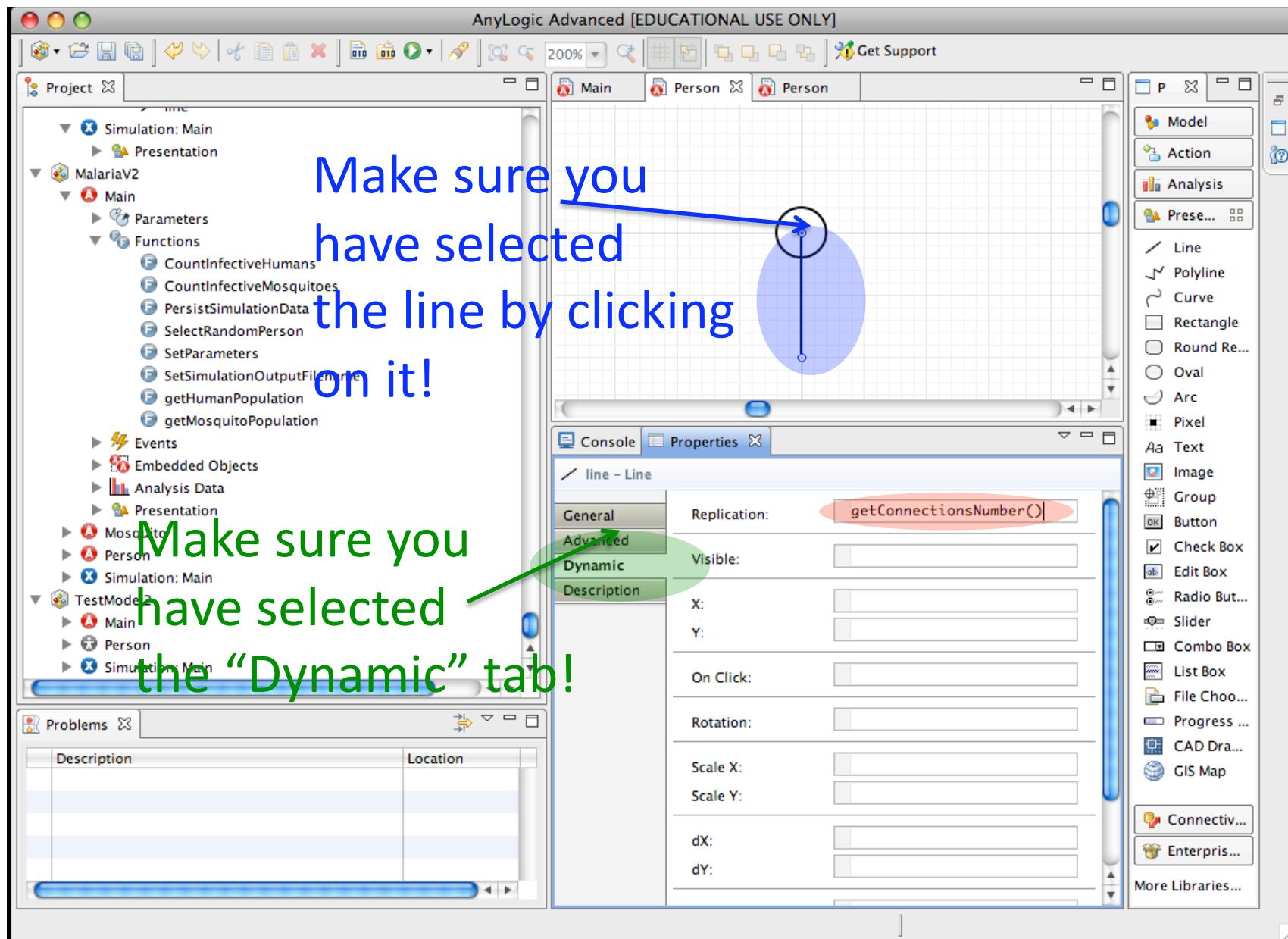
Create an Oval at the Origin (Cross-Hairs)



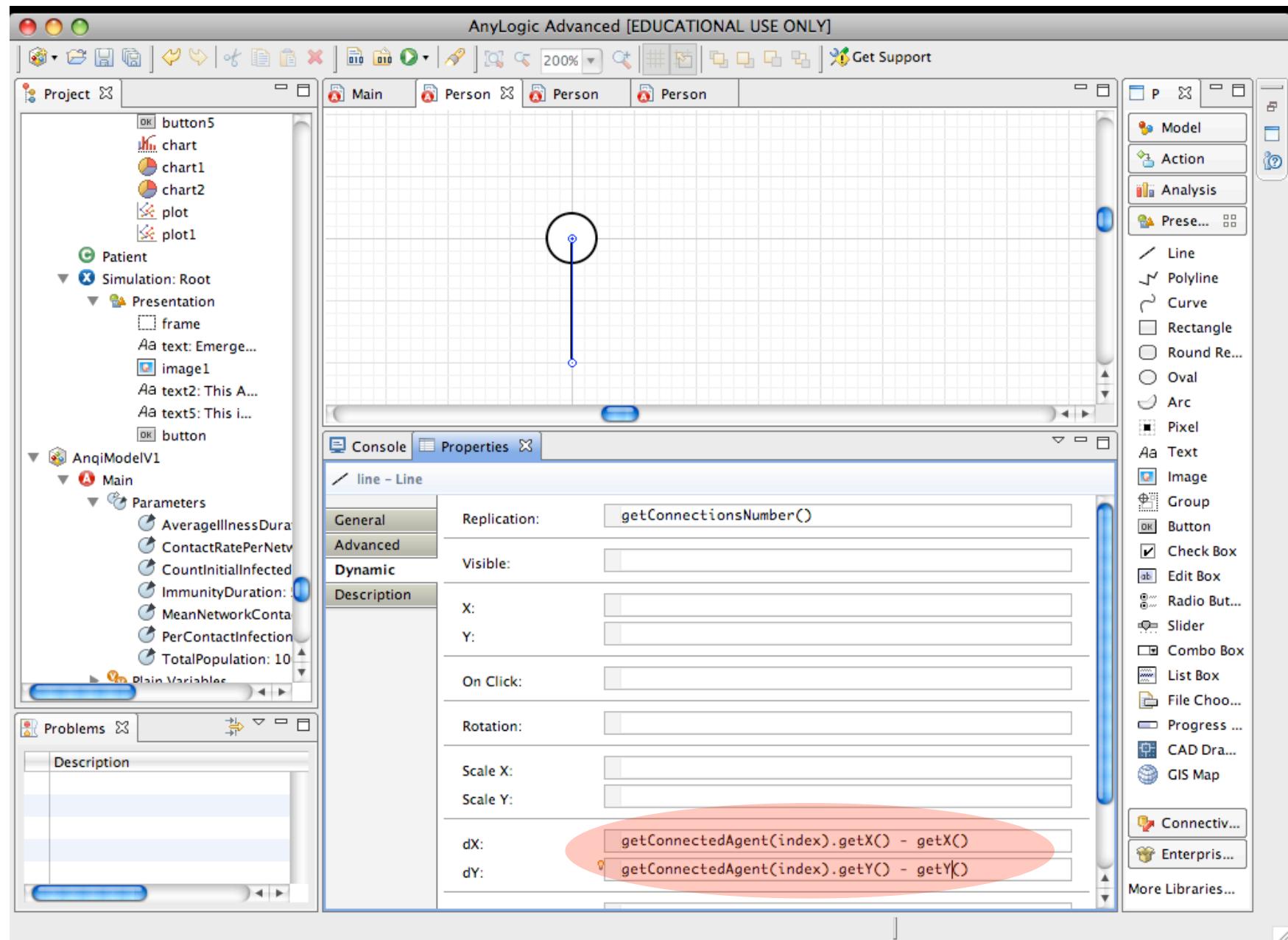
From the Centre of the Oval, Draw a Line



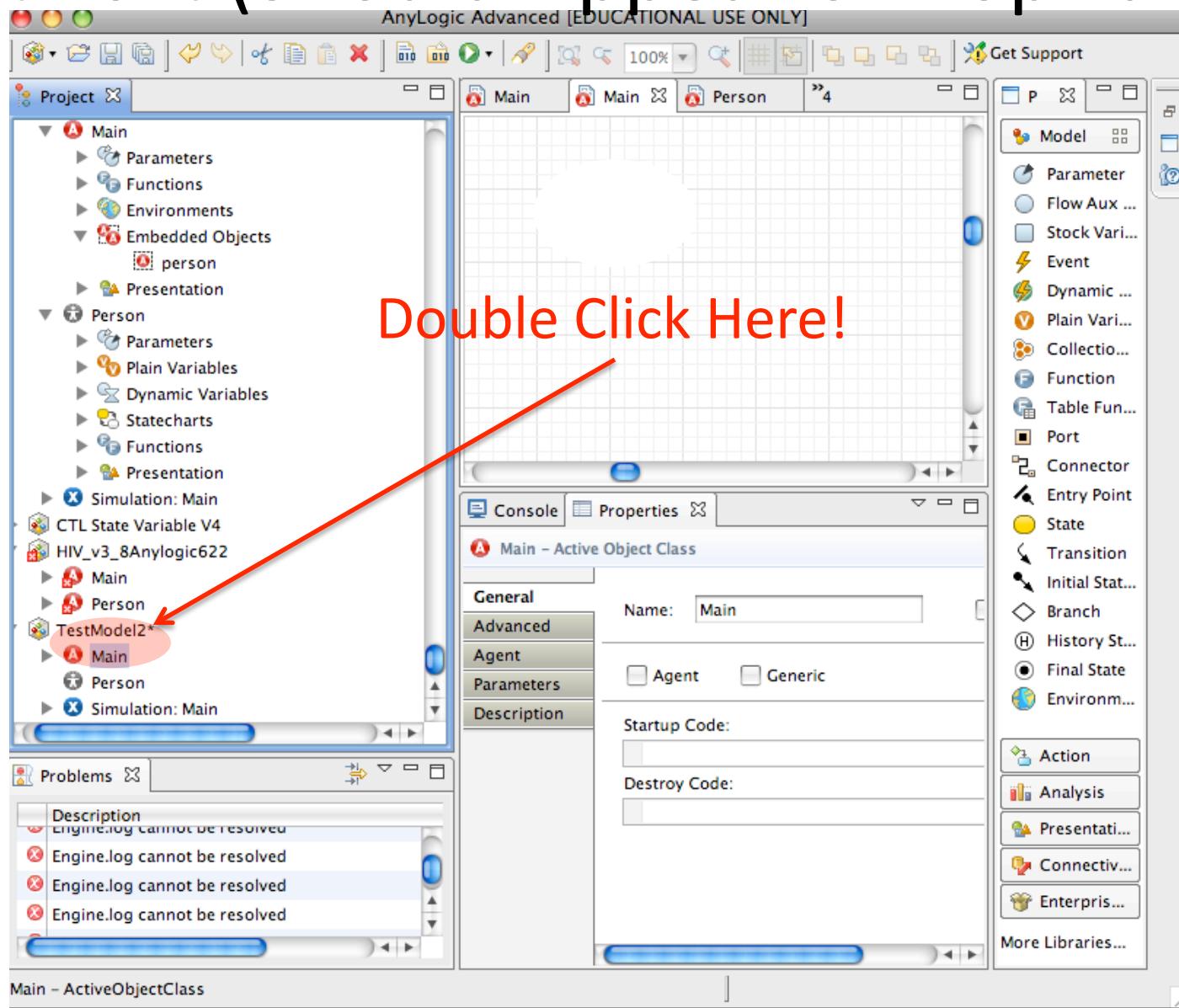
Set the “Replication” Dynamic property of the *Line* so there is 1 for each connection



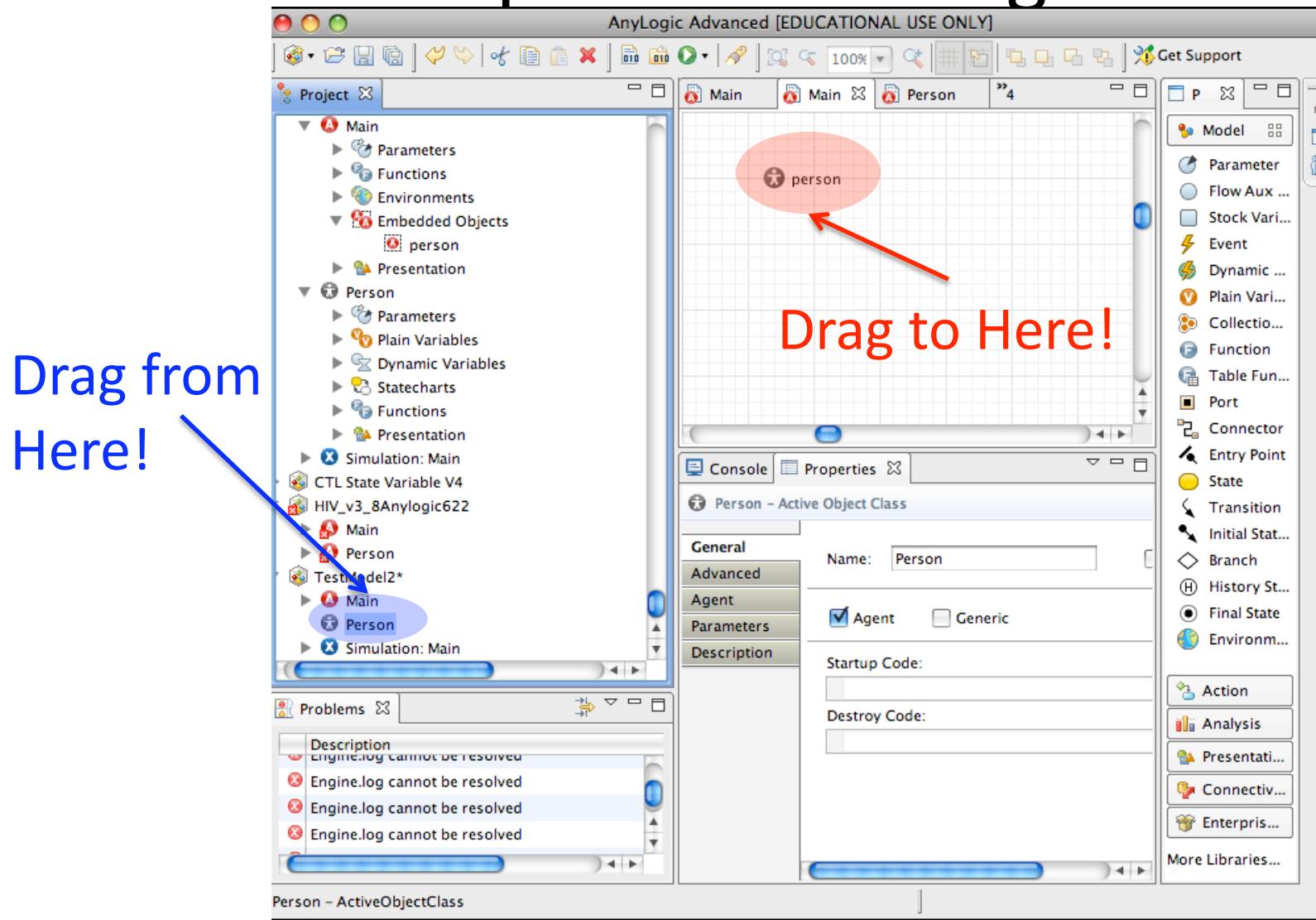
Also set the “dX” and “dY” properties



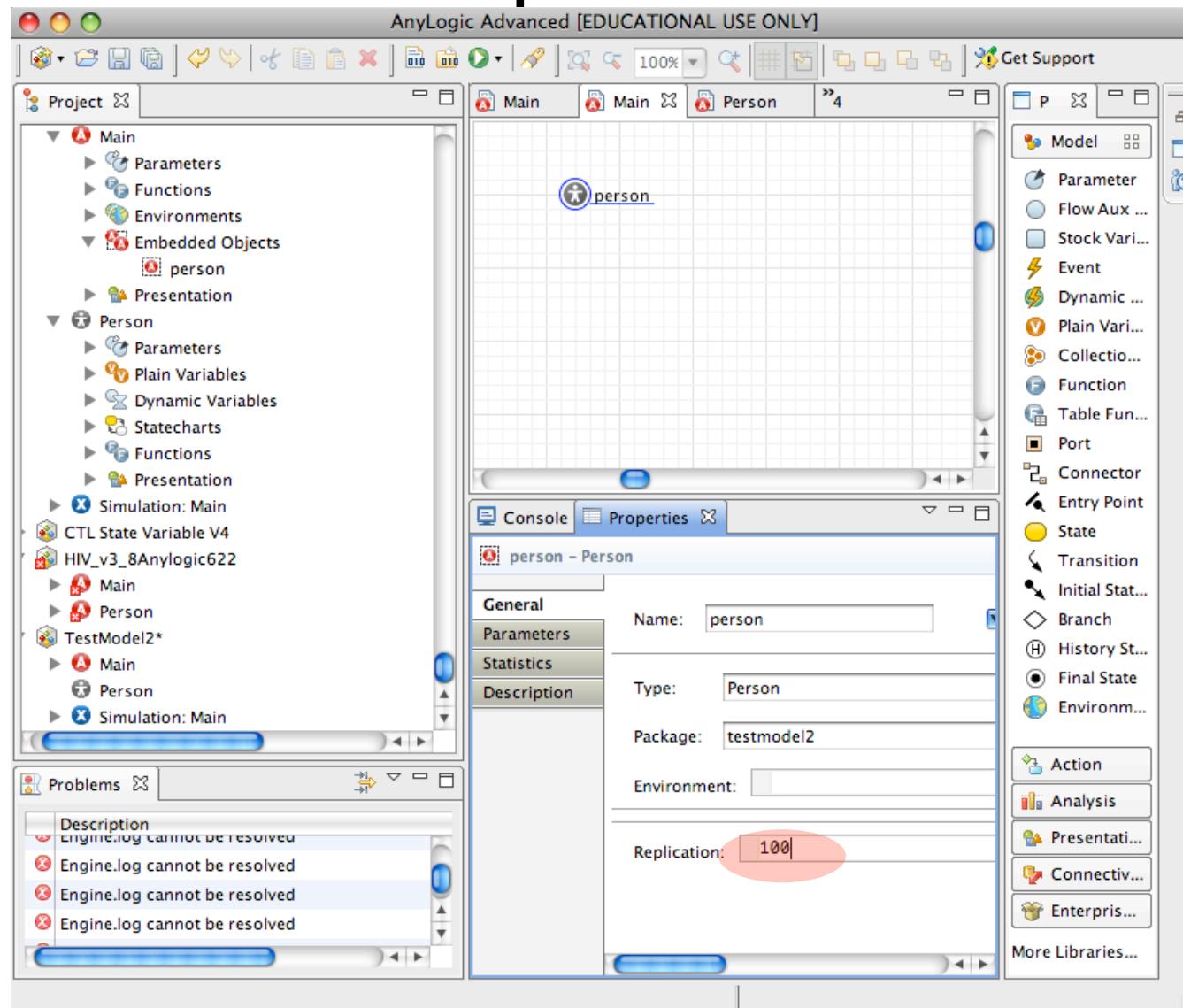
Double Click on “Main” class Name to View this it (Should Appear on Top Tab)



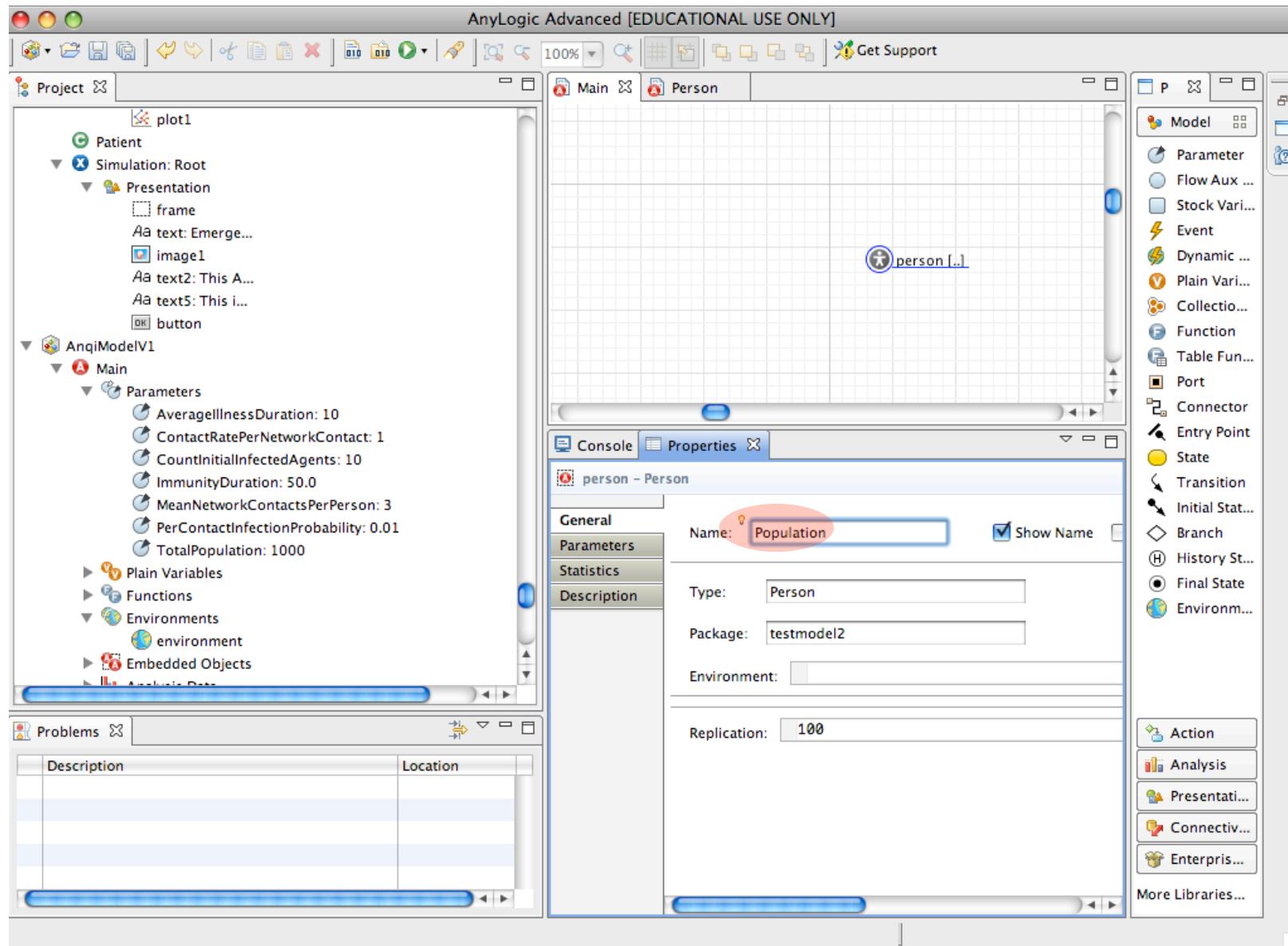
Click and Drag from “Person” into the Space on the Right



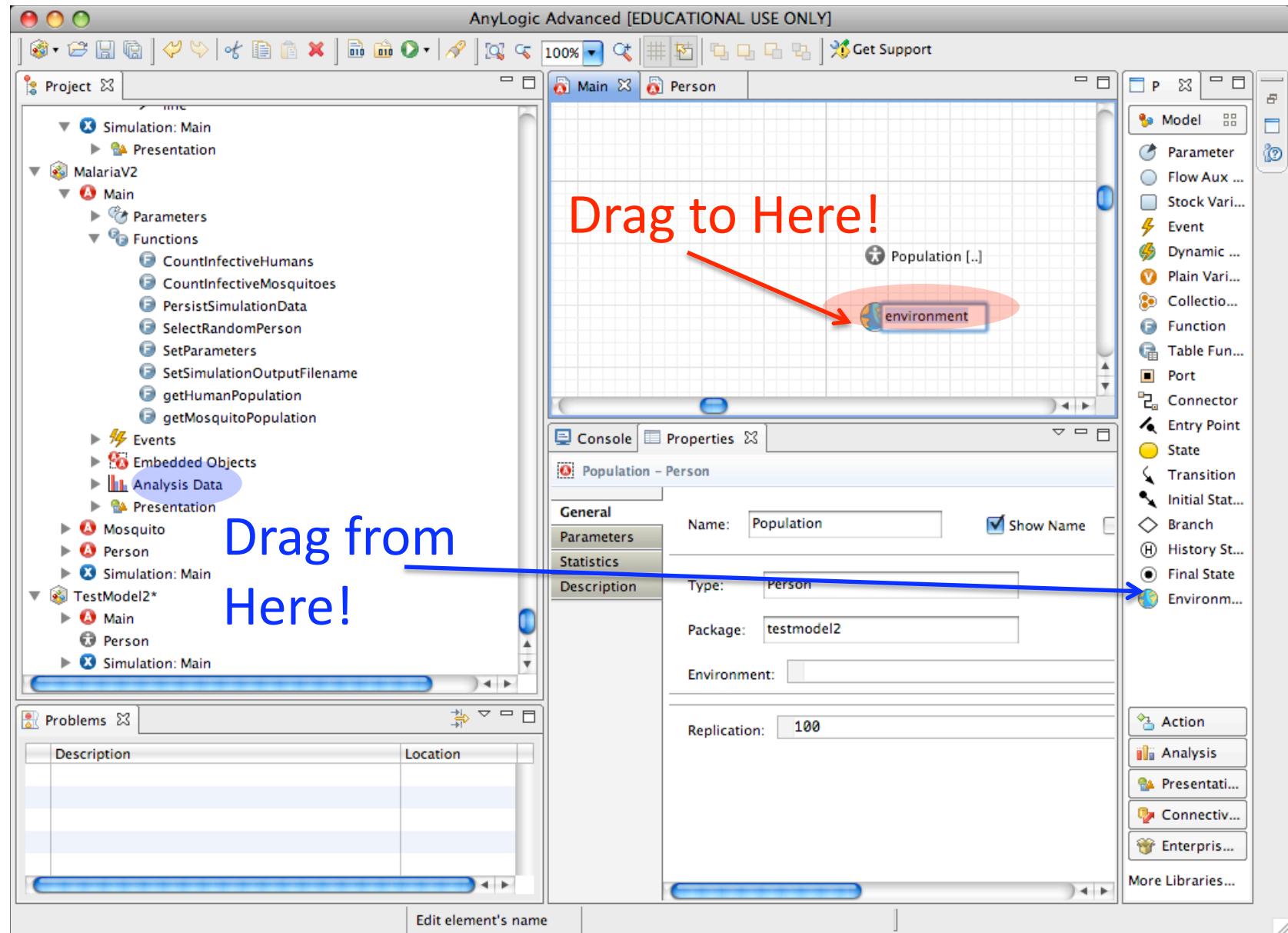
Set the Count of Agents in the Agent Population



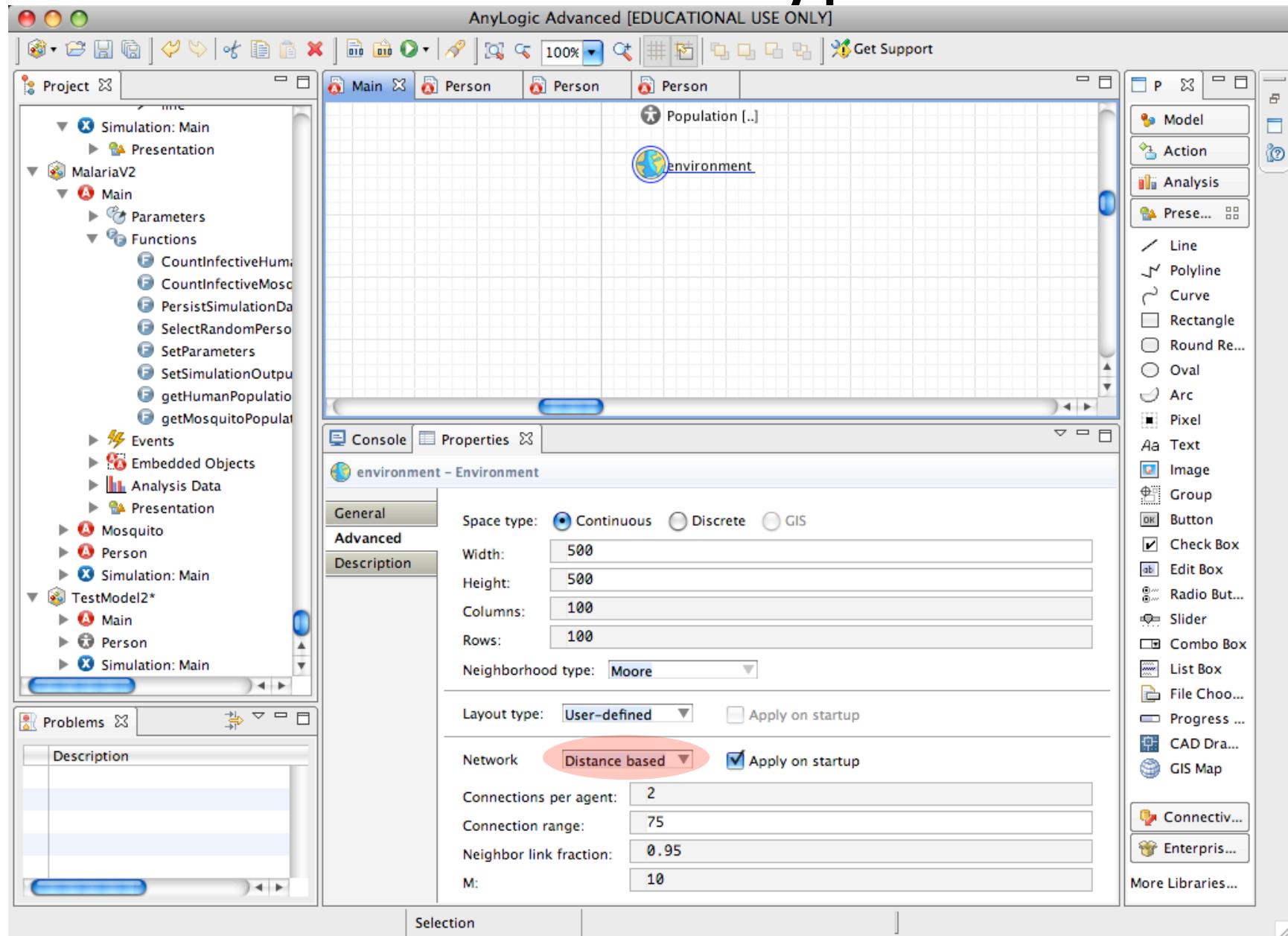
For Clarity, Rename “Person” to “Population”



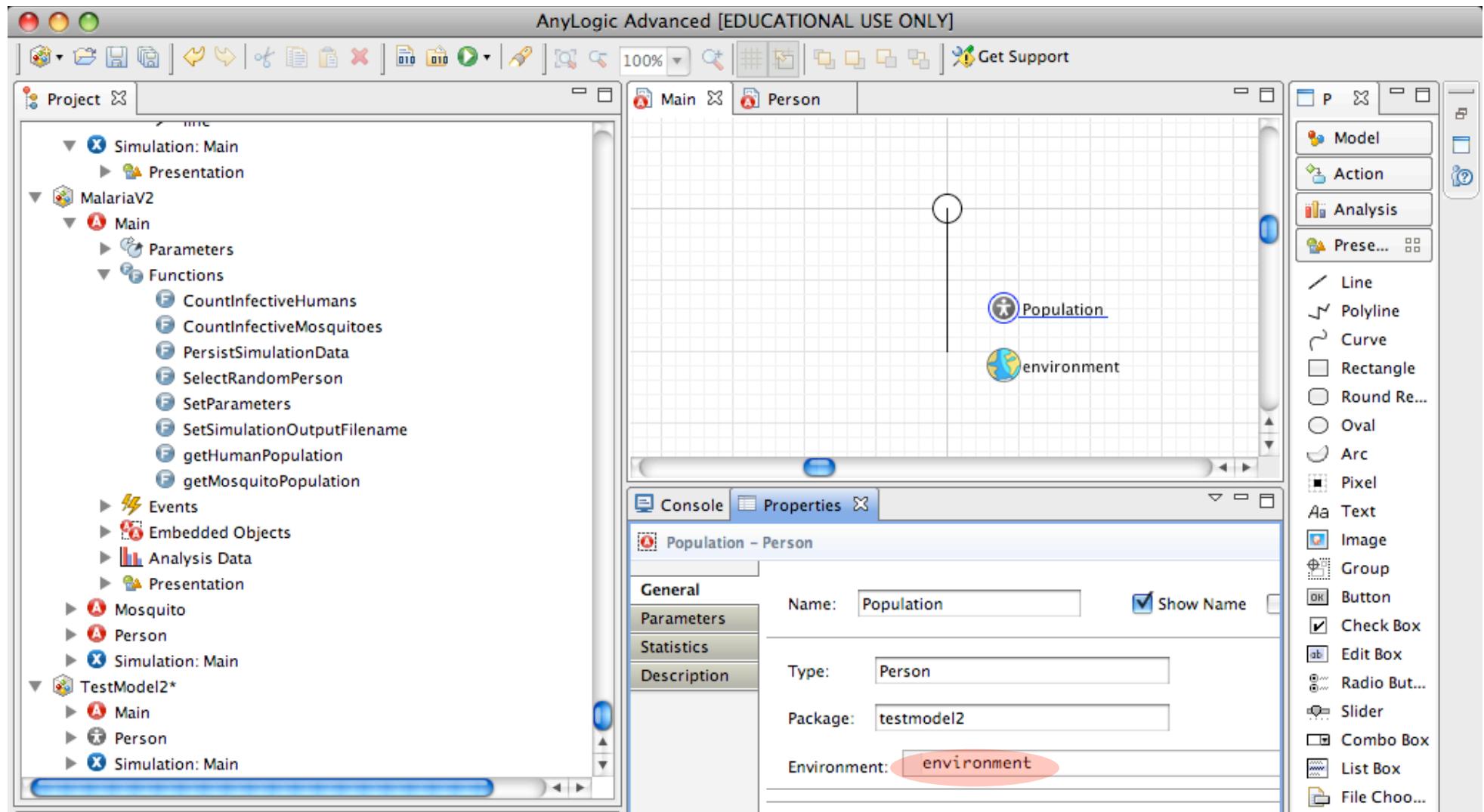
Add an Environment



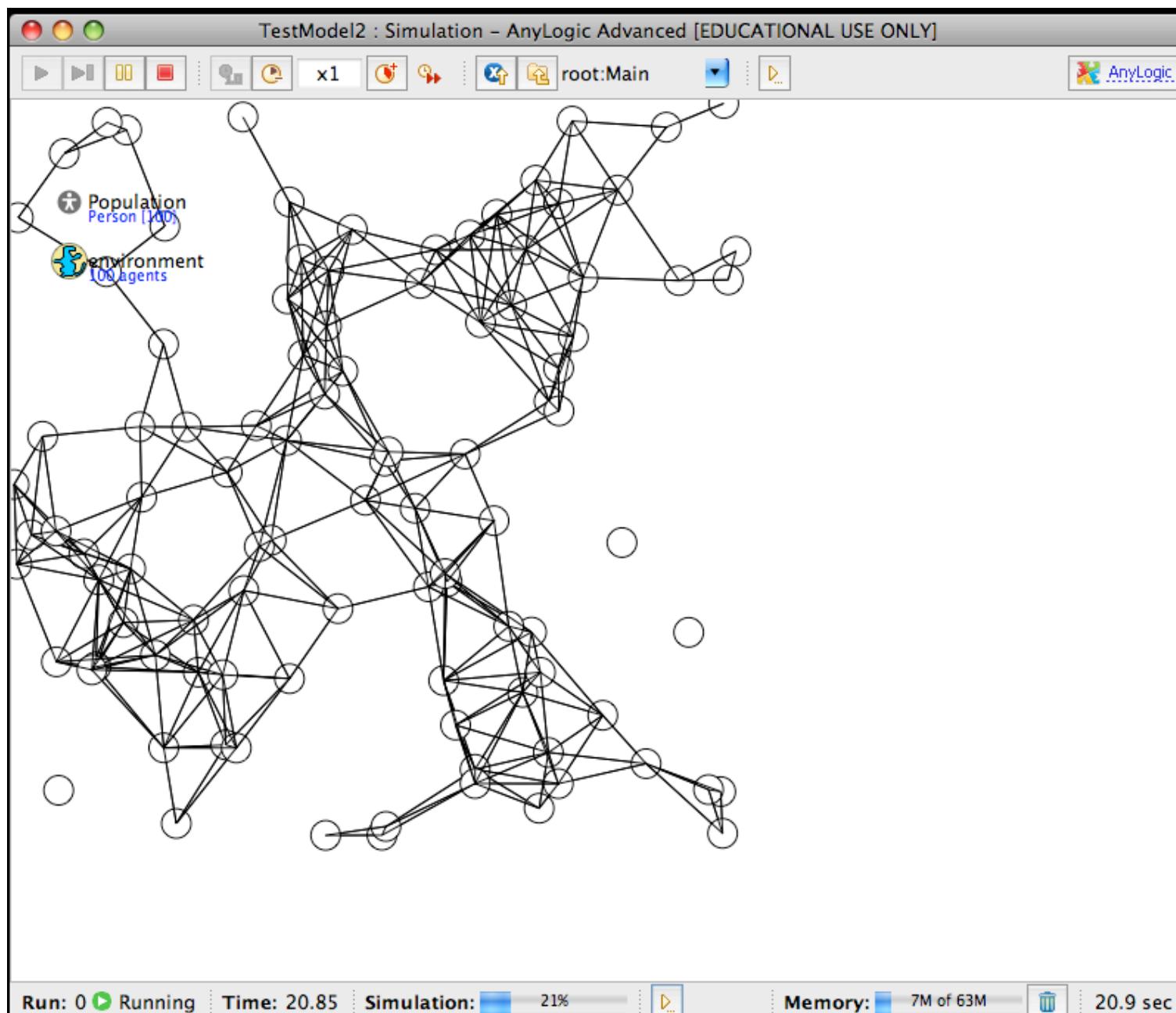
Set the Network Type to Use



Make the Population Depend on the Environment (for placement, connections, etc.)



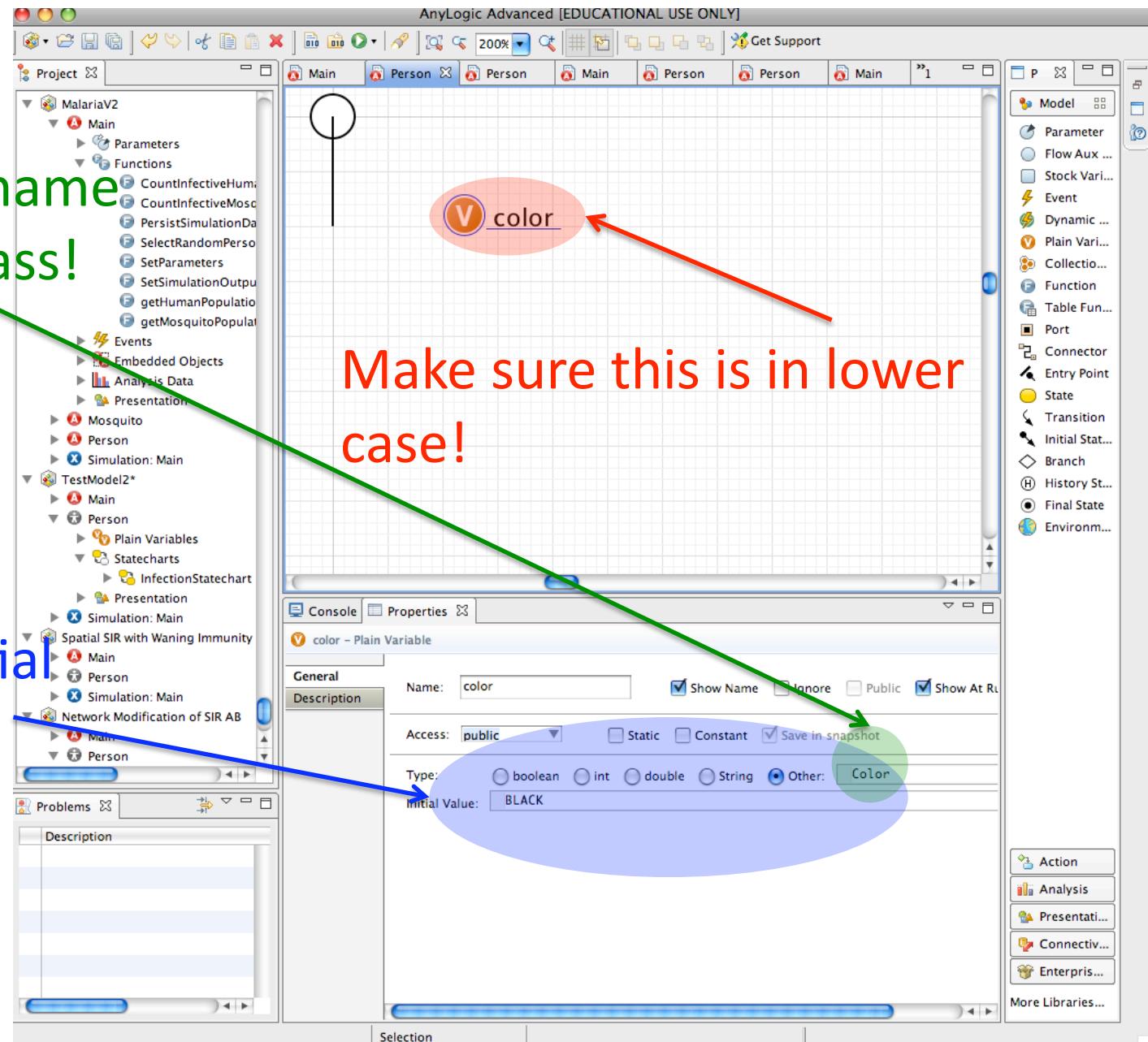
Try Running the Model!



Adding “Color” Variable

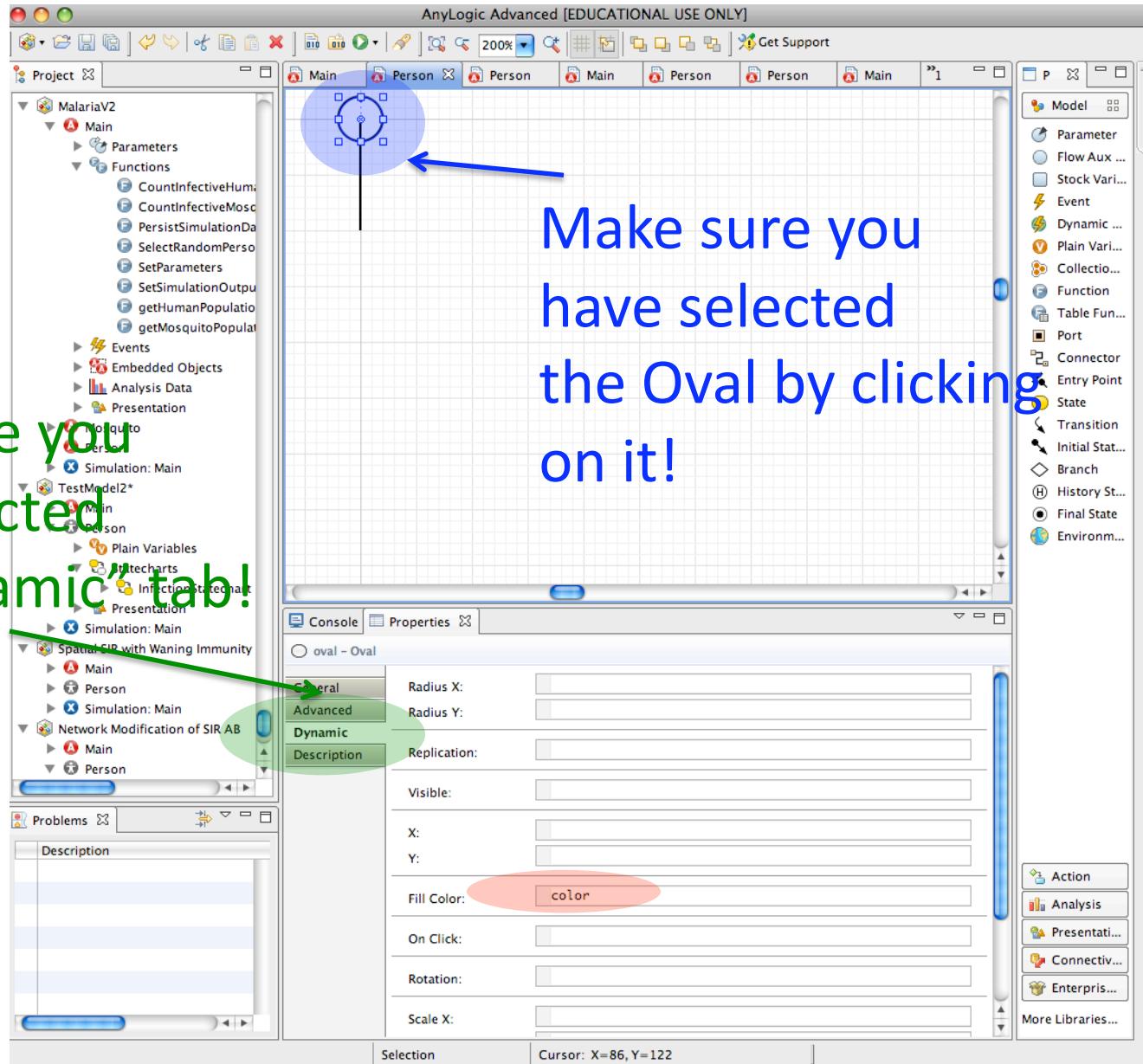
This is the name
of a Java class!

Fill in the
type and Initial
Value
(watch
for correct
case!!)



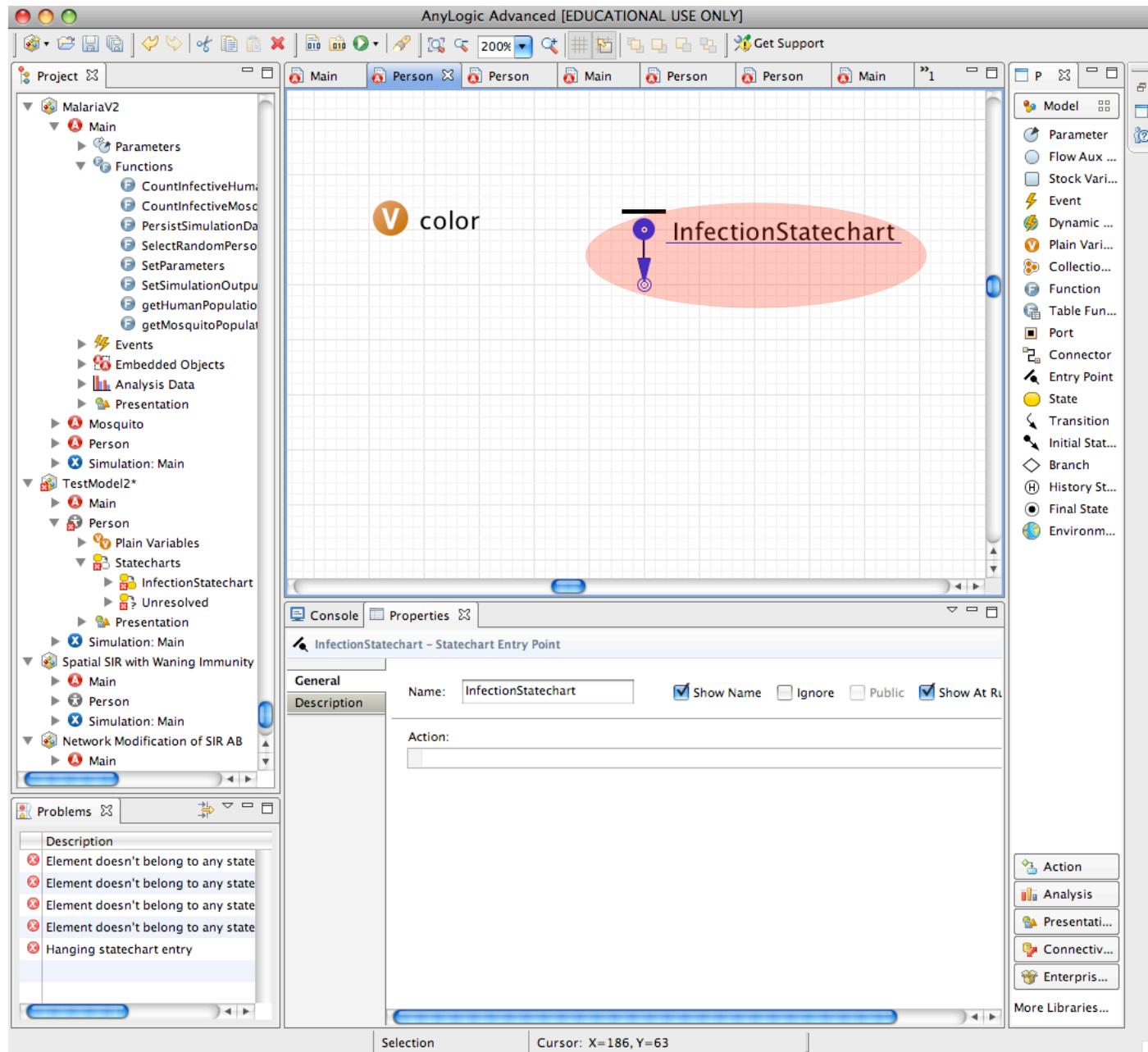
Make Oval “Color” property Use Variable

Make sure you
have selected
the “Dynamic” tab!

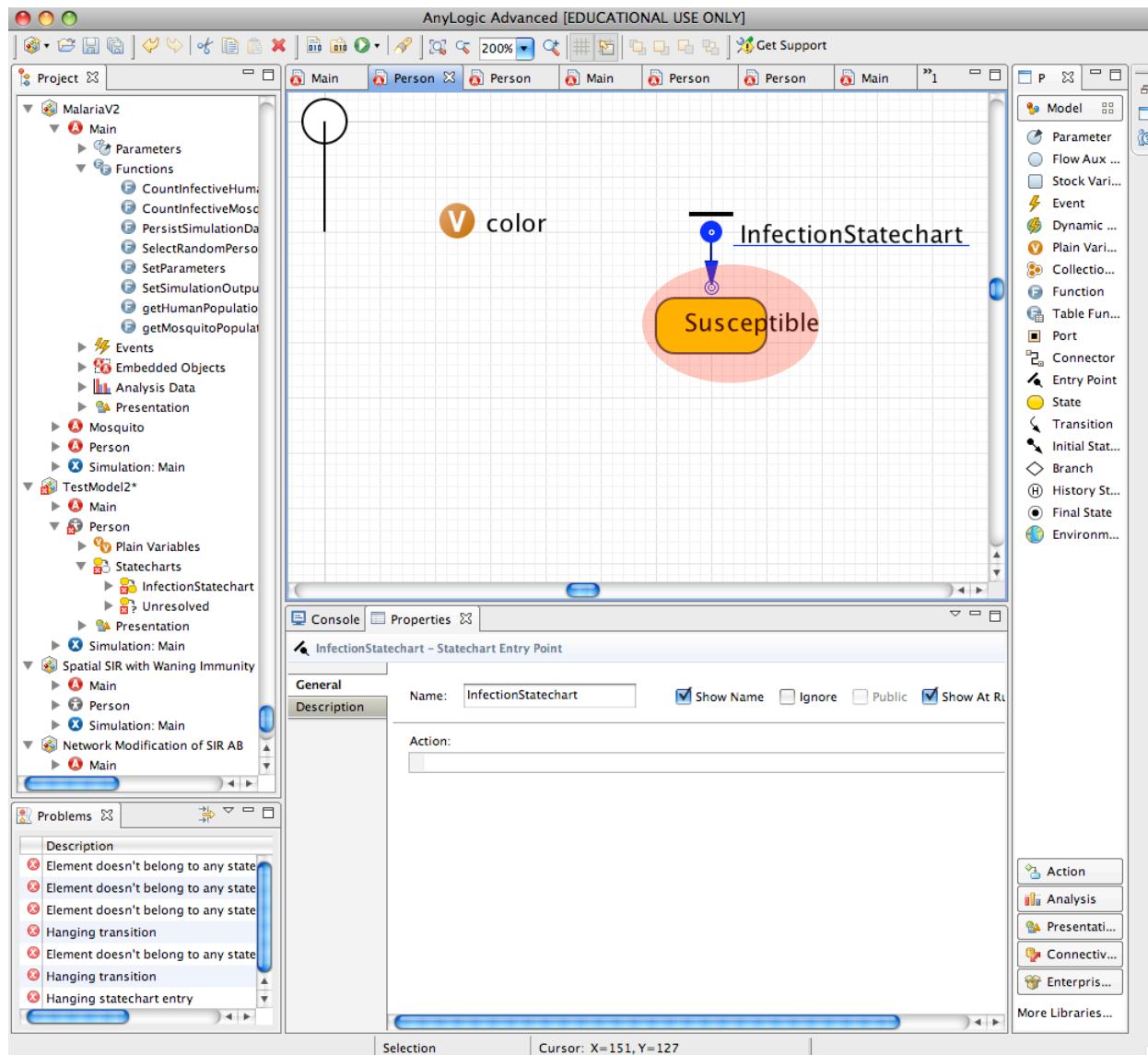


Make sure you
have selected
the Oval by clicking
on it!

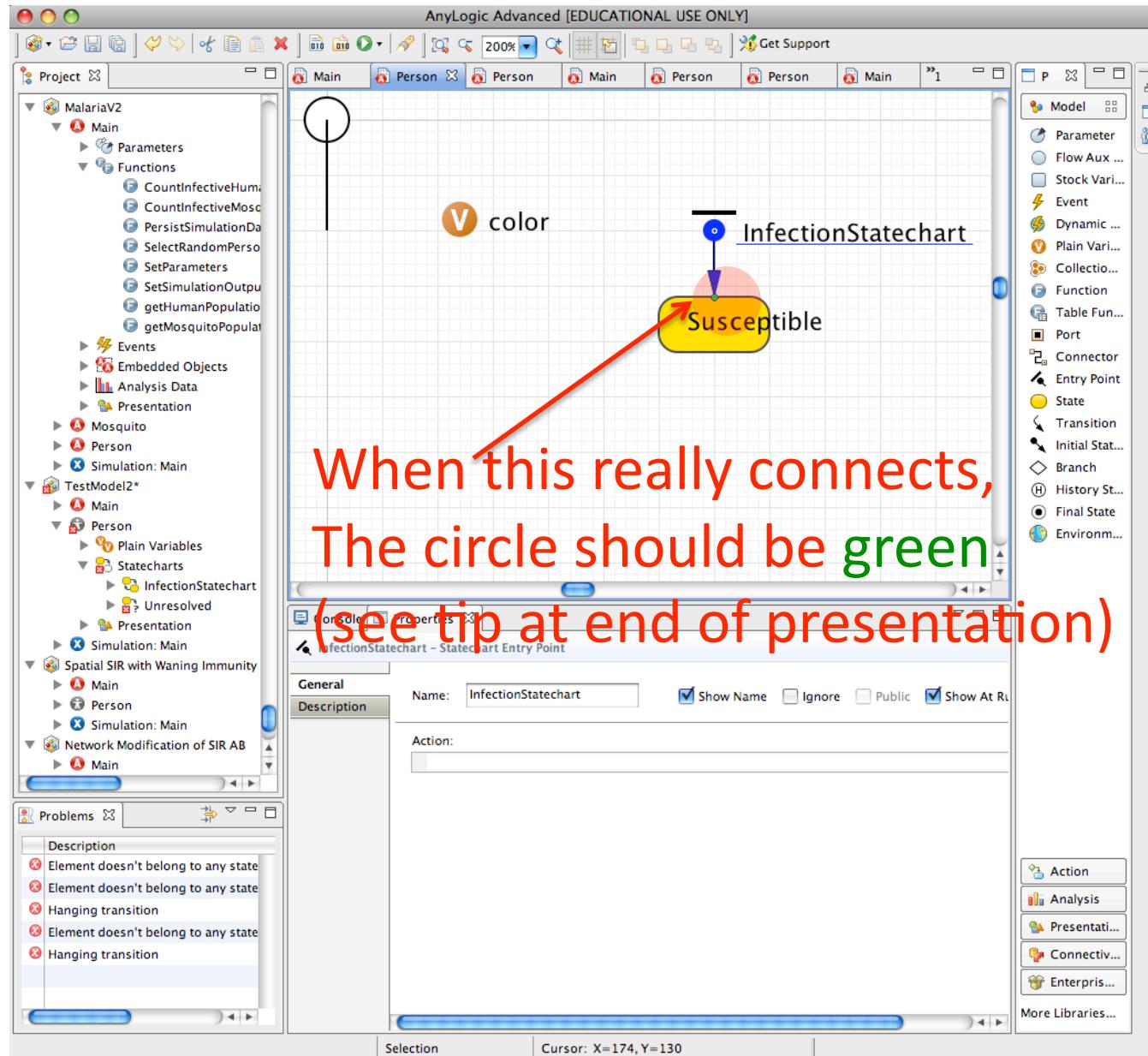
Add Entry Point of State chart



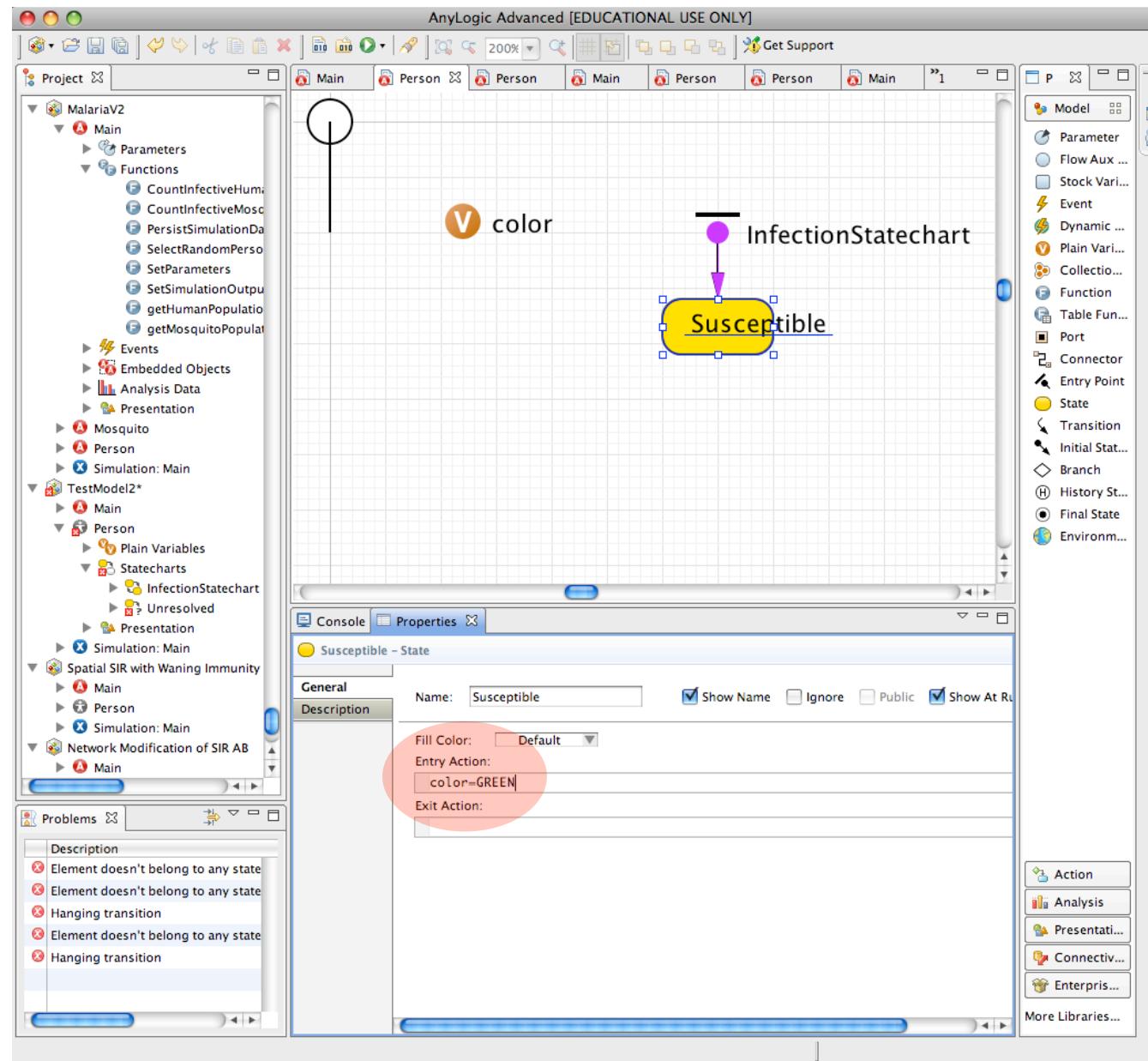
Add in “Susceptible” State



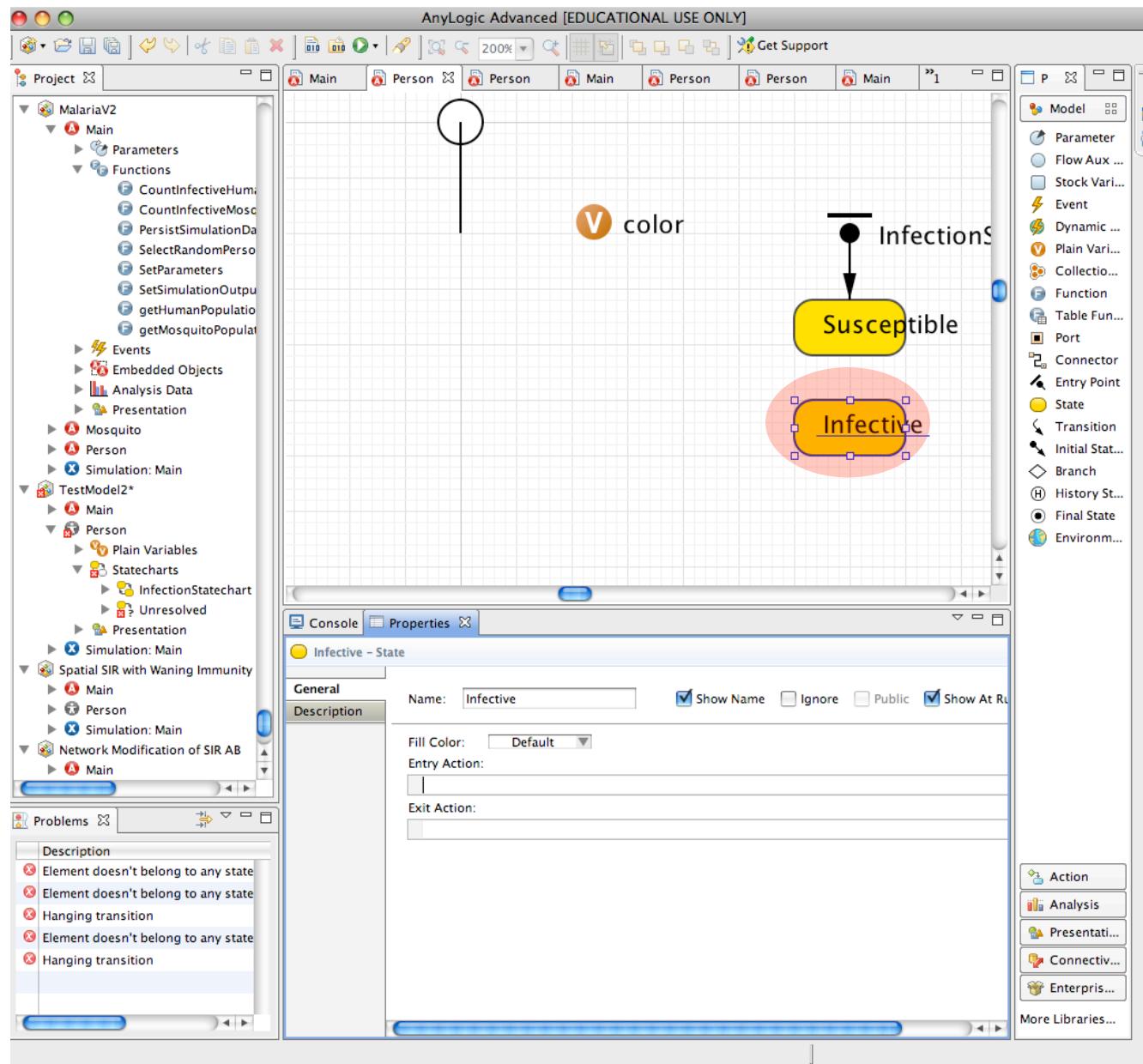
Connect with Entry Point



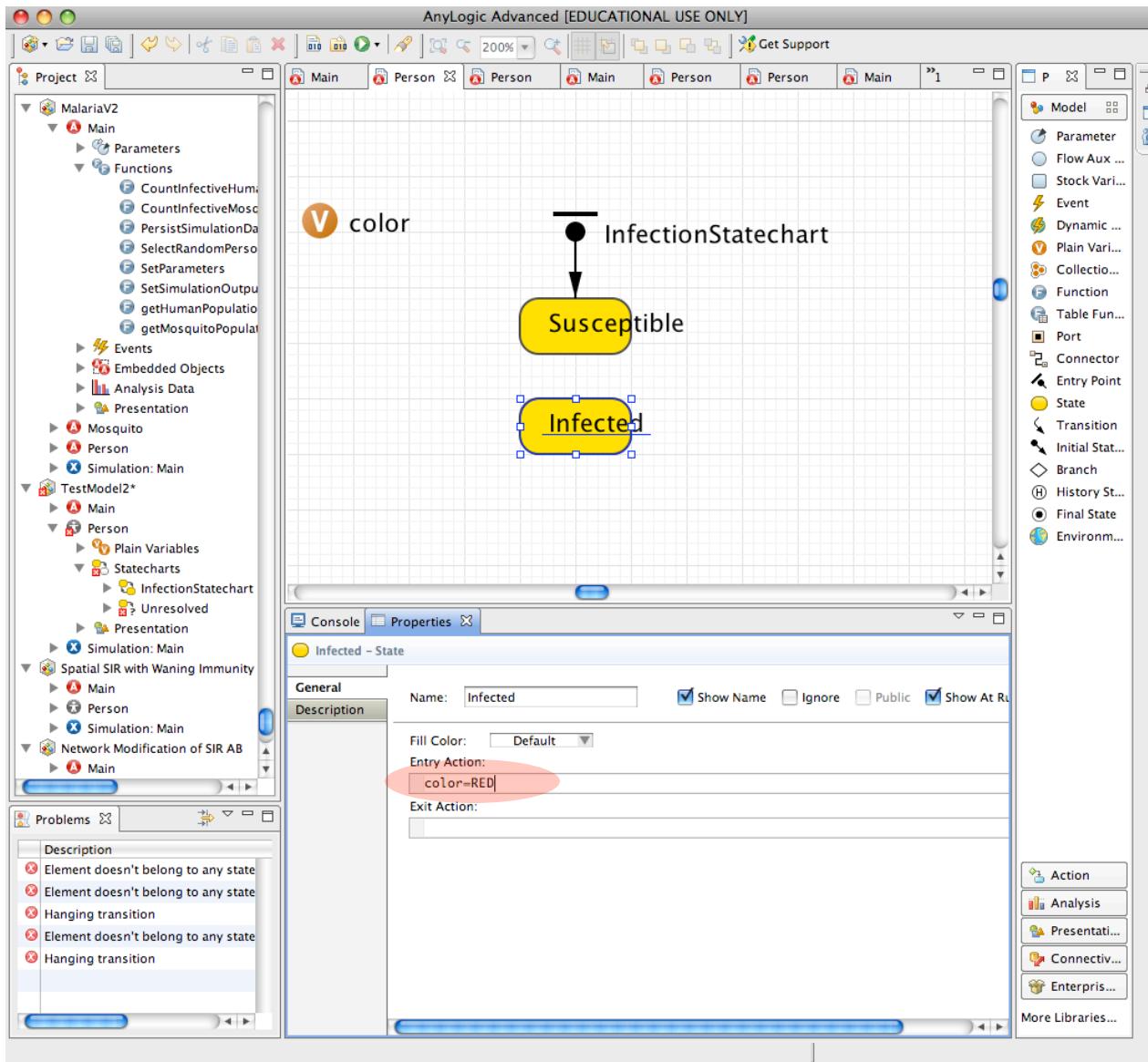
Fill In Code to Color Green when Enter State



Adding in “Infective” State



Set to Color Red when Enter State



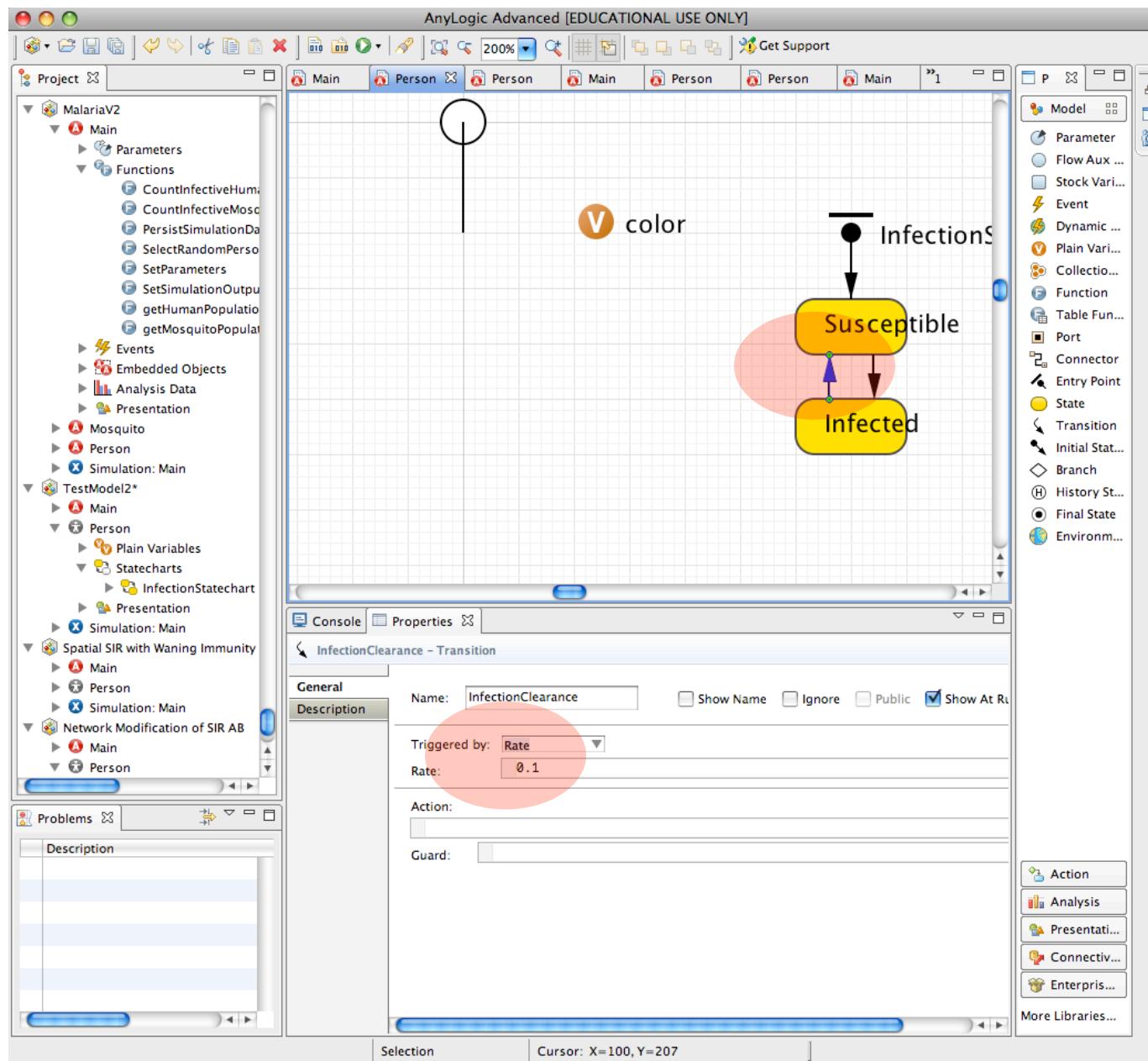
Adding Transition

The screenshot shows the AnyLogic Advanced interface with the following elements:

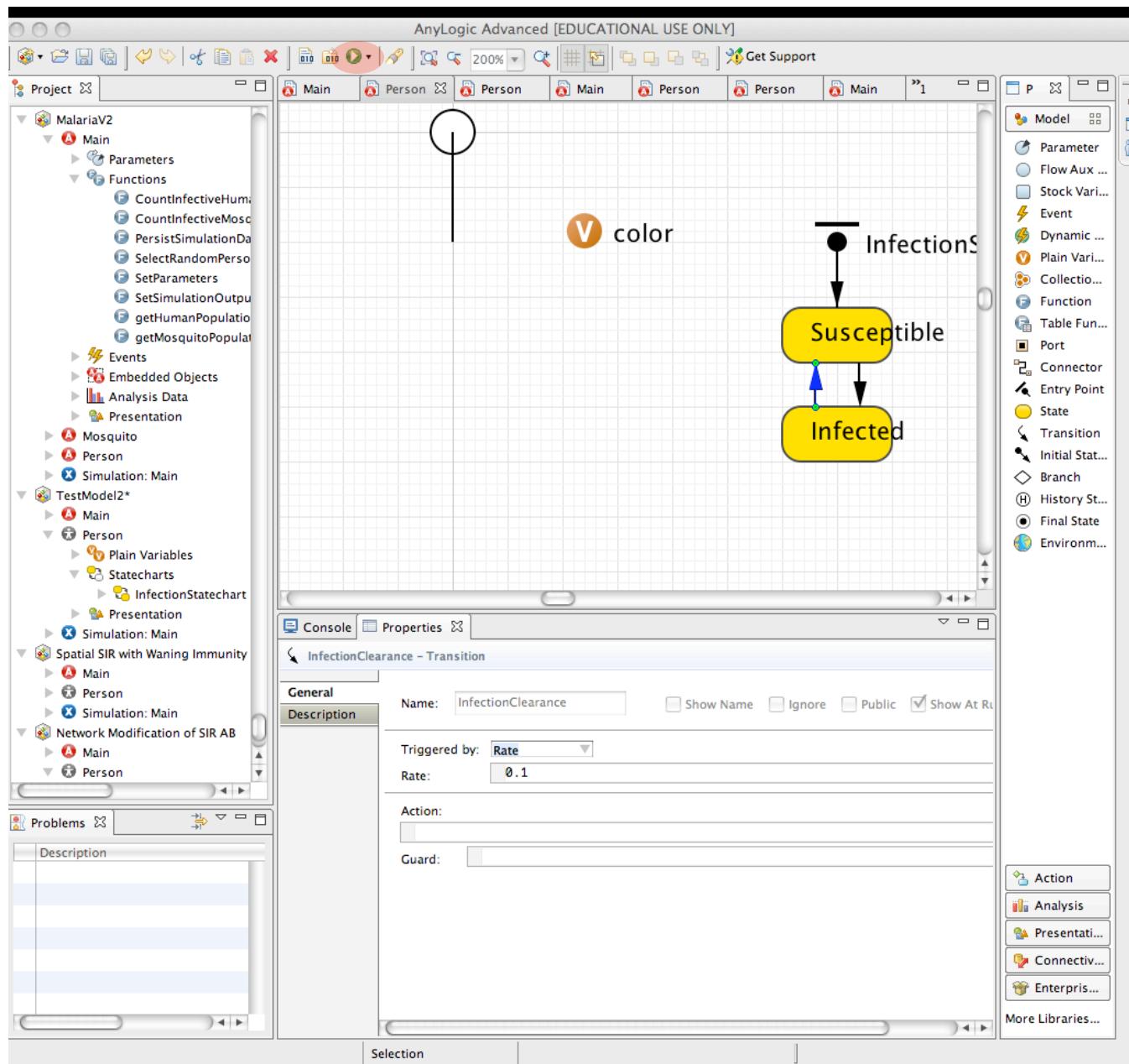
- Project Explorer:** Shows a tree structure with projects like "MalariaV2", "TestModel2*", and "Spatial SIR with Waning Immunity".
- Diagram Area:** Displays a statechart diagram titled "InfectionStatechart". It features two states: "Susceptible" (yellow rounded rectangle) and "Infected" (yellow rounded rectangle). A transition arrow points from "Susceptible" to "Infected". A small red arrow points from the text below to this transition.
- Properties Panel:** An open panel titled "Infection - Transition" with the following settings:
 - Name:** Infection
 - Triggered by:** Rate
 - Rate:** 0.01
 - Action:** (empty)
 - Guard:** (empty)
- Problems Panel:** Shows two errors:
 - Element doesn't belong to any state
 - Hanging transition
- Toolbars and Libraries:** Standard AnyLogic toolbars at the top and a large library panel on the right containing categories like Model, Parameter, Flow Aux..., and State.

Text Overlay: A large red annotation text is overlaid on the diagram area, reading: "When this really connects on both sides, circles should be green". A red circle highlights the "Rate" field in the Properties panel.

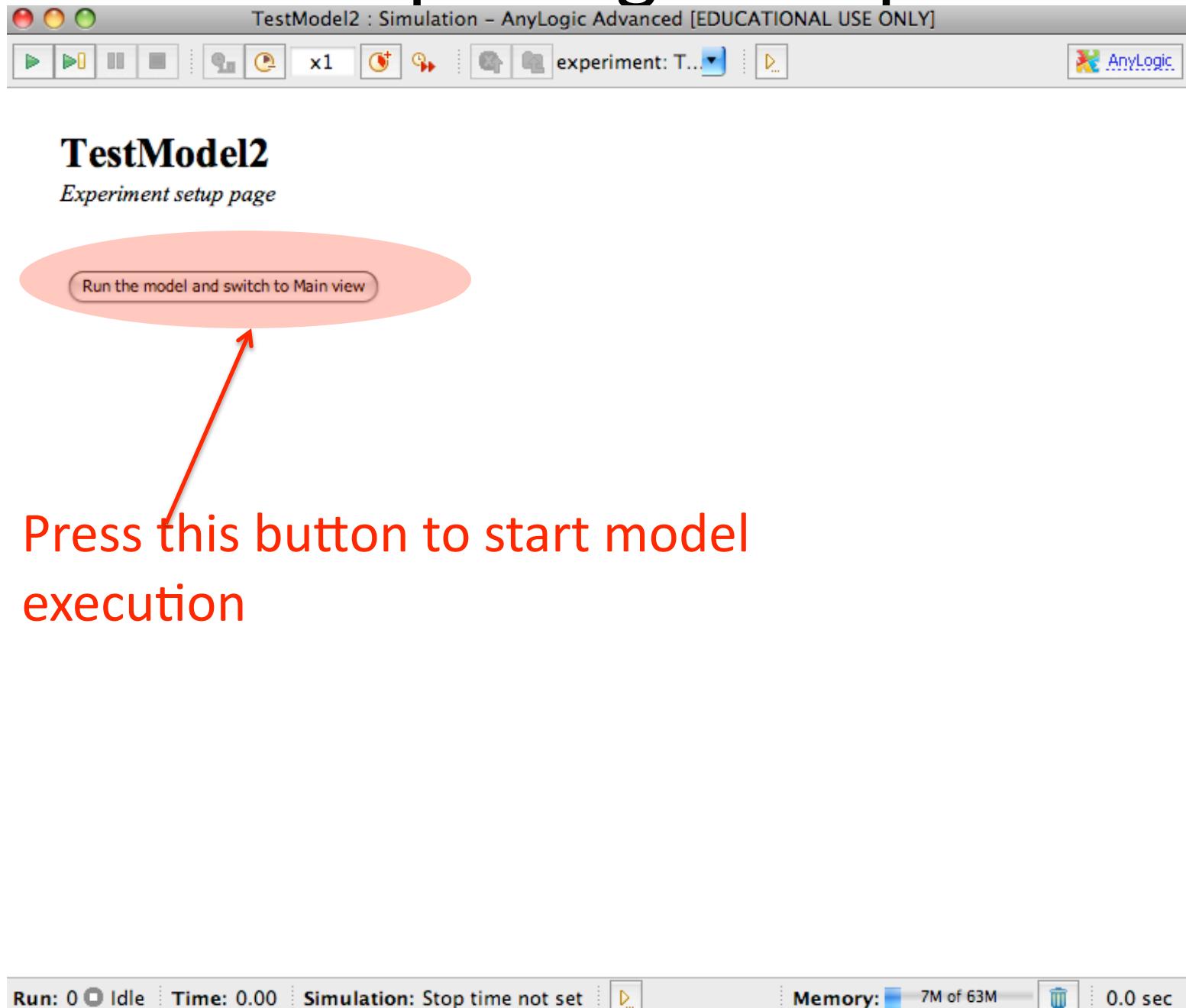
Adding Infection Clearance Transition



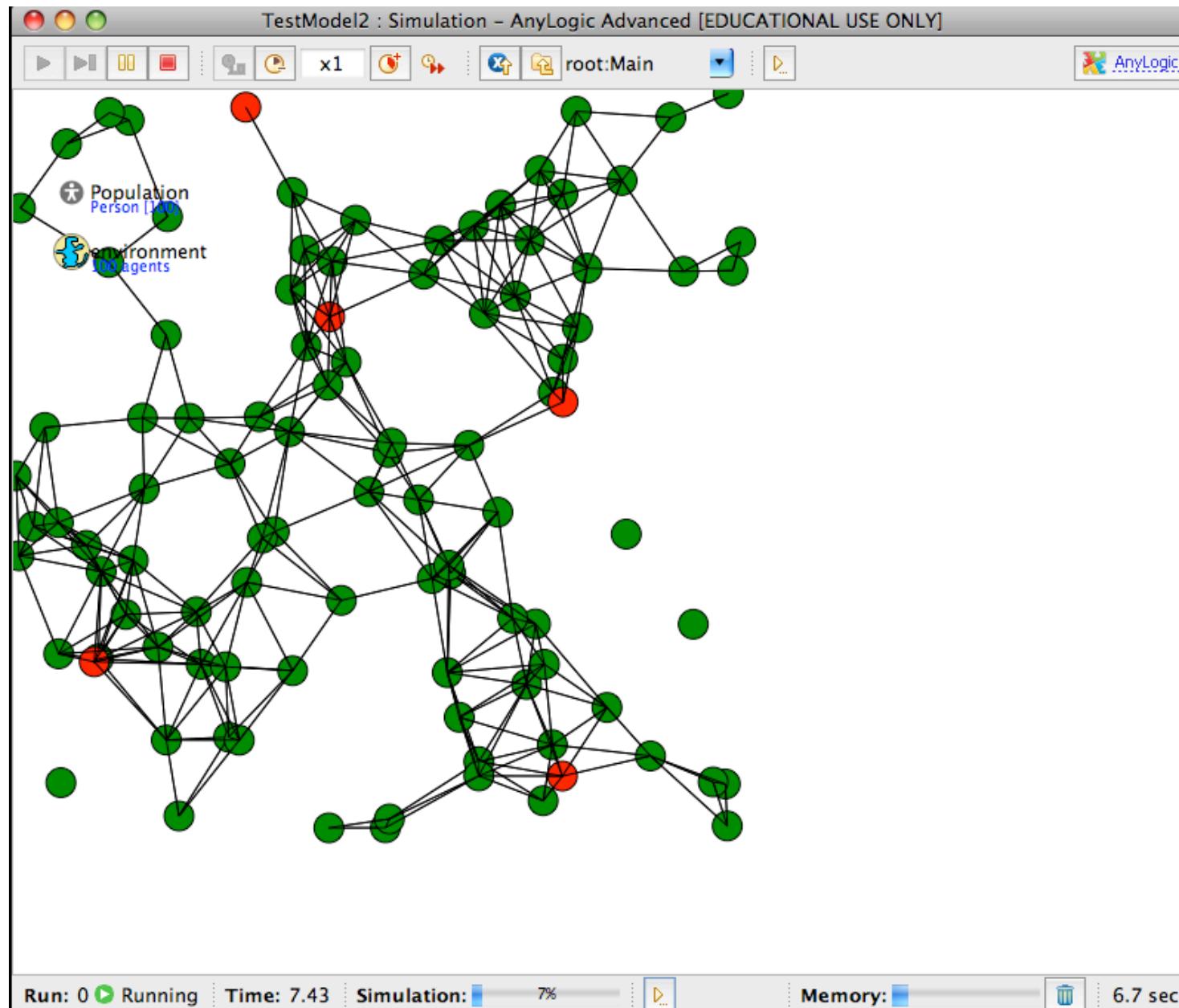
Run the Model!



Completing Set-Up



Model Presentation



Making Infection Depend on a Message

The screenshot shows the AnyLogic Advanced software interface. On the left is the Project Explorer with several model files listed. The main workspace displays a Statechart diagram with two states: "Susceptible" (yellow rounded rectangle) and "Infected" (yellow rounded rectangle). A transition labeled "InfectionS" leads from Susceptible to Infected. A blue arrow points to the "InfectionS" transition. Above the states, a circle with a vertical line is labeled "color". To the right of the workspace is a toolbar with various icons for modeling elements like Parameter, Flow Aux..., Stock Vari..., Event, Dynamic..., Plain Vari..., Collection..., Function, Table Fun..., Port, Connector, Entry Point, State, Transition, Initial State..., Branch, History State..., Final State, and Environment. Below the toolbar is the Properties panel, which is currently open for the "Infection - Transition". The "General" tab is selected, showing the transition's name as "Infection". The "Triggered by" dropdown is set to "Message", and the "Message type" dropdown is set to "Other". The "Fire transition" section has "Unconditionally" selected. The "Action" and "Guard" fields are empty.

Make sure you have selected the transition by clicking on it!

Using a “Contact” Event to Spread Infection

The screenshot shows the AnyLogic Advanced software interface. On the left is the Project Explorer with several models listed: Simulation: Main, MalariaV2, TestModel2*, Spatial SIR with Waning Immunity, and Network Modification of SIR AB. The main workspace displays a statechart diagram. A yellow rounded rectangle labeled "Susceptible" has a blue arrow pointing to a yellow rounded rectangle labeled "Infected". Above the "Infected" state is a black circle labeled "InfectionS". To the left of the states is a small orange circle labeled "color". A large blue arrow points from the text "Add this transition" to the arrow between the two states. The bottom right corner of the "Action" section in the Properties panel is highlighted with a red oval. The Properties panel shows the "Contact - Transition" settings: Name: Contact, Triggered by: Rate, Rate: 2, Action: sendC("Infection", RANDOM_CONNECTED);, and Guard: . The toolbar at the top includes icons for simulation control, zoom, and help.

Add this transition

Name: Contact

Triggered by: Rate

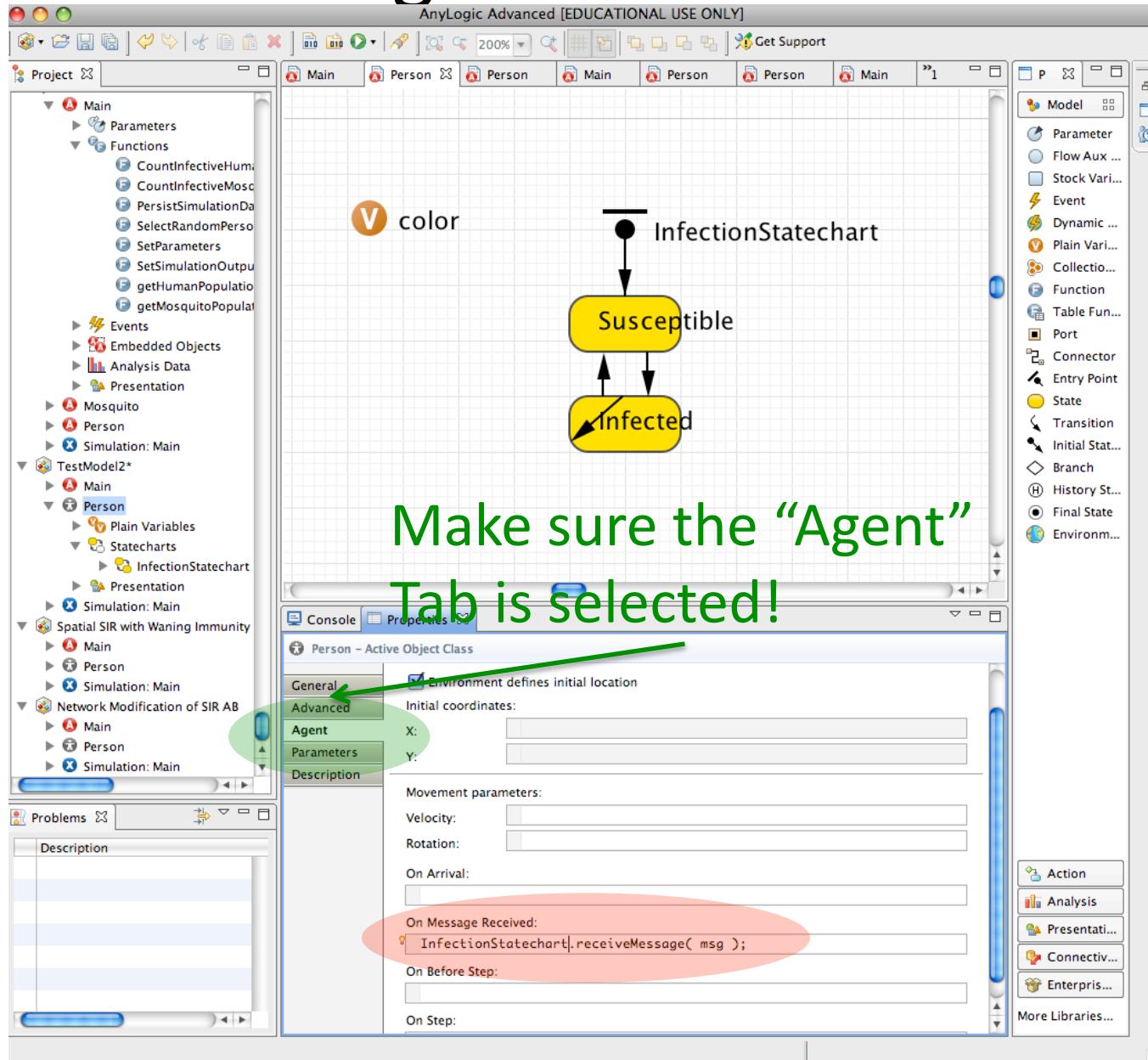
Rate: 2

Action:

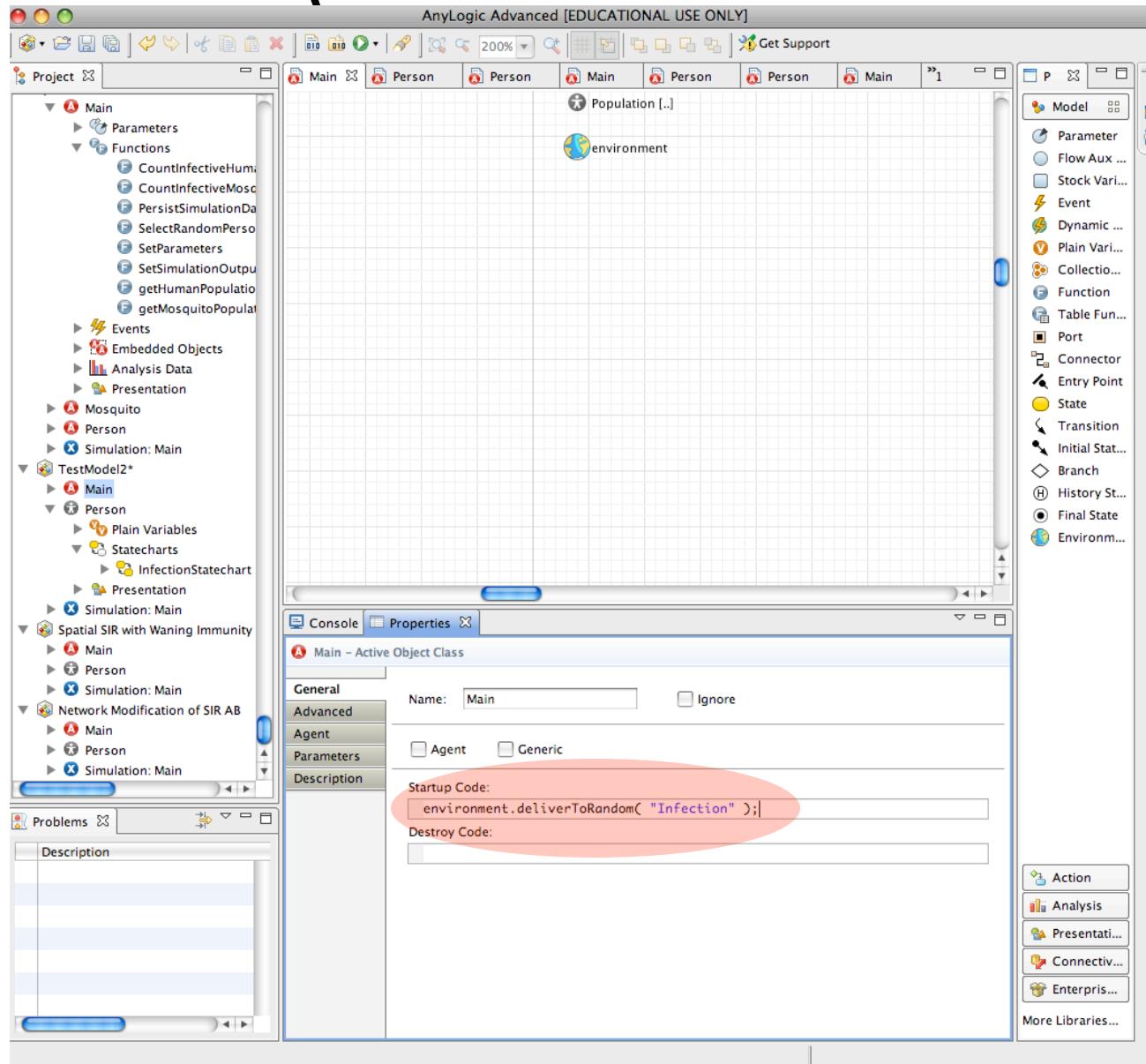
```
sendC("Infection", RANDOM_CONNECTED);
```

Guard:

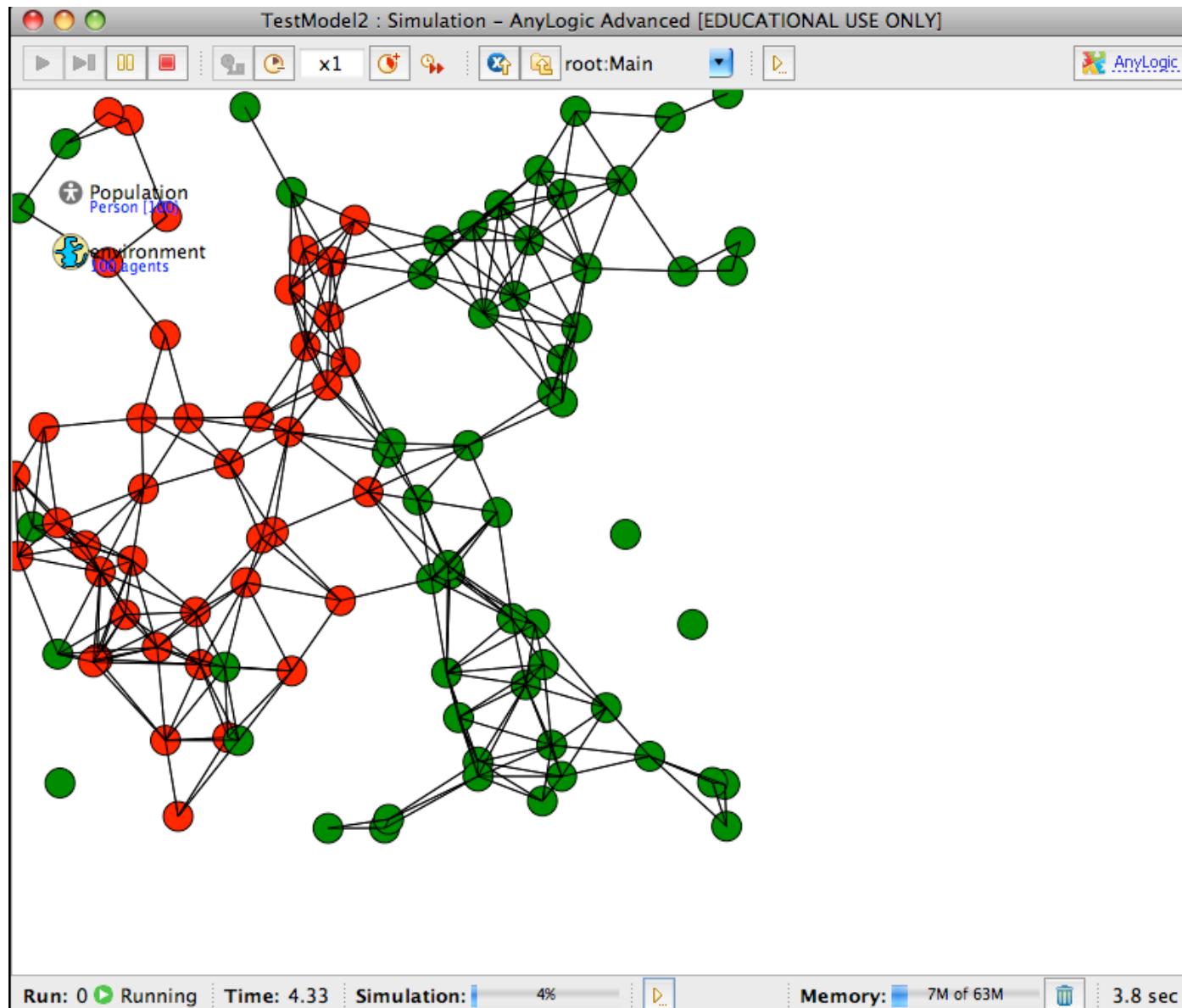
Setting “Person” so forwards Infection Message to Statechart



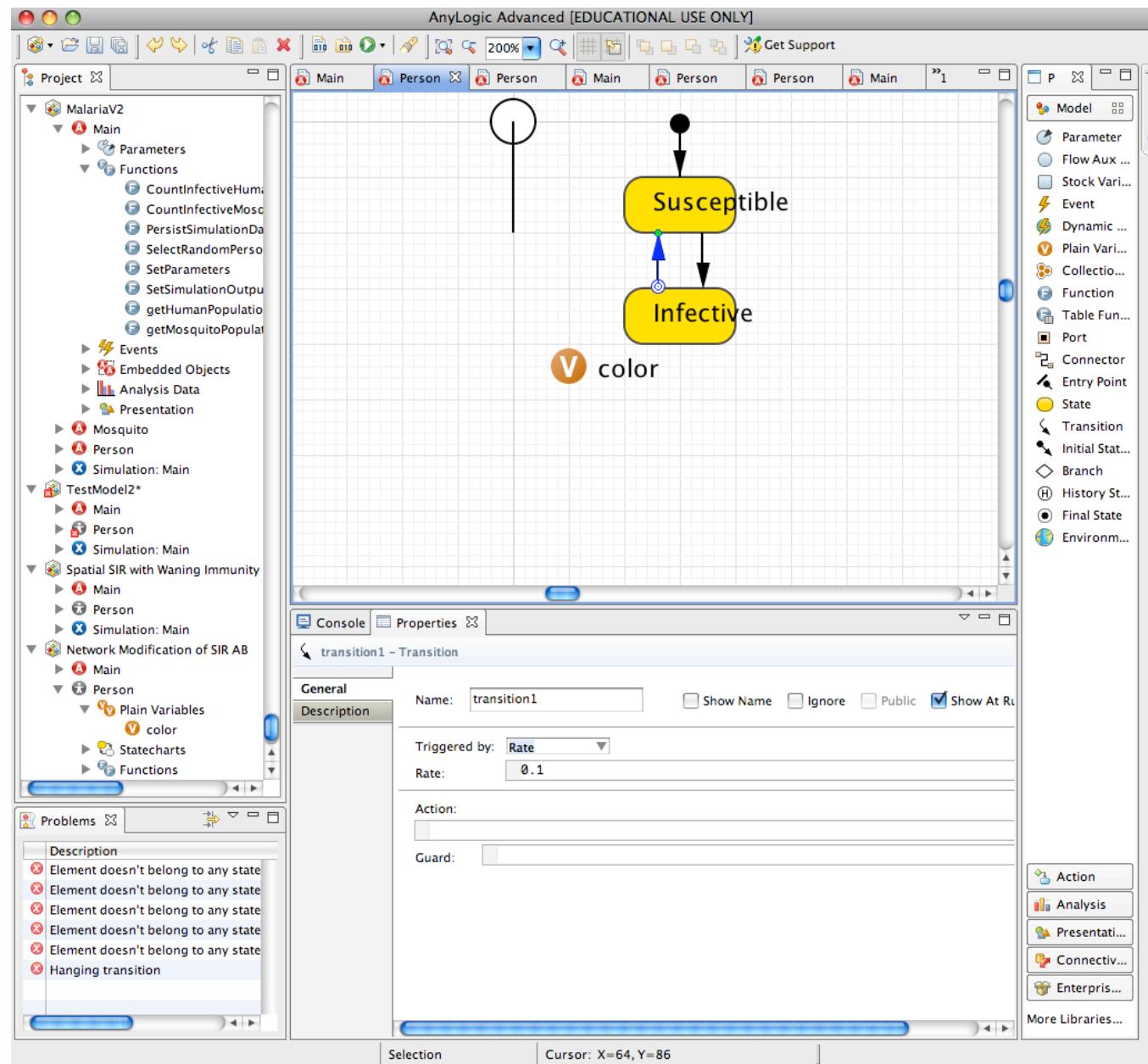
Setting Startup Code So Initially Infects a Random Person (so start with 1 infective)



Infection Percolation over the Network



Tip: Beware Loose Connections



Corrected

