

# Computational Modeling in Practice: Building Computational Models

Kyle A. Joyce

Department of Political Science  
University of California, Davis

August 4, 2014

# Getting Started

Before you begin

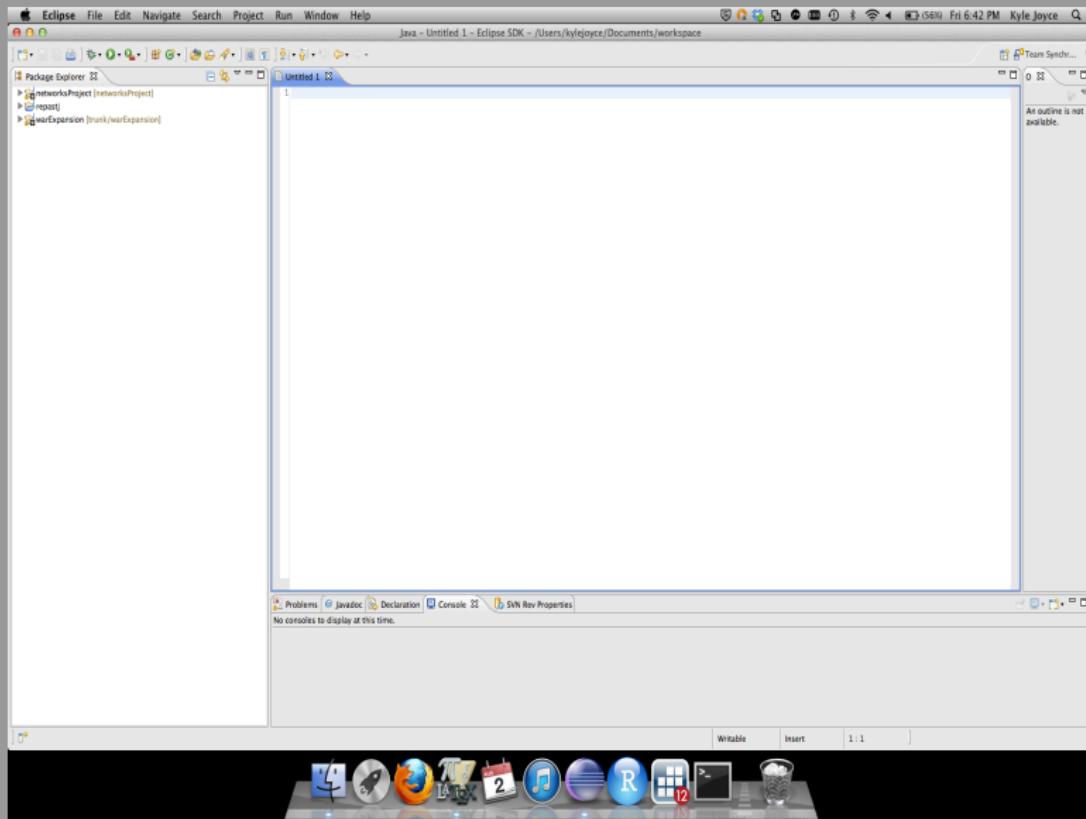
- Do you need to use agent-based modeling?

# Getting Started

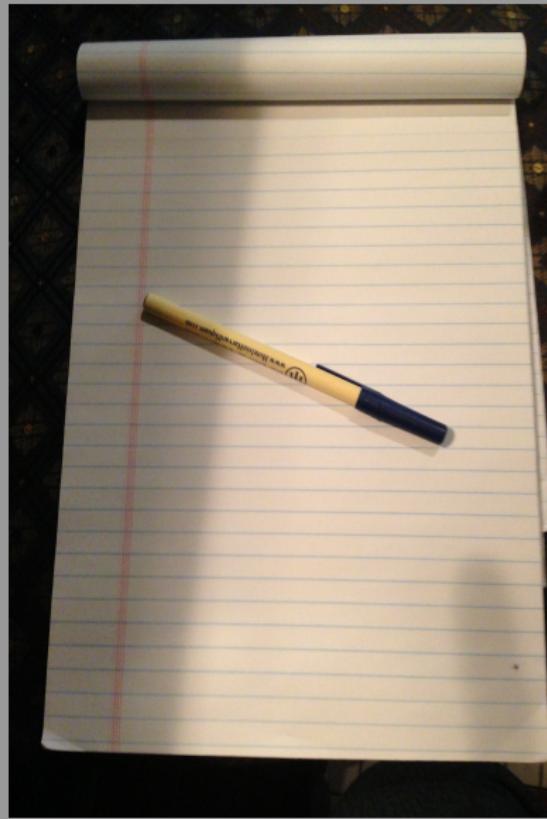
Where do you begin

- Do you have/need an empirical target? Or is it a general model?
- What are the key mechanisms?

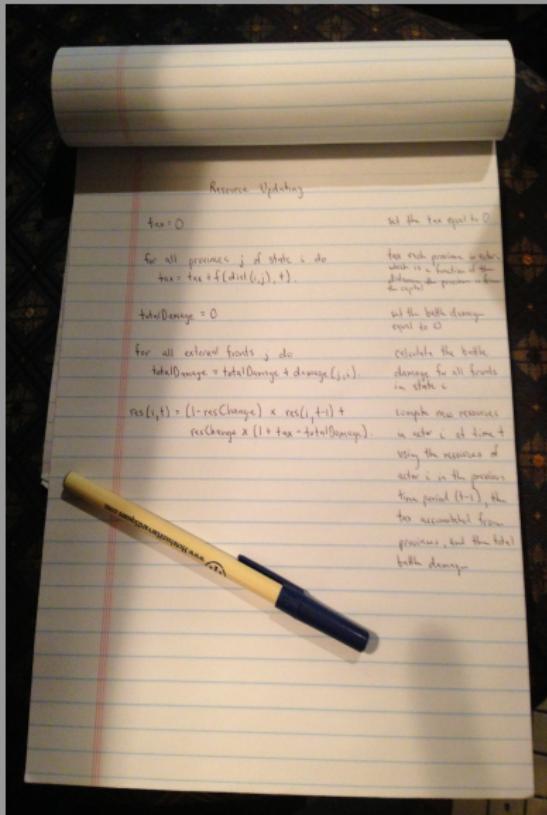
# The Blank Screen



# Paper and Pen



# Write Pseudo Code



## Write Pseudo Code

tax=0

**for** all provinces  $j$  of state  $i$  **do**  
    tax=tax+f(dist(i,j),t).

totalDamage=0

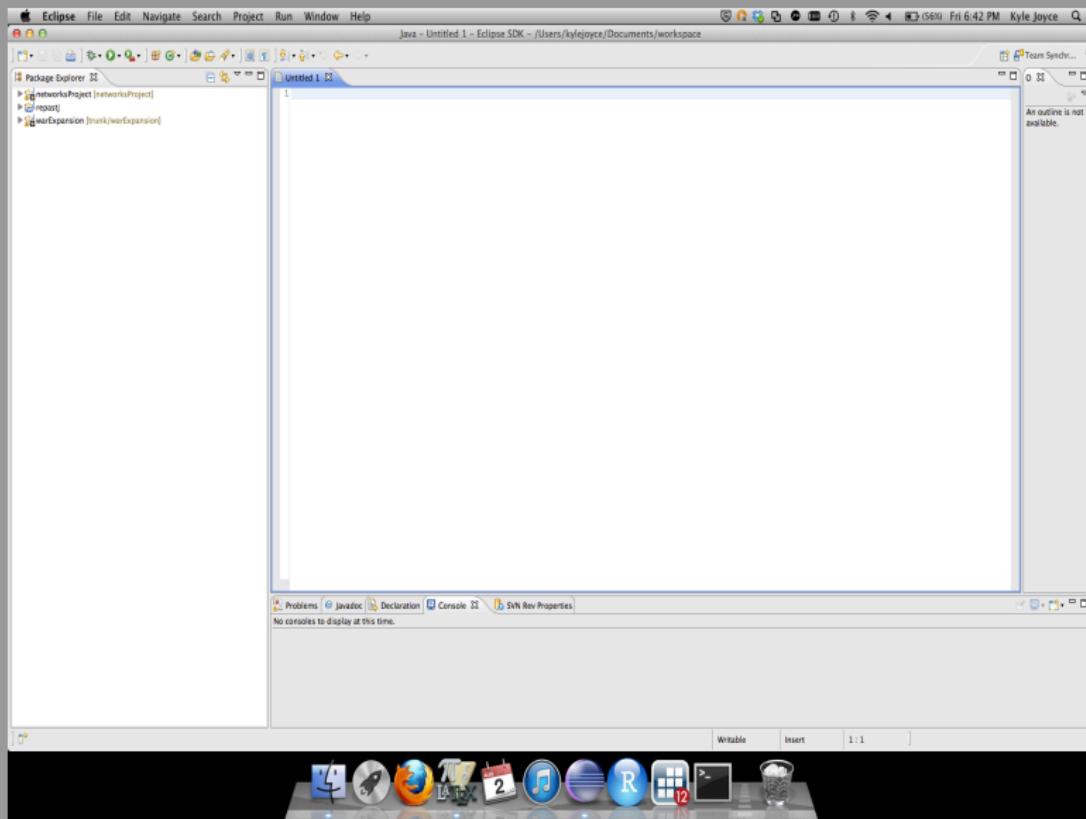
**for** all external fronts  $j$  **do**  
    totalDamage=totalDamage+damage(j,i).

res(i,t)=(1-resChange)★res(i,t-1)+  
                resChange★(1+tax-totalDamage).

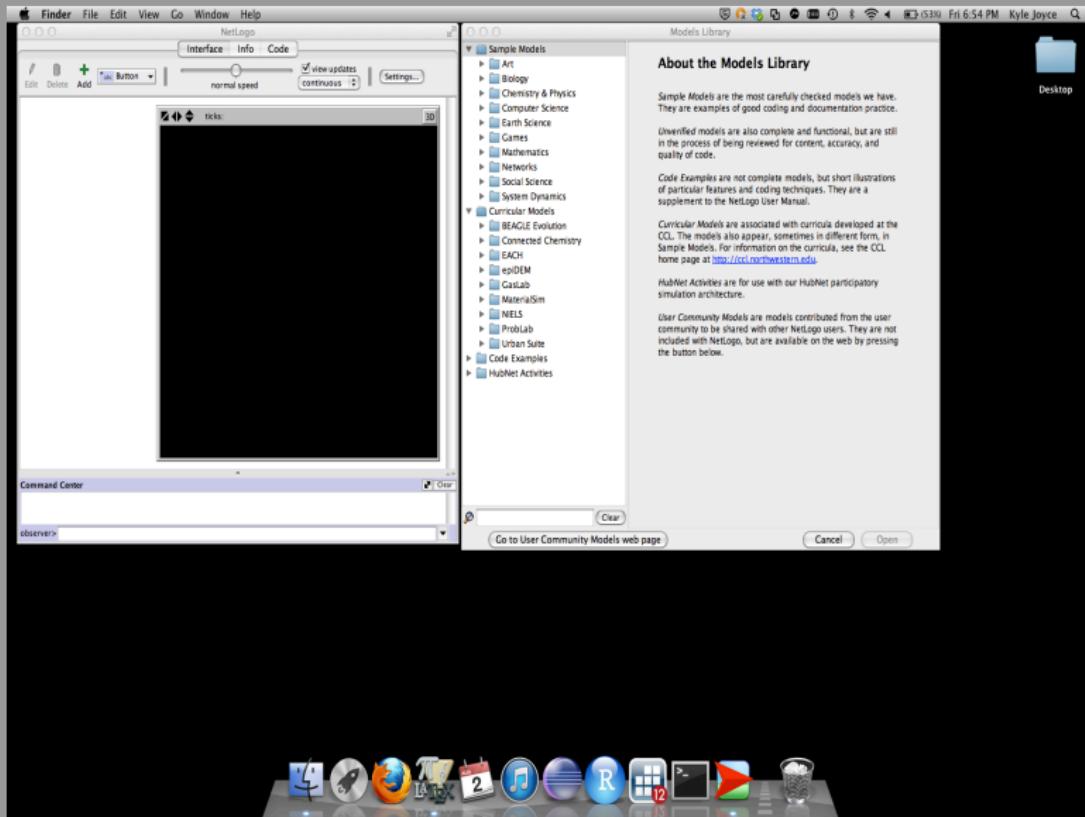
# Components of Agent-Based Models

- Agents: characteristics, decision rules, interaction with space, interaction with other agents
- Space: grid, torus, network
- Schedule: what happens and when, how many time steps, stopping rule
- GUI: parameters, space, graphs
- Batch Runs: parameter sweeps, how many parameters to vary and for what settings
- Data Collection: what data do you need to collect for analysis

# The Blank Screen



# Borrow Code



# Borrow Code

Firefox File Edit View History Bookmarks Tools Window Help

CoMSES Computational Model Library | Open Agent-Based Modeling Consortium

www.openabm.org/models

Gmail Pilot Gmail SmartSite MyUCDavis Kyle A. Joyce spins Department Library UC Davis Timesheet RStudio psrm JOP Matching Madne... LaTeX Templates Penn State Prof... Bookmarks

Become A Member Log In

open abm ... a node in the CoMSES Network

Search

home about faq contact

## CoMSES Computational Model Library

Browse Search Add Help

Showing 1 - 15 of 179 models.

Title	Submitter	Post date
(Policy induced) Diffusion of Innovations - An integrated demand-supply Model based on Cournot Competition	M Rixin	Aug 29, 2011
9 Maturity levels in Empirical Validation - An innovation diffusion example	M Rixin	Oct 19, 2011
A Computational Model of Workers Protest	J Kim	May 12, 2011
A consumer-demand simulation for Smart Metering tariffs (Innovation Diffusion)	M Rixin	Aug 18, 2011
A Double-Auction Equity Market For a Single Firm with AR1 Earnings	C. Wachter	

This is a plug-in for the latest AMI-ETL or Access Plus 11.0 which is freely downloadable from [www.comses.net](http://www.comses.net).



# Programming

- Take a model and add something
- Start simple then add
- Program things that must be true
- Document your code
- Use sensible names (even if they are long)
- List all variables at the beginning of the program
- Write subroutines (and use switches) instead of deleting code
- Document each version of the code (use a version control system)
- Do single runs before batch runs