

# Simulating Rats on Mazes: Why, How, and When

Christopher G. Prince  
UMD Dept of Computer Science  
[chris@cprince.com](mailto:chris@cprince.com)

## *Abstract:*

In this talk I present a rat maze simulator called *RatCog*. The simulator is intended for use by research psychologists and neuroscientists to assist them in spatial behavioral research with rats. RatCog is a freely available program displaying a radial-maze and providing for models of both experimental procedures and rat spatial behavior. Envision the following scenario. A research psychologist is preparing to test a theory with rats on mazes. Running rats requires resources (time, money, lab space etc.), so she wants to optimize her design and experimental process. At the last Society for Computers in Psychology meeting, she heard a talk about simulating rats on mazes. She does a quick web search, downloads the RatCog maze simulator and sees that simulating a rat amounts to loading plugin models. Links from the RatCog web site provide standard computational models of rat spatial learning, recently published in the spatial behavior literature, and standardized to load as plugins in RatCog. She downloads three potentially useful computational models of rat spatial behavior and uses a scripting language to write her experimental procedure. Then she loads both her “experimenter” model and her first rat behavior model as plugins. As she revises her experimental procedure, she finds that this first rat plugin is not performing well – it does not adequately remember previously baited arms across a 1/2-hour simulated delay. She unloads this rat plugin, and loads the second one. This model is more suitable. Pleased with her afternoon’s work, she uses the graphing capacities of RatCog to plot the number of arm entries of her dozen simulated rats, saves the simulation run parameters in a file, and emails the graph, parameters, and rat and experimenter plugins as attachments to her colleague in New York.

This scenario, while partly in the future, is based on currently possible models and technology. I will elaborate on the current state of development of RatCog, why simulations are valuable, how they are conducted, and when they should be conducted.

<http://www.cprince.com/PubRes/UMD-Psych-2001>  
<http://www.cprince.com/projects/RatCog>