
SimZombie: A User Guide

SimZombie is a Java package designed to simulate epidemics, specifically those of zombie, vampire and werewolf "outbreaks". It is based on the mathematical model presented in 'When Zombies Attack!: Mathematical Modelling of an Outbreak of Zombie Infection' by Munz et al., which is based on the SIR Infectivity Model.

Parameters of the simulation include the speed at which the infected are capable of moving, the size of the environment and initial population, the chance that susceptibles fight back against the 'monsters', etc.

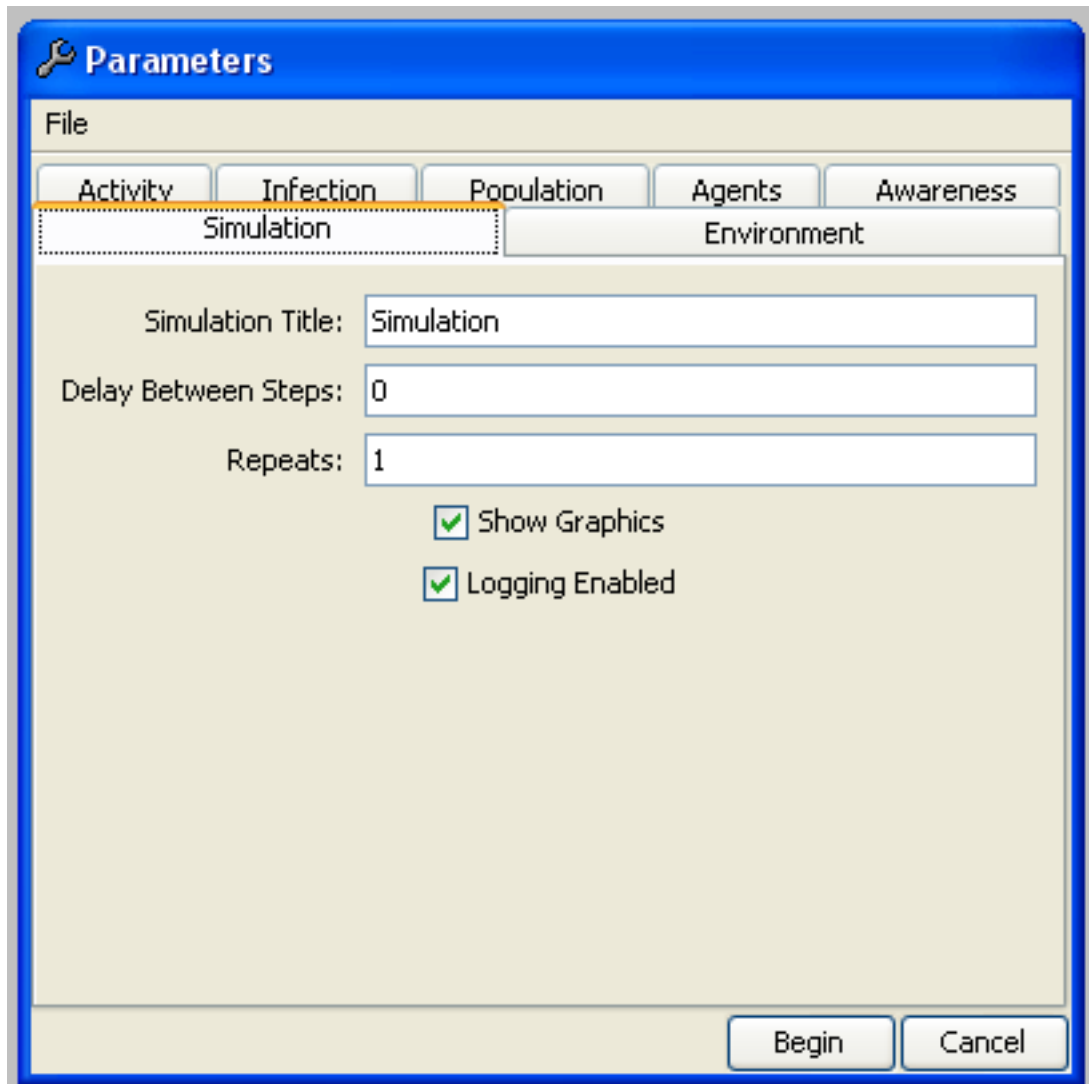
SimZombie was developed by Matthew Crossley, a PhD student in the Novel Computation Group at Manchester Metropolitan University. For more information about Matthew, please visit <http://www.matthewcrossley.com>

Features of SimZombie include:

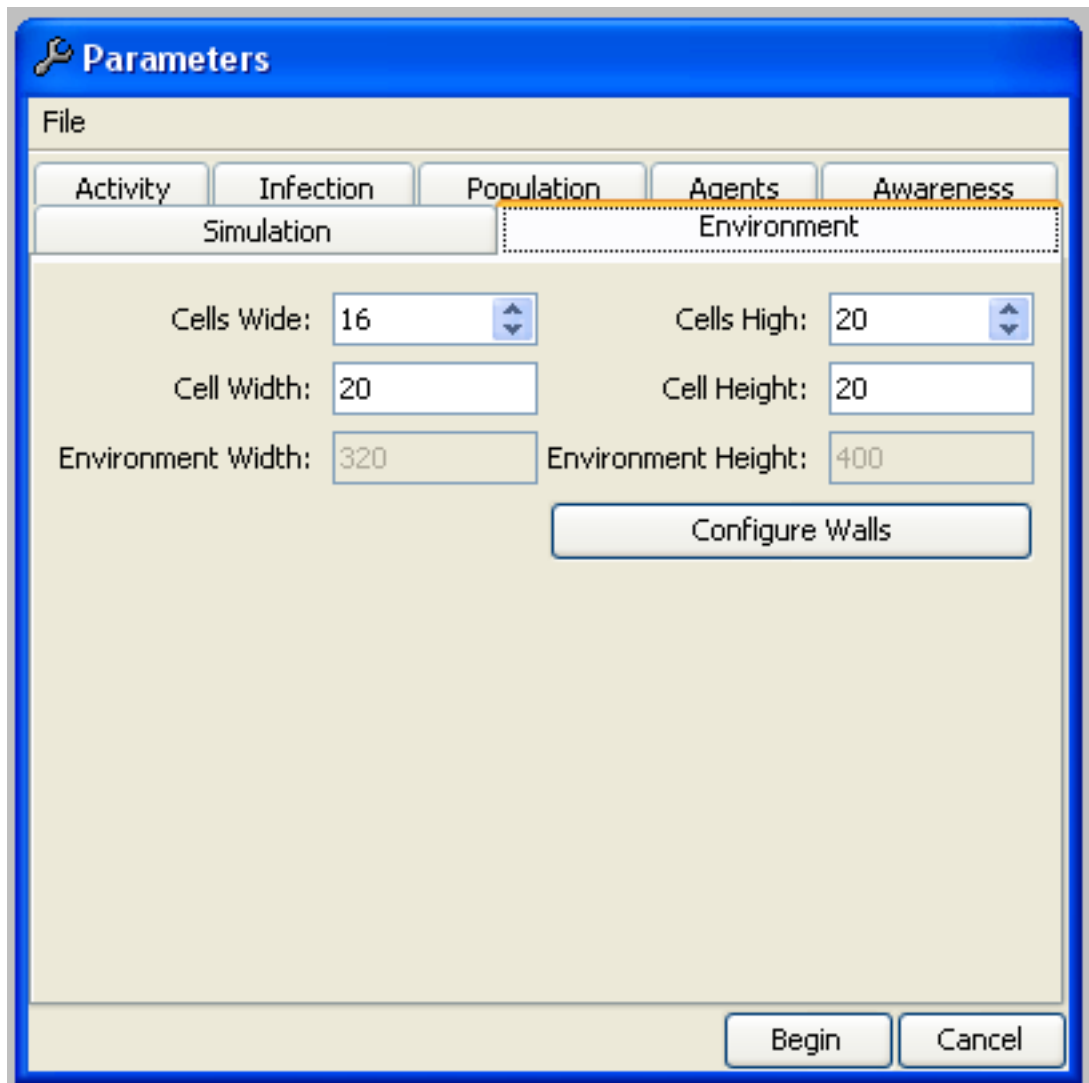
- Runs simulations of infectious diseases with parameters to create a range of 'monster' outbreaks
- Automated graphing of a simulation while running
- Ability to save simulations for reuse later, or to rewind and replay simulations on the fly
- Exporting graphs as png files and simulations as animated gifs
- Saving data as comma separated values, for importing into another graphing package

The next few pages detail how to set up a new simulation in SimZombie, and some brief descriptions of each of the parameters.

To get started, click the **Simulations** menu, and then the **New Simulation** option. This should open a window similar to that below:

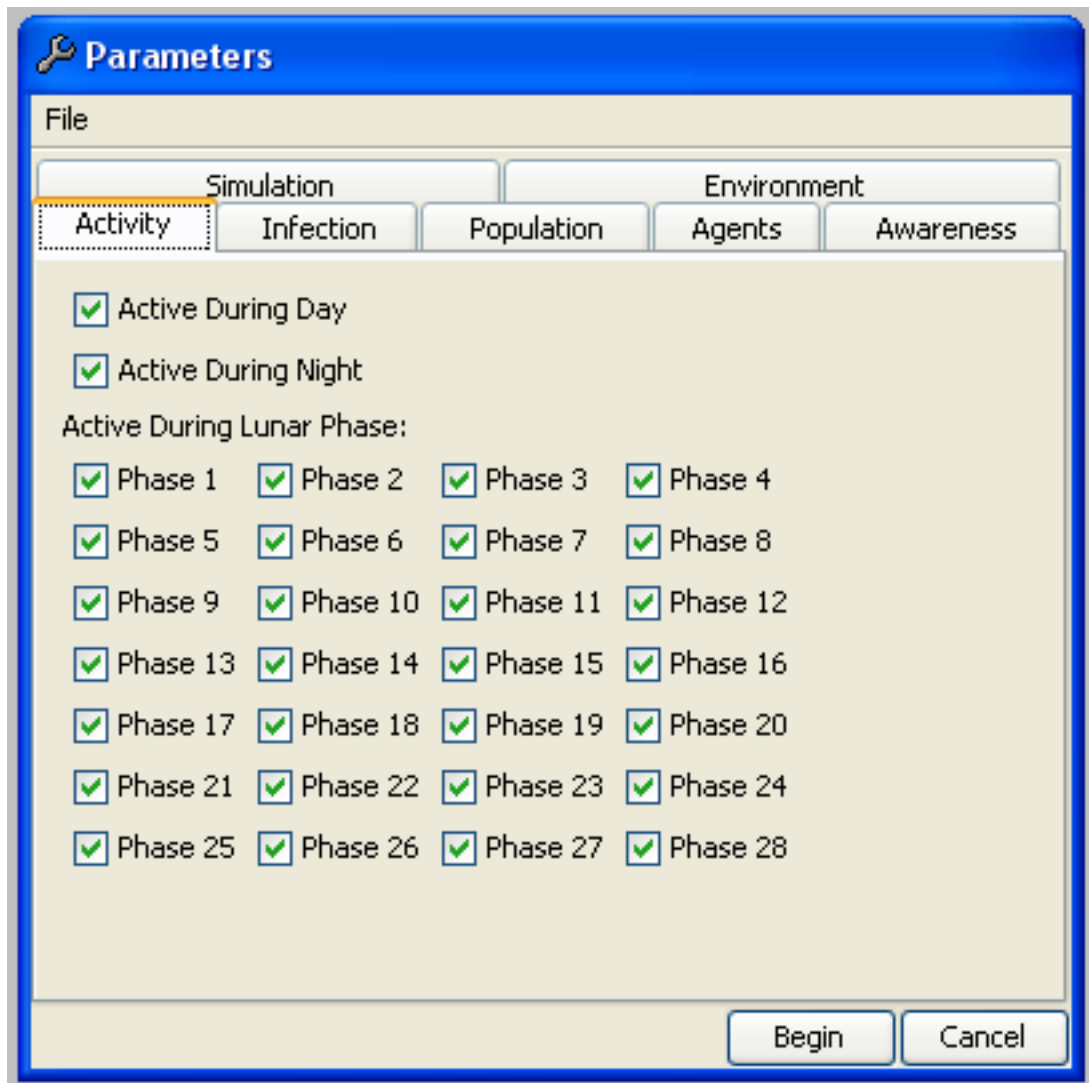


This is the *Simulation* parameters screen. Most of these are for debugging purposes only, however simulations should be given a descriptive unique name for later identification purposes. If you do not require a simulation to be replayed/saved/rewound, you can deselect 'logging enabled' to run with considerably less RAM usage.

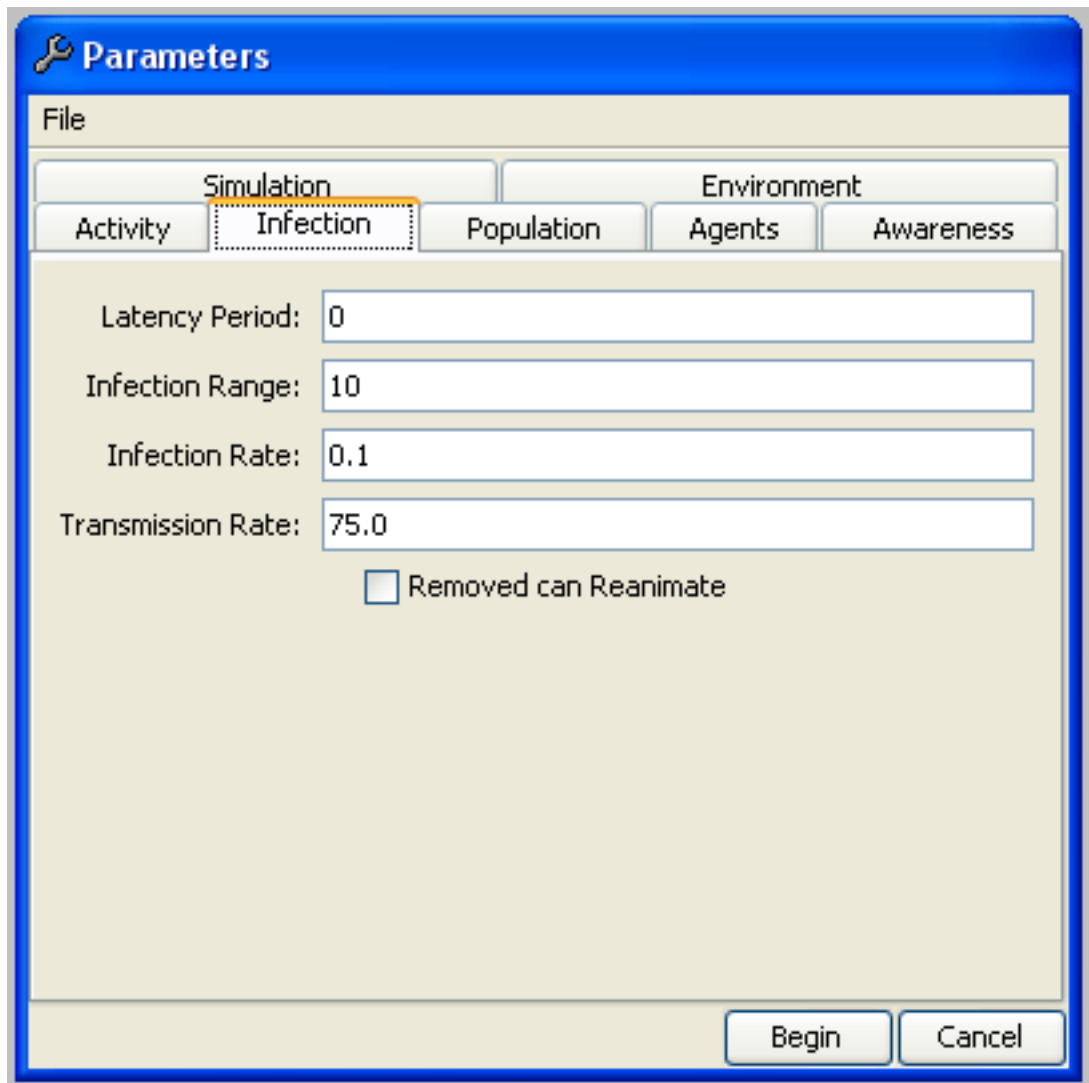


These parameters control the size of the environment. We assume a well-mixed population - think of an arena, almost - of the given size. The cell width, height and number of cells have been set by default to a simulation that will fit in the window, but feel free to experiment with smaller environments.

You may also want to play with the 'Configure Walls' button, which opens a window for you to draw walls into the environment. Using this you can create mazes or boxed off areas. Simply click on the edge of a square to add a wall, click again to remove a wall.



Active monsters are monsters capable of attacking people. This is where you may want to give some consideration to the type of monster you're modelling - vampires, for example, may be active every day but only at night. For the purpose of werewolves, a full moon falls around phase 14 and 15. Check a box here to indicate that your monster is **active**, uncheck to indicate your monster is **inactive**.

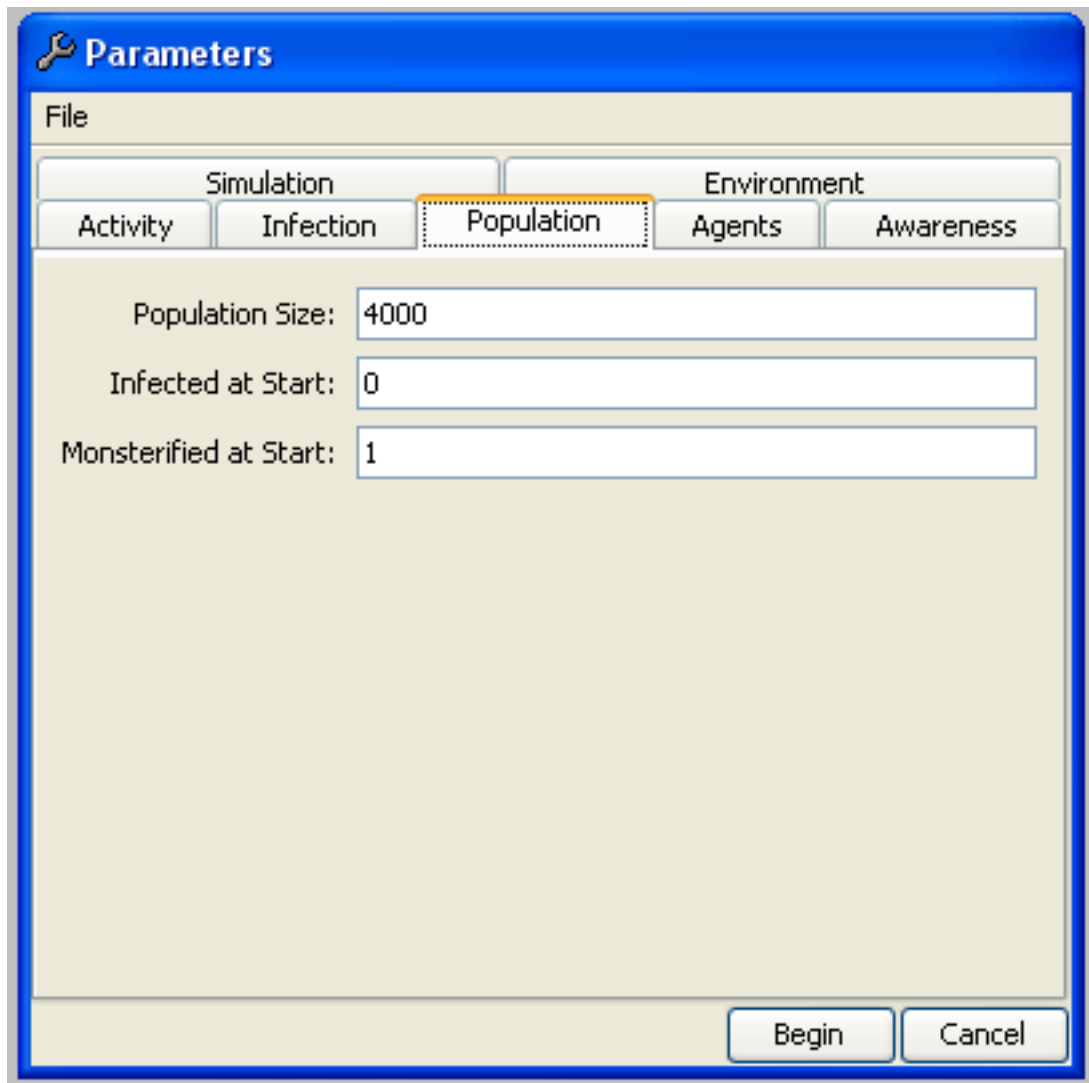


Latency Period: This setting is a number, in steps, of how long it takes an individual to go from infected to fully monsterified.

Infection Range: The range at which the infection transmits, in pixels. A smaller value would represent monsters that have to get closer to infect their victims.

Infection Rate: The percentage of people who become infected *naturally* - that is, without contact with a monster. Setting this to zero means monster contact is the only way to become a monster, whereas a higher percentage may show the deceased coming back to life.

The **Removed can Reanimate** checkbox is currently non-functional, and checking or unchecking this box does not affect the simulation.

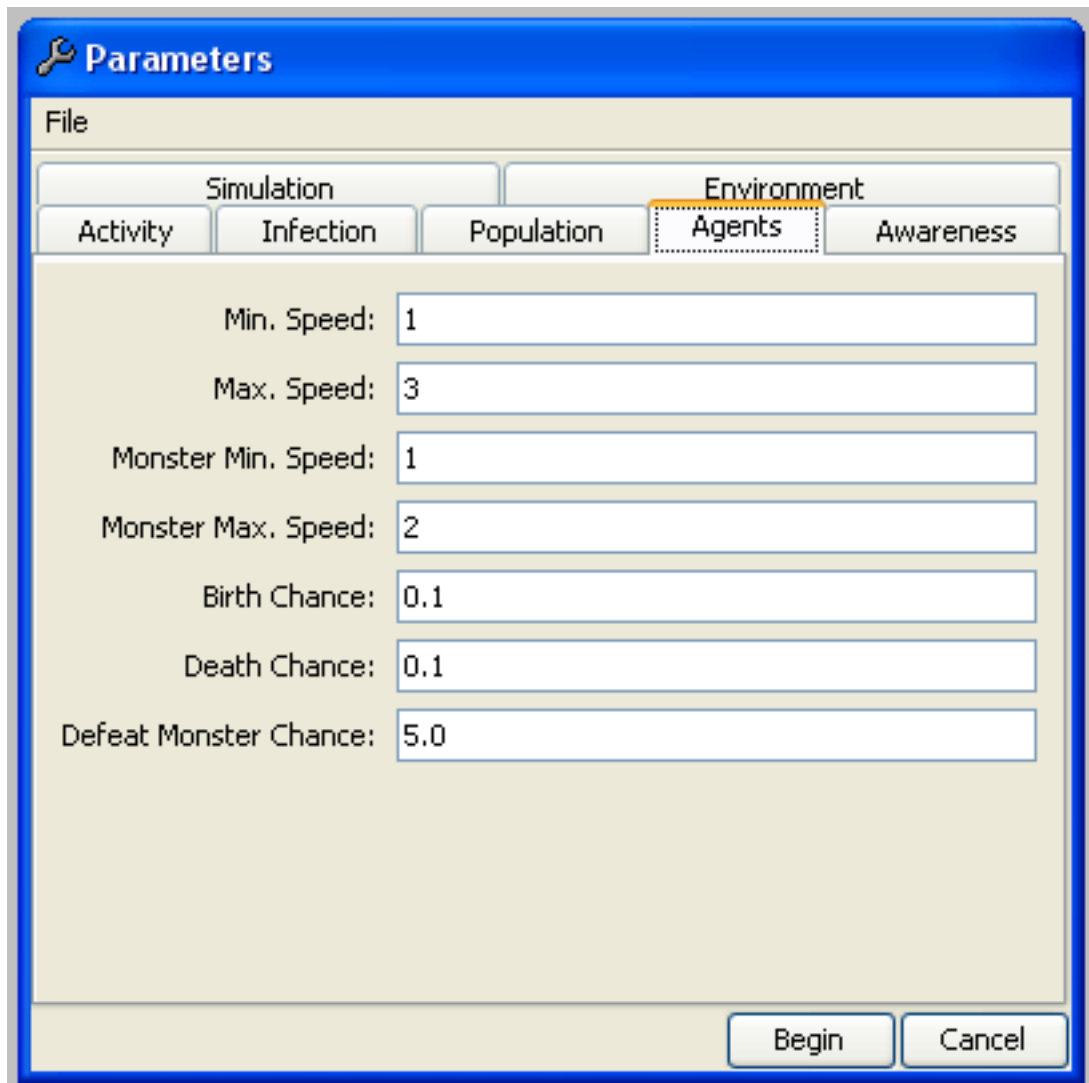


These parameters relate to the initial population of the simulation.

Population Size: This is the *total* population of *all* people in the simulation, including monsters. Please note, large numbers may cause the simulation to run very slowly.

Infected at Start: This is a number of people who begin with the infection *dormant*. They are not monsters yet, but will become monsters after the specified latency period in the *Infection* tab.

Monsterified at Start: The number of people that begin the simulation completely monsterified. These are taken from the total population size. It's usually a good idea to have a few monsters to start with, just in case the first one gets killed easily.

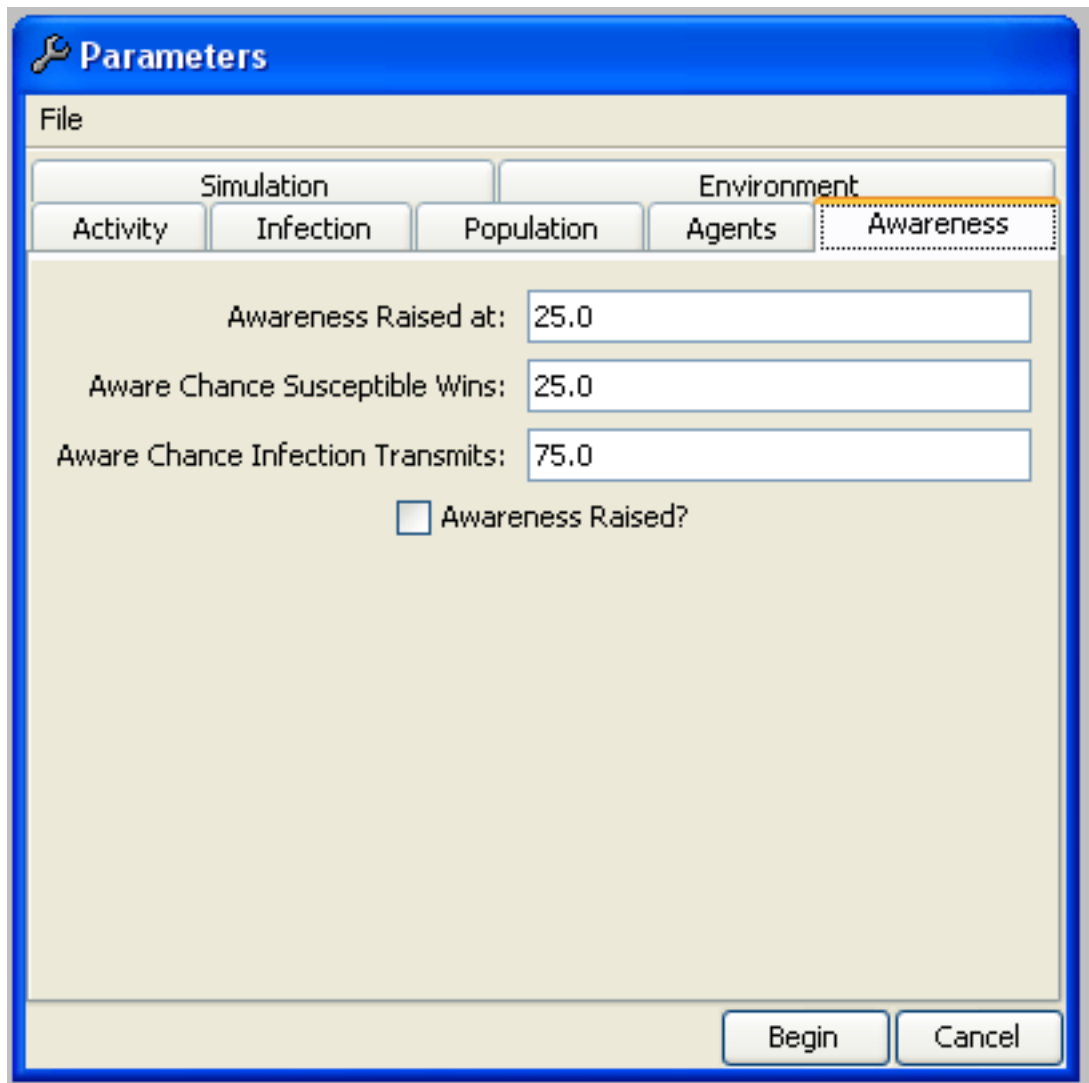


Speed settings relate to the movement of individuals. Feel free to set these to the same value, or a range to have people move at a speed *randomly chosen* between the minimum and maximum.

Birth Chance: A percentage chance of a healthy individual giving birth to another healthy individual. Large values here can cause your population to inflate very rapidly, causing the simulation to run very slowly.

Death Chance: A percentage chance of a healthy individual suddenly becoming deceased due to natural causes. To keep a constant population, keep this the same as your birth chance, but feel free to experiment.

Defeat Monster Chance: When encountering a monster, this is the percentage chance that the healthy individual successfully kills the monster. Setting this very high gives your people a fighting chance against the outbreak!



Awareness accounts for people noticing the outbreak and preparing themselves - maybe arming themselves with baseball bats?

Awareness Raised at: The *percentage* of the population that have to be affected by a monster in some way before awareness is raised. Consider the impact of your monster - vampires might be stealthy, whereas a giant plague of zombies is more noticeable.

Aware Chance Susceptible Wins: This setting acts like *Defeat Monster Chance* in the *Agents* tab, but after awareness. When people have taken up makeshift weaponry, perhaps they're more adept at killing?

Aware Chance Infection Transmits: This parameter acts like *Transmission Rate* in the *Infection* tab, but for after awareness. Perhaps you might consider people eating garlic to stop them becoming a vampire?

Awareness Raised?: This starts the simulation with the population already in an aware state.