# AI Progress Report #2

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I have implemented nearly all of my redesign from the previous week. There are still some remaining bugs with my data structures. However, I can already see a much more diverse set of behaviors.

## Design Changes

### Antibiotic Potency

I've built the antibiotic to reduce in potency as it spreads. If an antibiotic cell has potency 100, the cells it spreads into have potency 80, and their *children* will have potency 60, and so on. I think in addition to this decrease over distance, I'll add a decrease over time such that all antibiotic potency will reduce by 5 every X generations.

### Mating and Fitness

Although I have designed tests to determine which DNA sequences result in the longest lasting bacteria cells, I still needed a way to determine fitness for the sake of mating *during* the simulation. My current idea is to use some kind of "experience" rating, which would be determined by the number of generations a bacteria has survived, and the number of antibiotic it has resisted. Then I can take one of two approaches…

a. Mating pairs are determined by using bacteria's DNA to choose a mate from a set of adjacent bacteria. Then genetic transfer is biased such that the more *experienced* bacteria imparts a greater portion of its DNA and accepts very little in return. While the less experienced bacteria would accept a large portion of DNA, becoming much more like the more experienced bacteria.
b. Rather than using the bacteria's DNA to match mating pairs from an adjacency list, I create mating pairs based on their experience, such that the first and second most experienced adjacent bacteria are mated, then the third and fourth, and so on. I would do this making each bacteria choose the potential mate whose experience rating is most similar to its own.

This week I plan to fix the current bugs and implement these design changes (and probably many others) as I tweak the system to be a more and more balanced battle between bacteria and antibiotic.
All code can be found on github: https://github.com/thomasguerena/cs441-ai-project
See branch *proj-refactor* for code currently in the works.