# $\lambda$ Lounge

## Evolutionary Algorithms

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# Why Use and Evolutionary Algorithm?

## The Evolutionary Algorithm

1. Population Initialization: generate a new population.
2. Fitness Evaluation: rate each member of the population.
3. Repeatedly:
   (a) Parent Selection: choose who to breed.
   (b) Recombination: cross the parents.
   (c) Mutation: applied to the offspring.
   (d) Fitness Evaluation: usually just the new offspring.
   (e) Survivor Selection: kill off the weak.

## Population Initialization

*"It's turtles all the way down ... until it's not."*

- Intelligently seed the population: think Adam and Eve. This is common if you are fine-tuning a solution you already have, either generated from your EA in a previous run, or from some different system.
  **Pro:** you can start off the population somewhere useful.
  **Con:** you have to know where *"somewhere useful"* is.
- Randomly generate the population.
  This is usually easy and usually doesn't cost too many generations.
- Doing both at the same time isn't uncommon.

## Fitness Evaluation

*"I'm so much more beautiful/intelligent/strong/fast/rich than you could ever hope to be."*

We need to determine the fitness of our solutions.

- Minimum or maximum direct value.
- Simulation of an environment.
- Some fitness heuristic.
- Head-to-head competition.

## Parent Selection

*"Who's your Daddy?"*

## Recombination

*(Pretend that 1970's porn music is playing.)*

# Mutation

## Survivor Selection

*"I brought you into this world, and I can take you out of it."*

***Let's look at code!***

*Questions?*