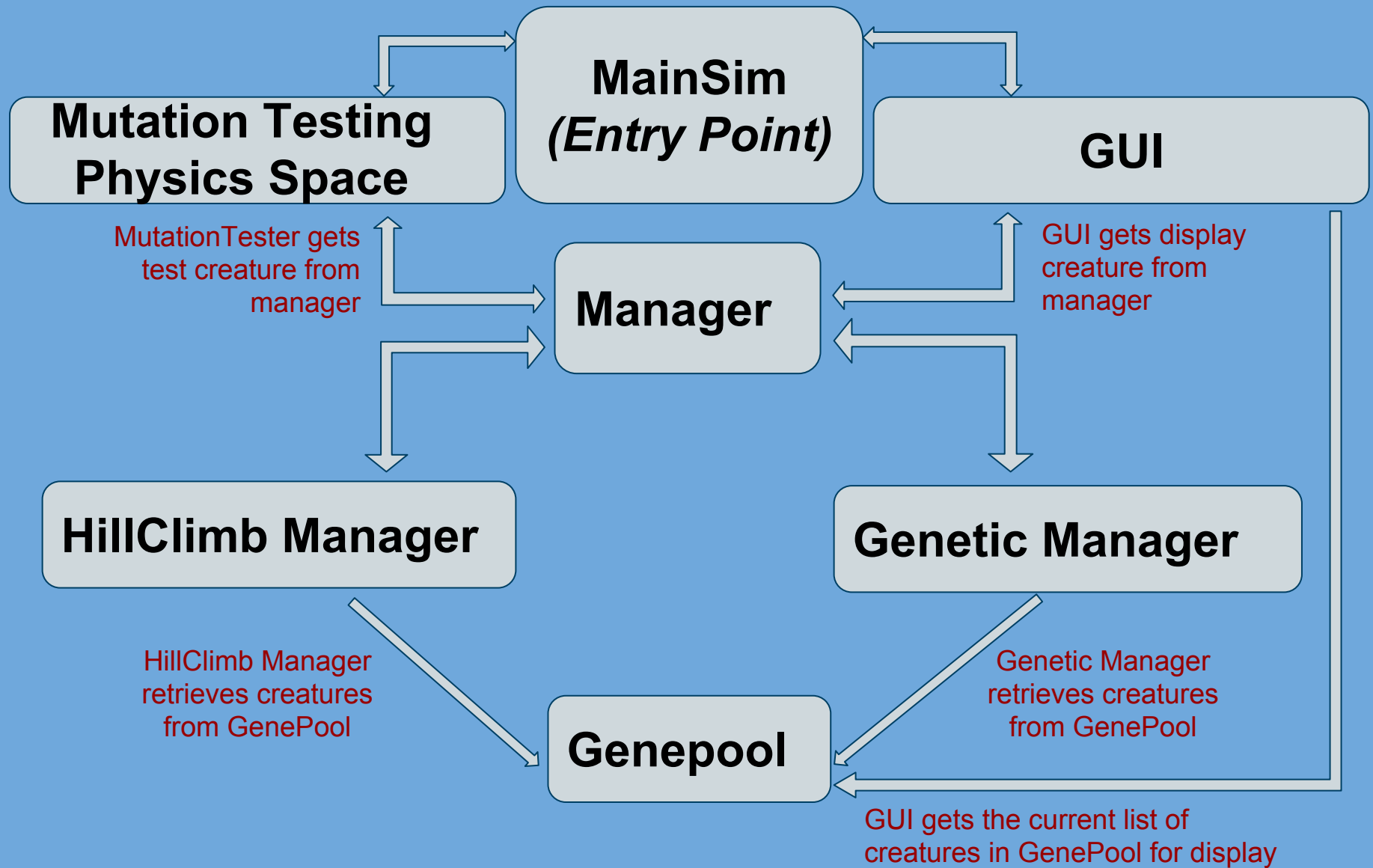


Torpedo ray

Creature Evolve

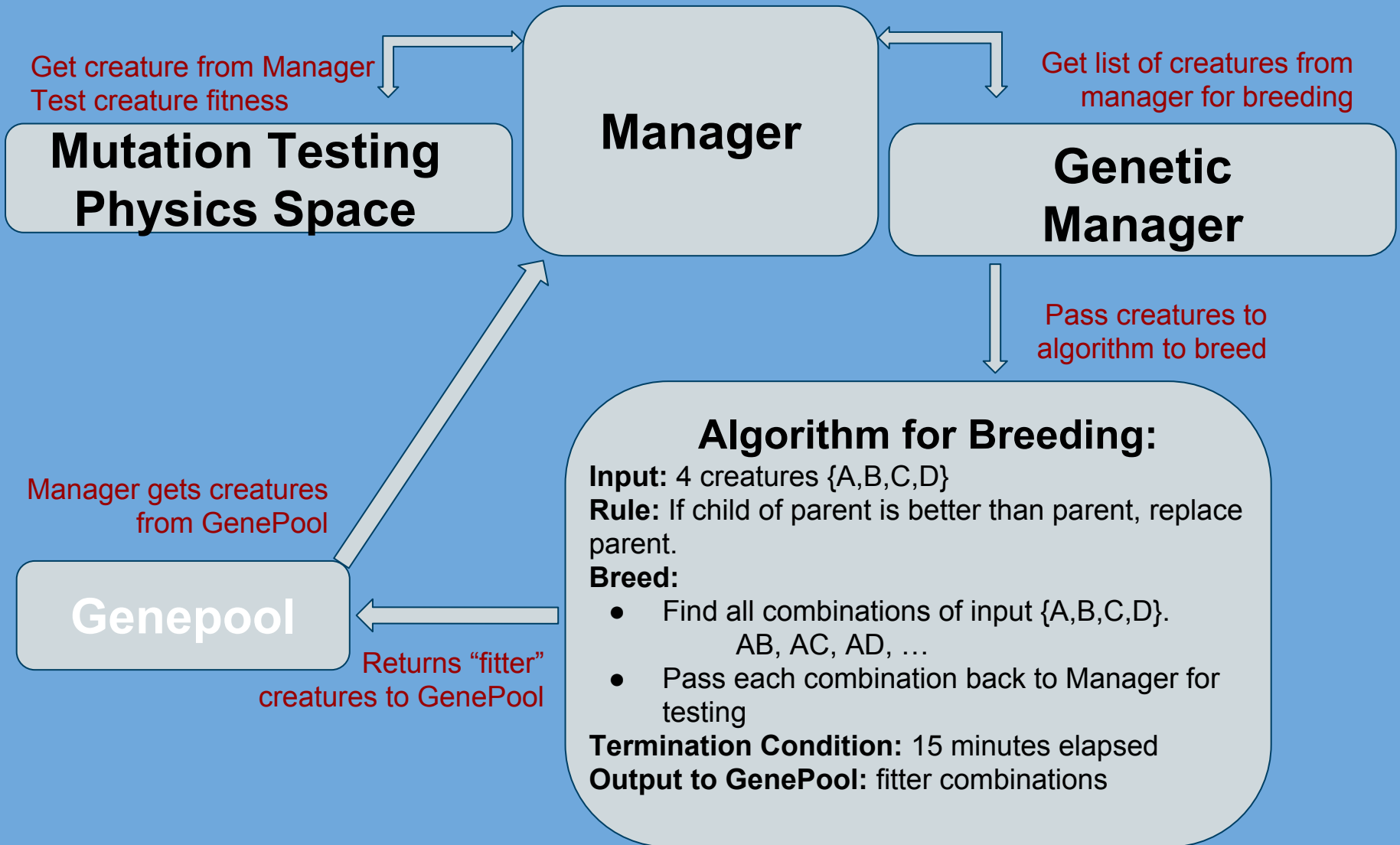
Tess Daughton
James Holland
Nathan Gonzalez
Tyler Shelton



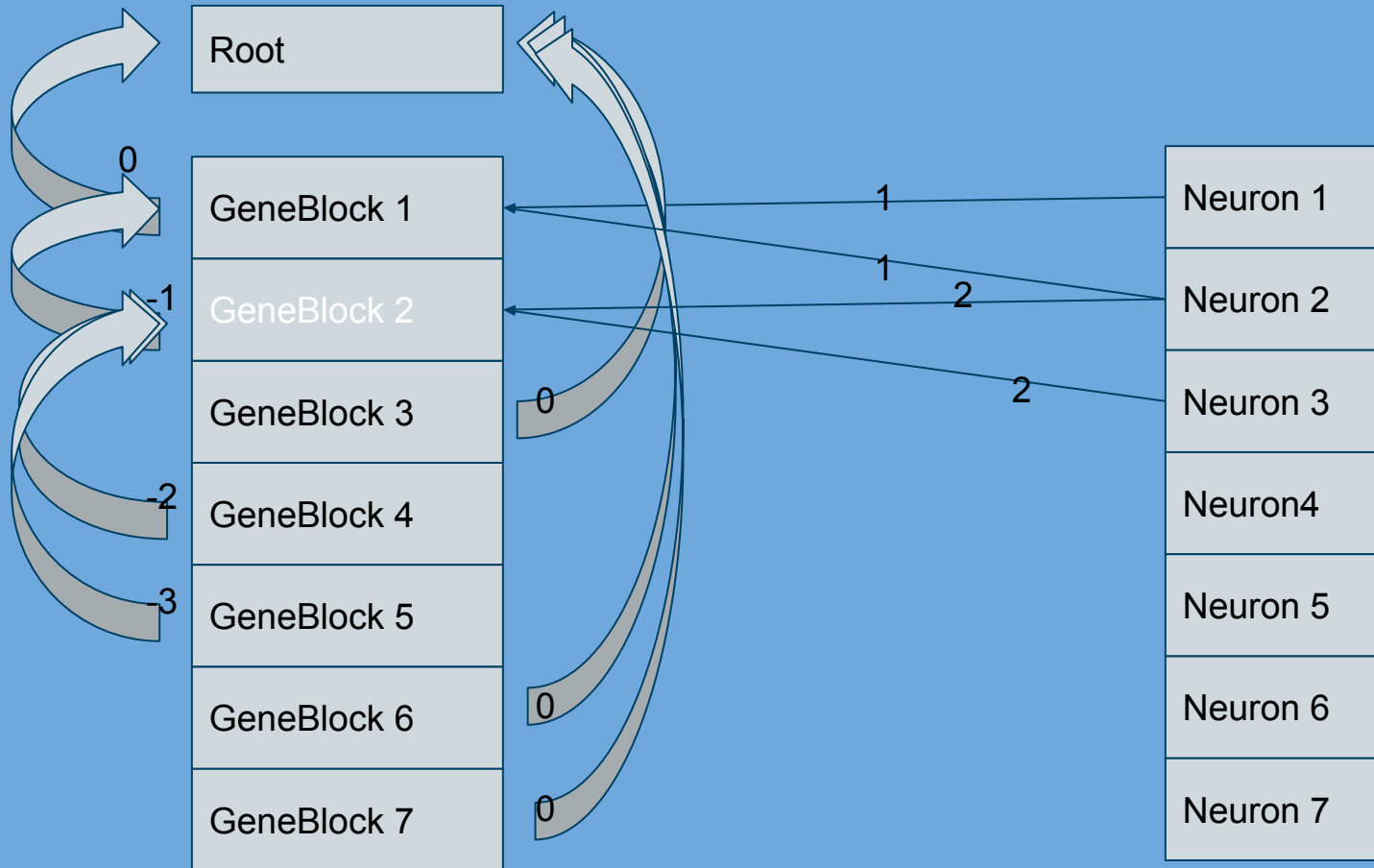
Hill Climbing

- *Hill climbing mode makes mutations using only one genome
- *Utilizes the following mutation types to make changes to that genome:

- **Adder**
- **Duplicator**
- **Scaler**
- **Randomizer**
- **Inverter**
- **Subtractor**
- **Extender**



Genome Representation



Genetic Algorithm

*Genetic algorithm combines two genomes from the Gene Pool to create a **child genome**

*Utilizes the following combination techniques to create the child genome:

- **Single Crossover**
- **Cut and Splice**
- **Chimera**

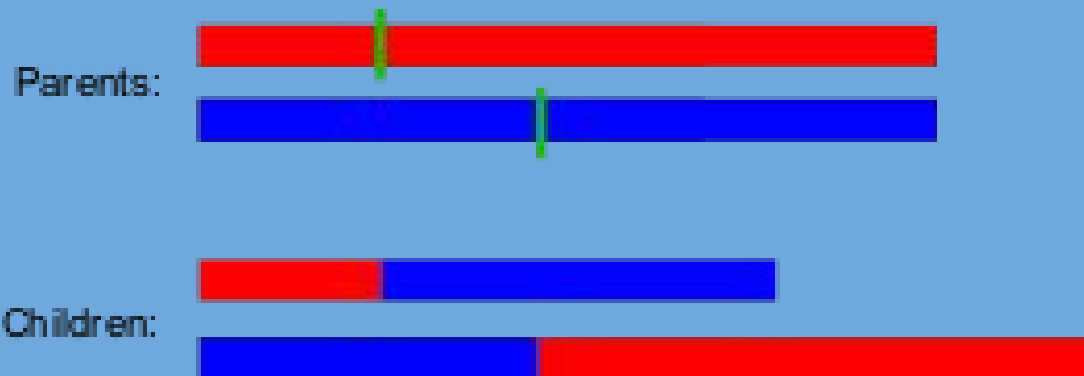
Single Point Crossover

*Starting from one end of one parent genome, copy gene by gene until some random crossover point is reached. At that crossover point, start copying from the second parent and continue until the end of the genome.



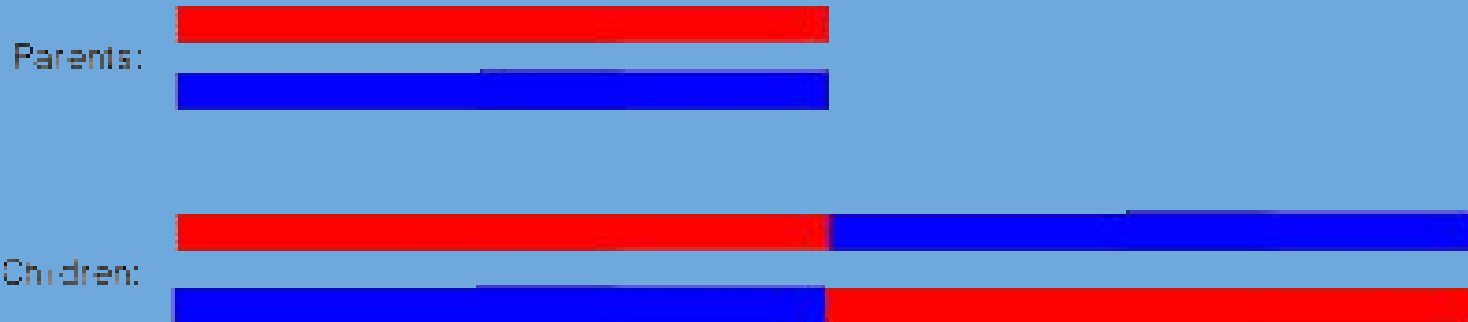
Cut and Splice

*Picks a unique location on each parent and cuts both parents there. The first half of parent 1 and the second half of parent 2 will be put together and the second half of parent 1 and first half of parent 2 will make the second child



Chimera

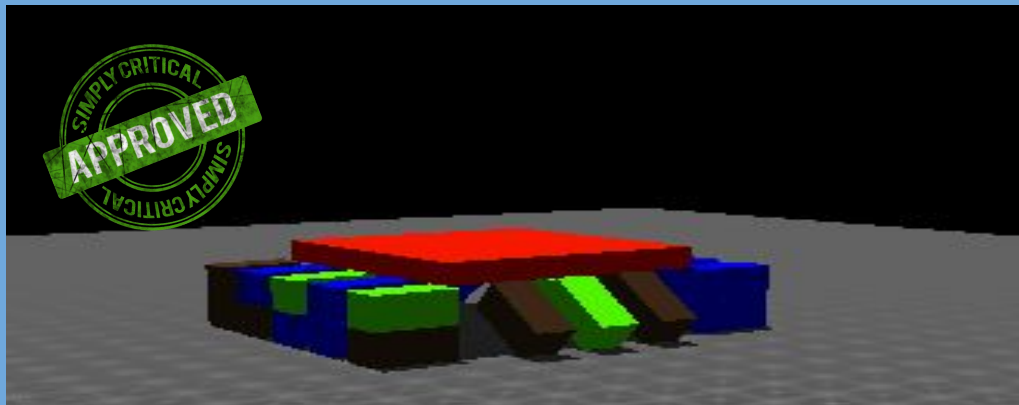
*Merges two parents into one parent by extracting limbs from one and sticking onto the other. Does this both ways and creates 2 children.



Validity Check

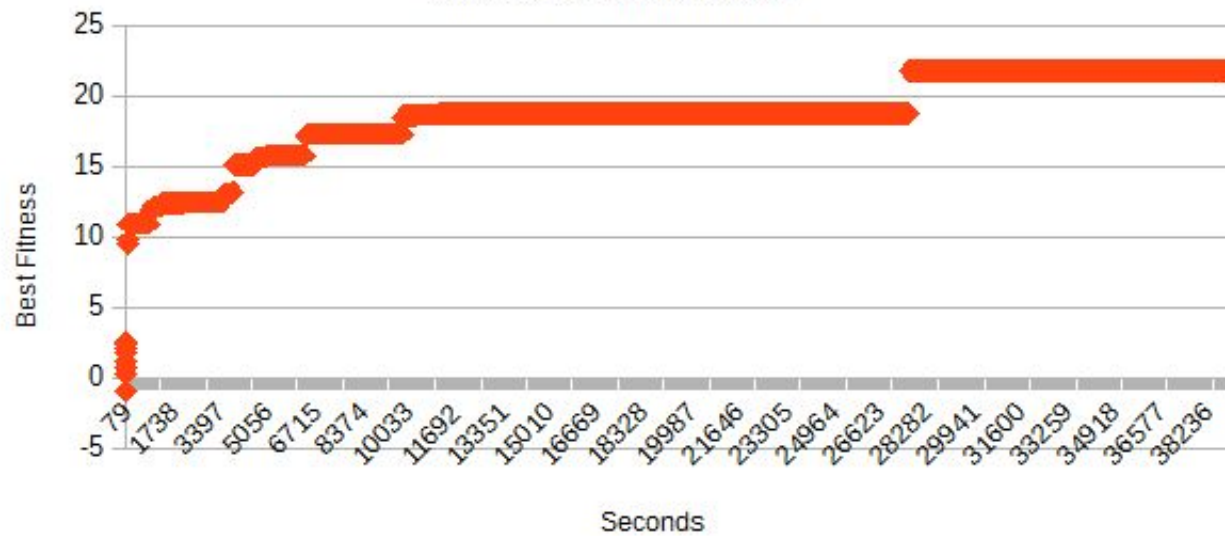
*To ensure that each creature is valid, we use three checks

- Check for internal intersections upon creature creation
- Detect movement before neurons triggered
- Test each “better” creature twice to ensure consistent result



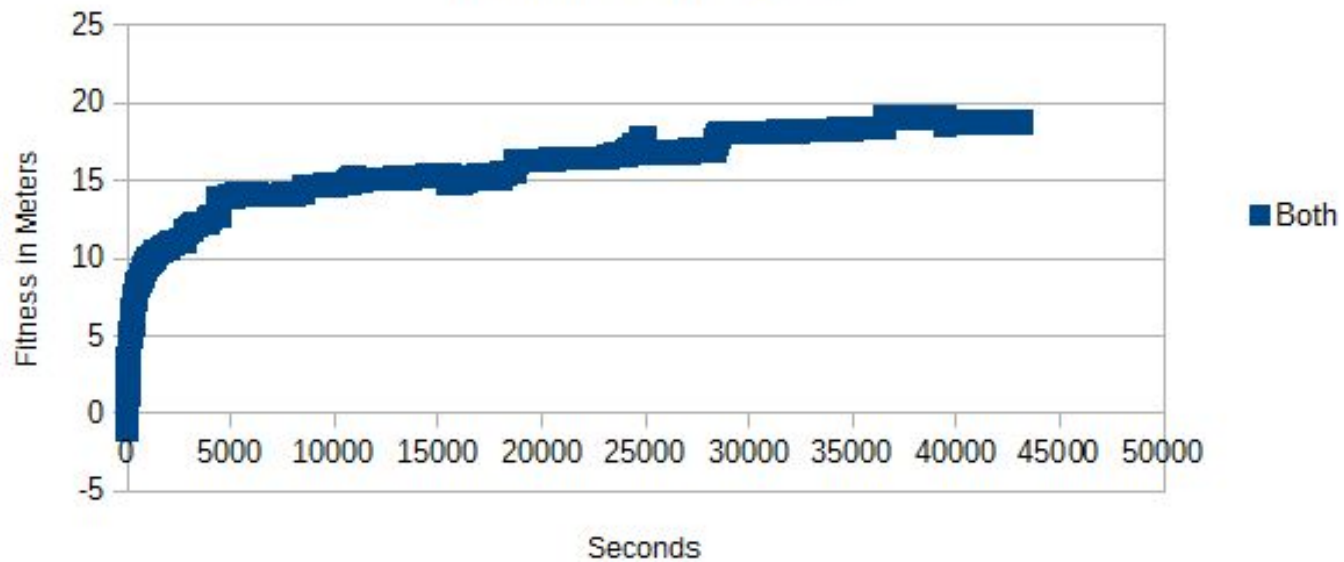
Hill Climbing Best Fitness

based on 2 valid test runs



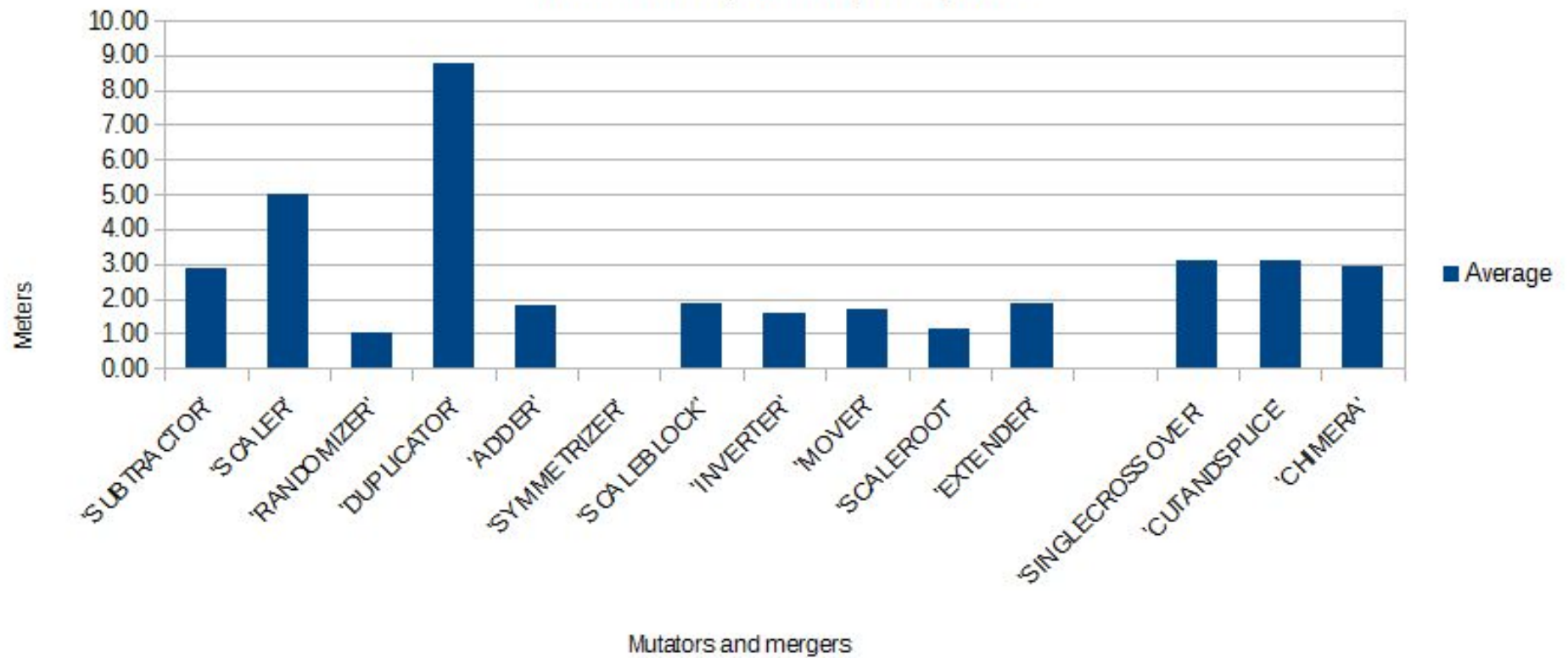
Hill Climbing and Genetic Average Fitness

Based on 16 valid test runs

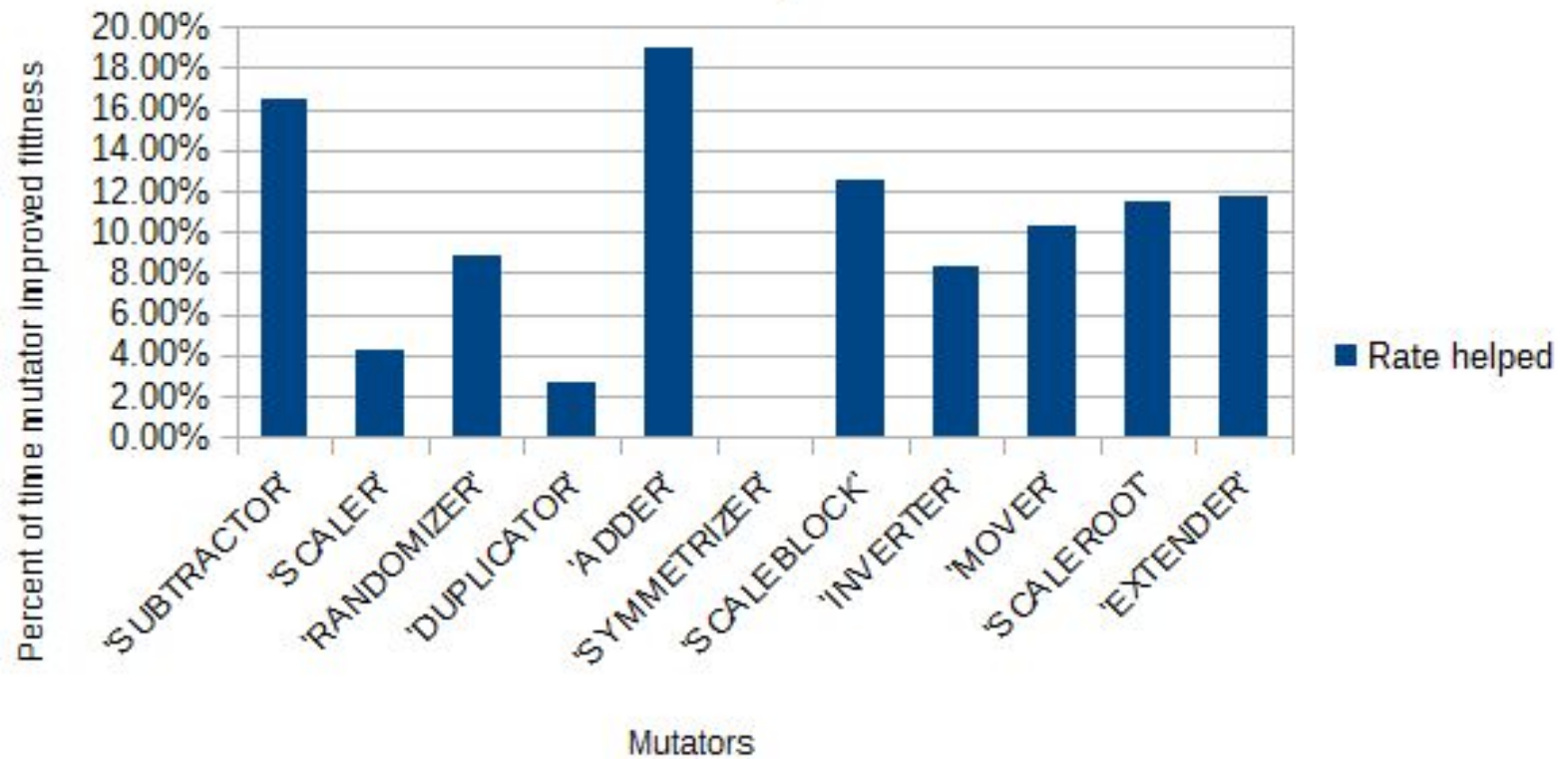


Average Improvement of Creature

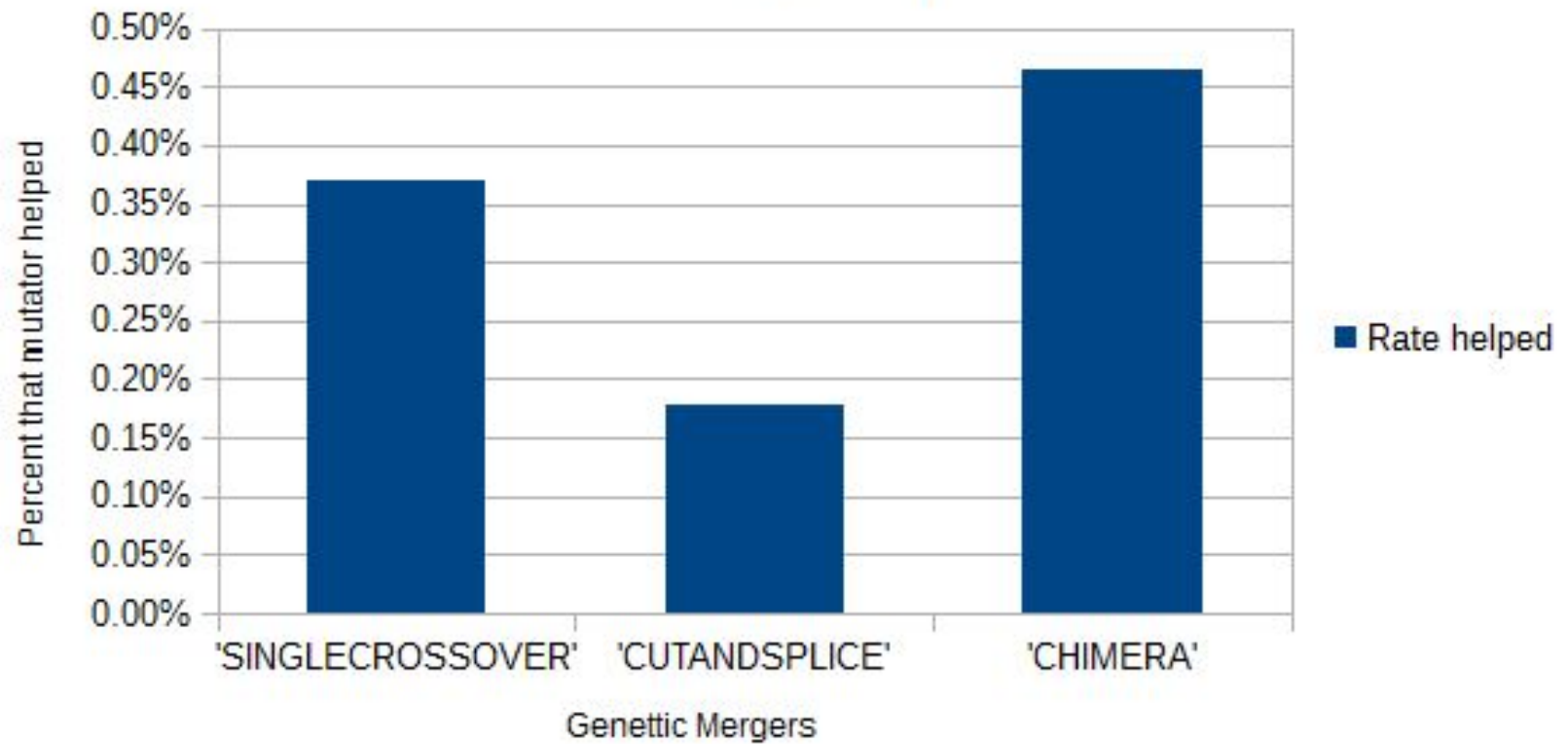
Given mutation improved on parent genome



Hill Climbing mutators

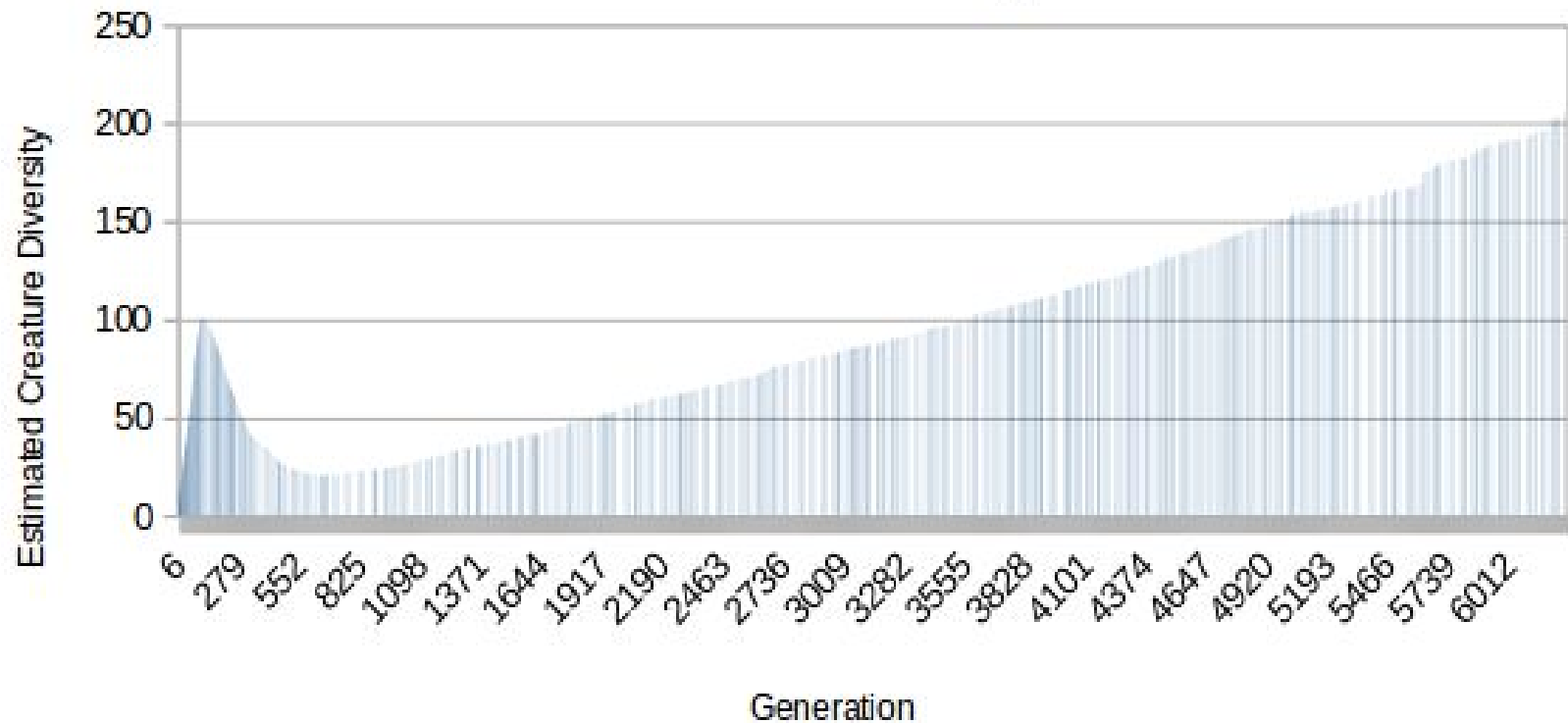


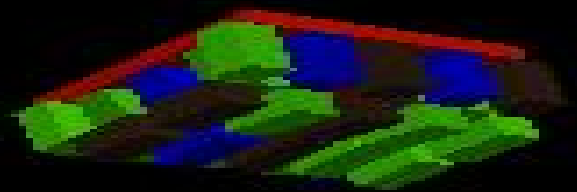
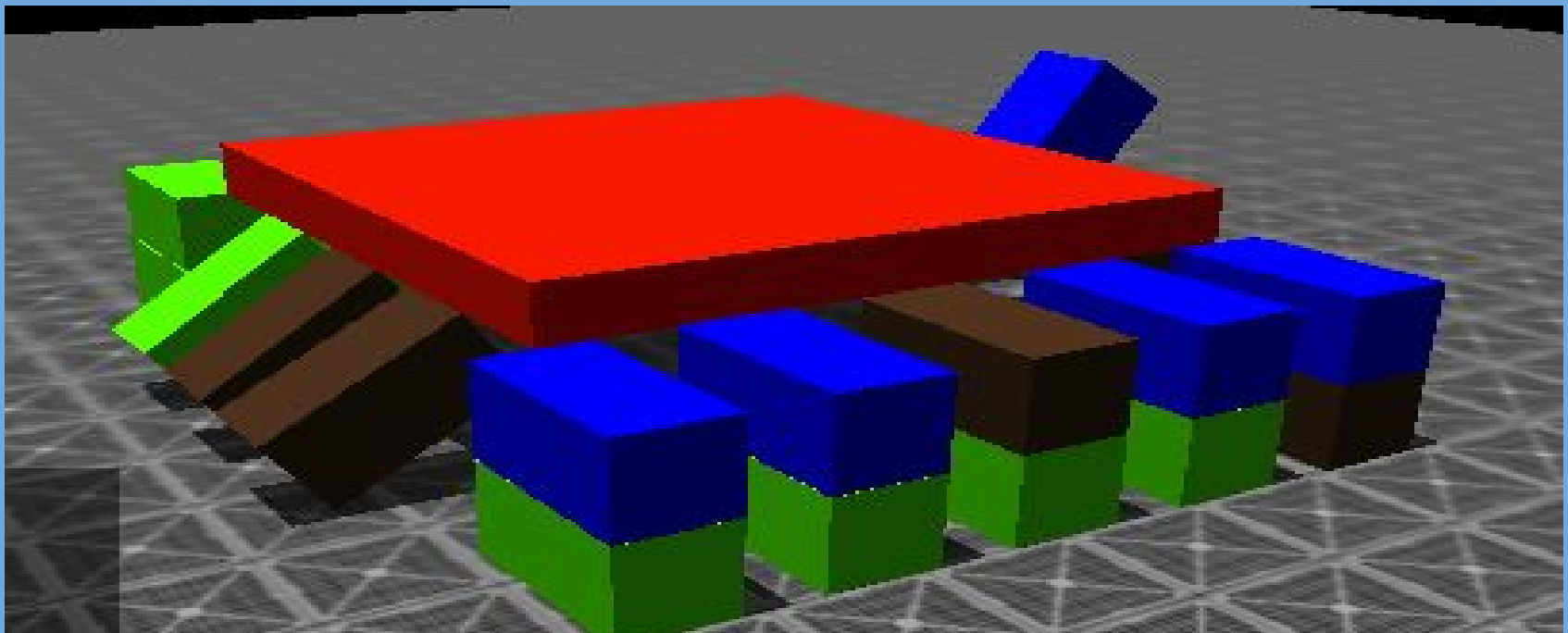
Genetic Percentage of Improvement



Analysis of Gene Pool Diversity

*flawed due to hashcode bug

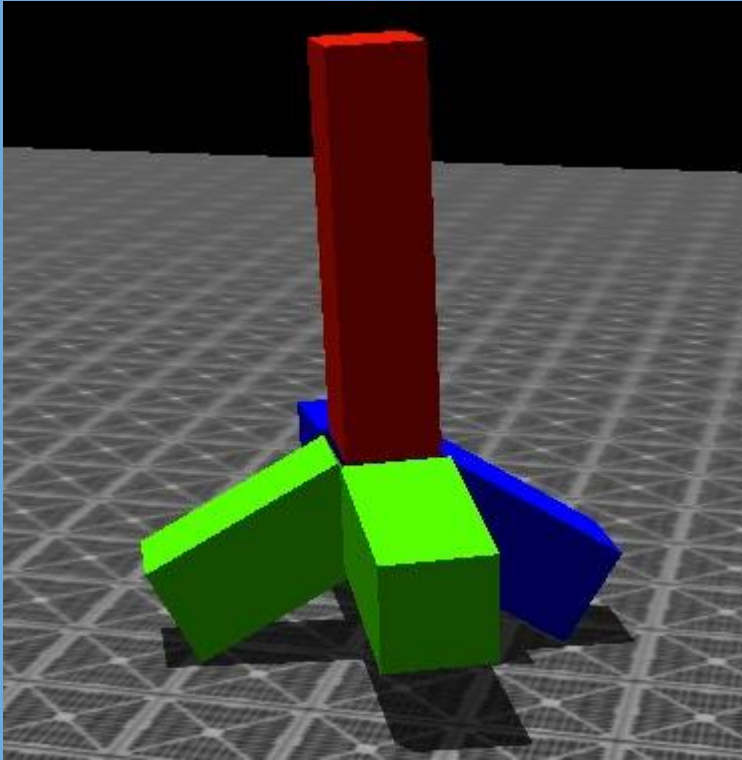




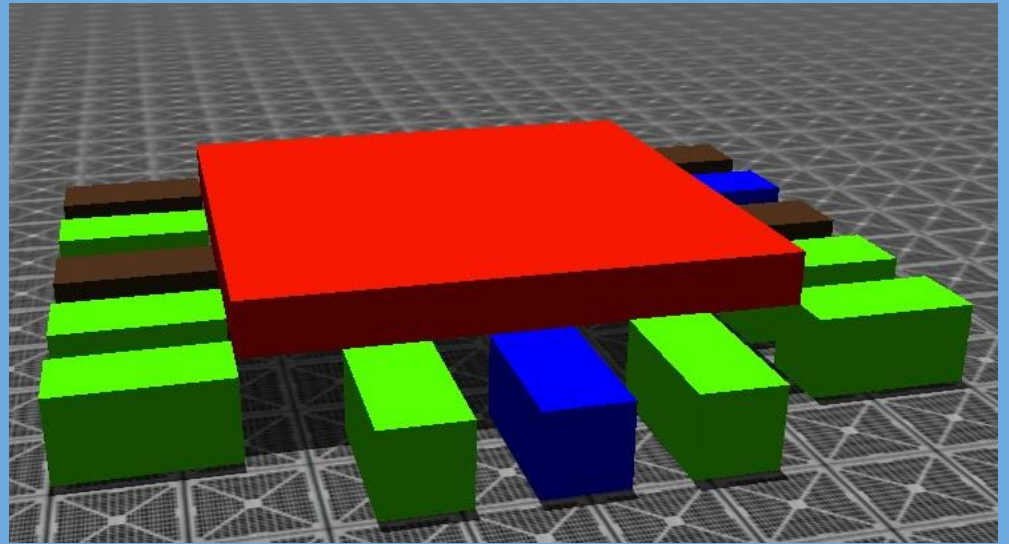
Dead Bug

Tyler's Monstrosity

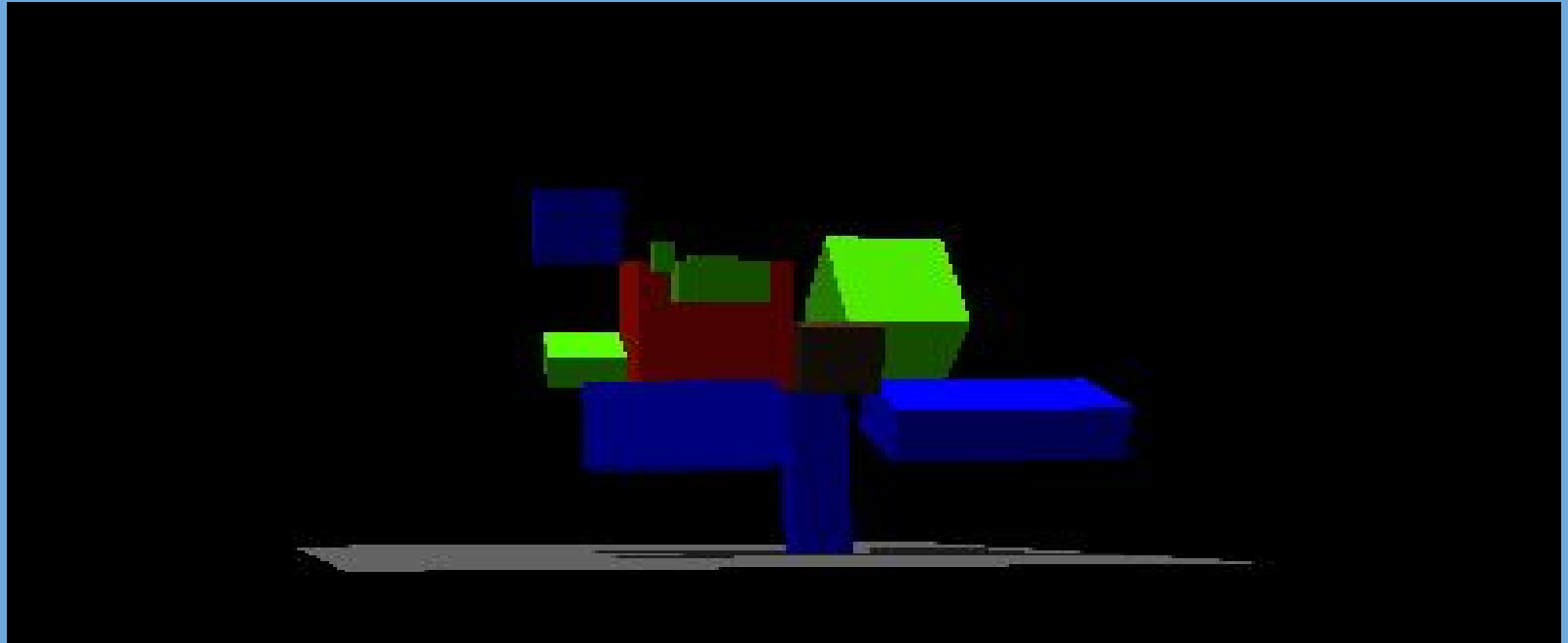
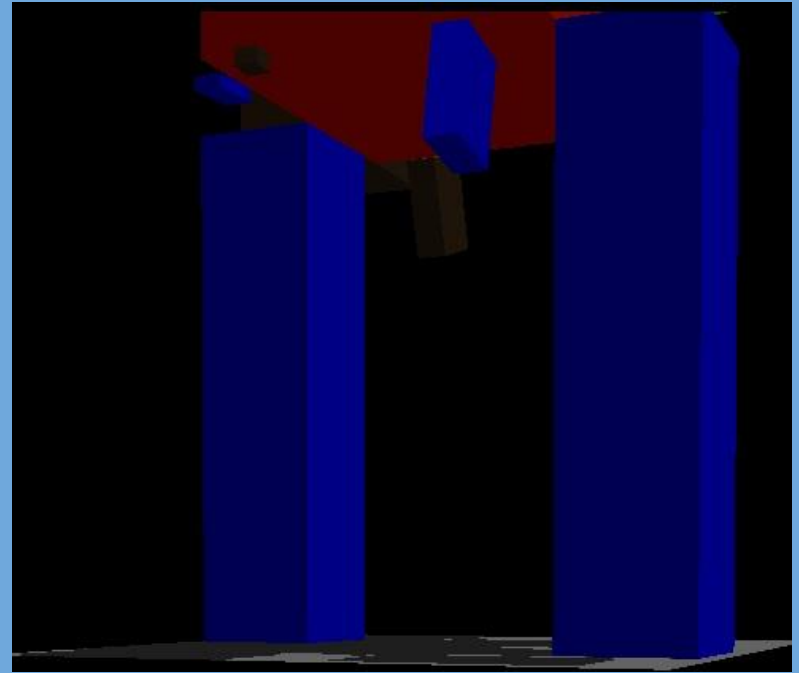
Duster



Squid



Oddities



Best Evolved Creature

