Number of limbs vs Size

Does the size of a robot influence the number of limbs?
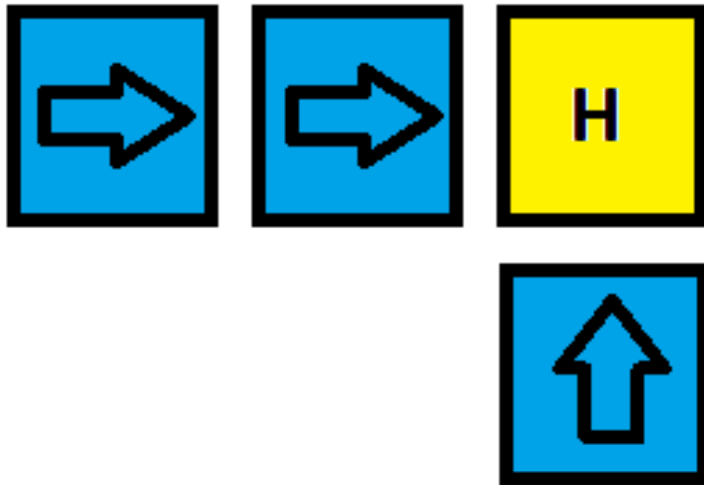
Understanding important for investigation of morphologies in complex environment

Setup

Representation	Coordinate based mappings
Crossover	None
Mutations	Uniform insertions
Parent Selection	Generated individuals are parents
Survivor Selection	(μ, λ)

Phenotype

"Nice"

Actual

Genotype

Maps coordinate to a status

(0, 0) -> H
(-1, 0) -> R
(-2, 0) -> R
(0, -1) -> U

Status	Description
H	Head of the robot
U	Block that was attached up
R	Idem right
L	Idem left
D	Idem down

Genotype – Phenotype Mapping

(0, 0) -> H

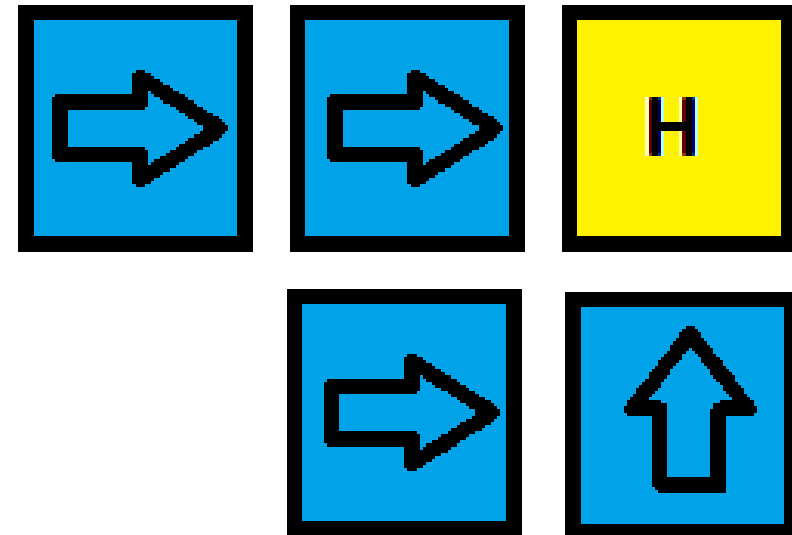(-1, 0) -> R

(-2, 0) -> R

(0, -1) -> U
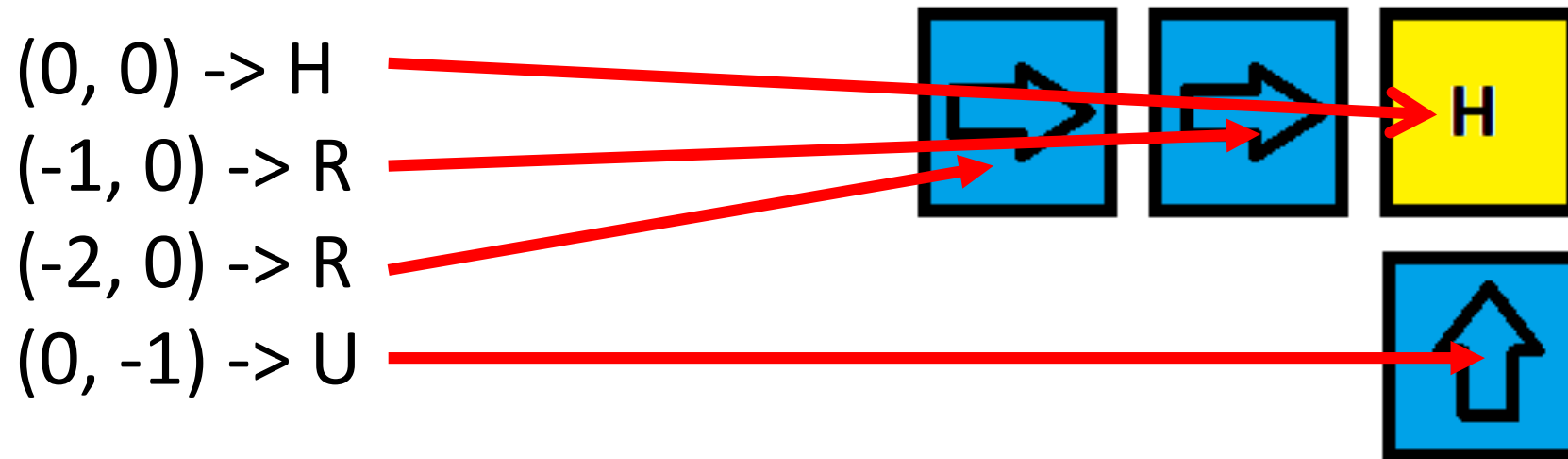
Mutation

- Find all attachment points

- Select one uniform randomly

- Ie in example: p(x) = 1/10
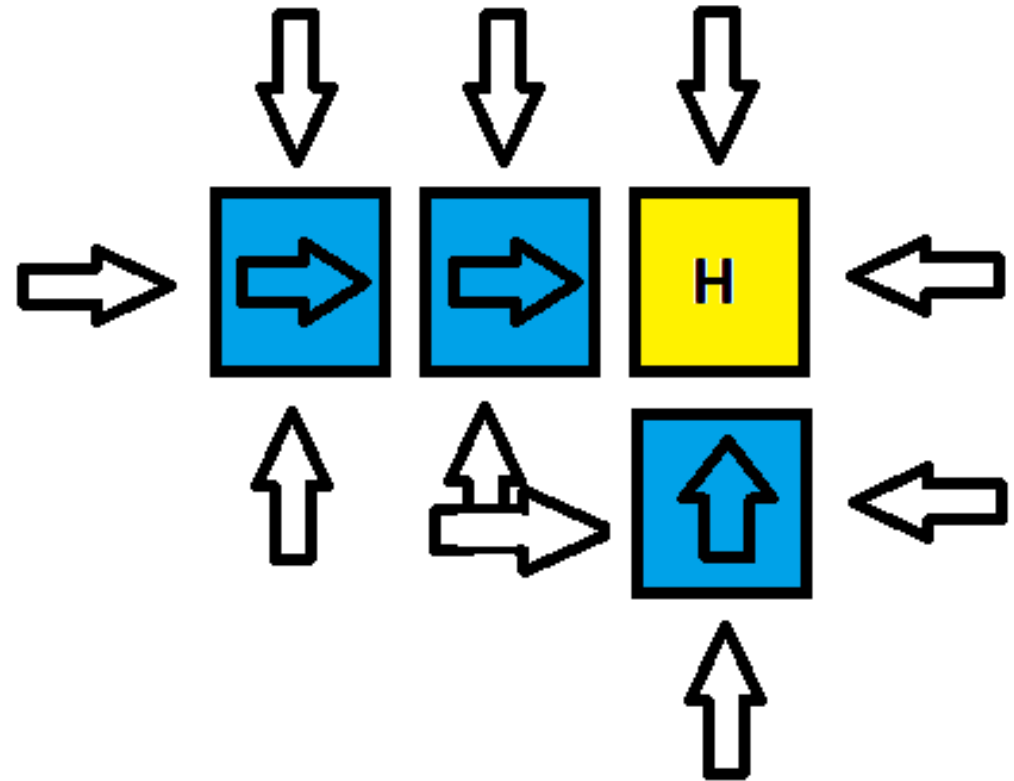
Mutation

- Attach block to chosen point

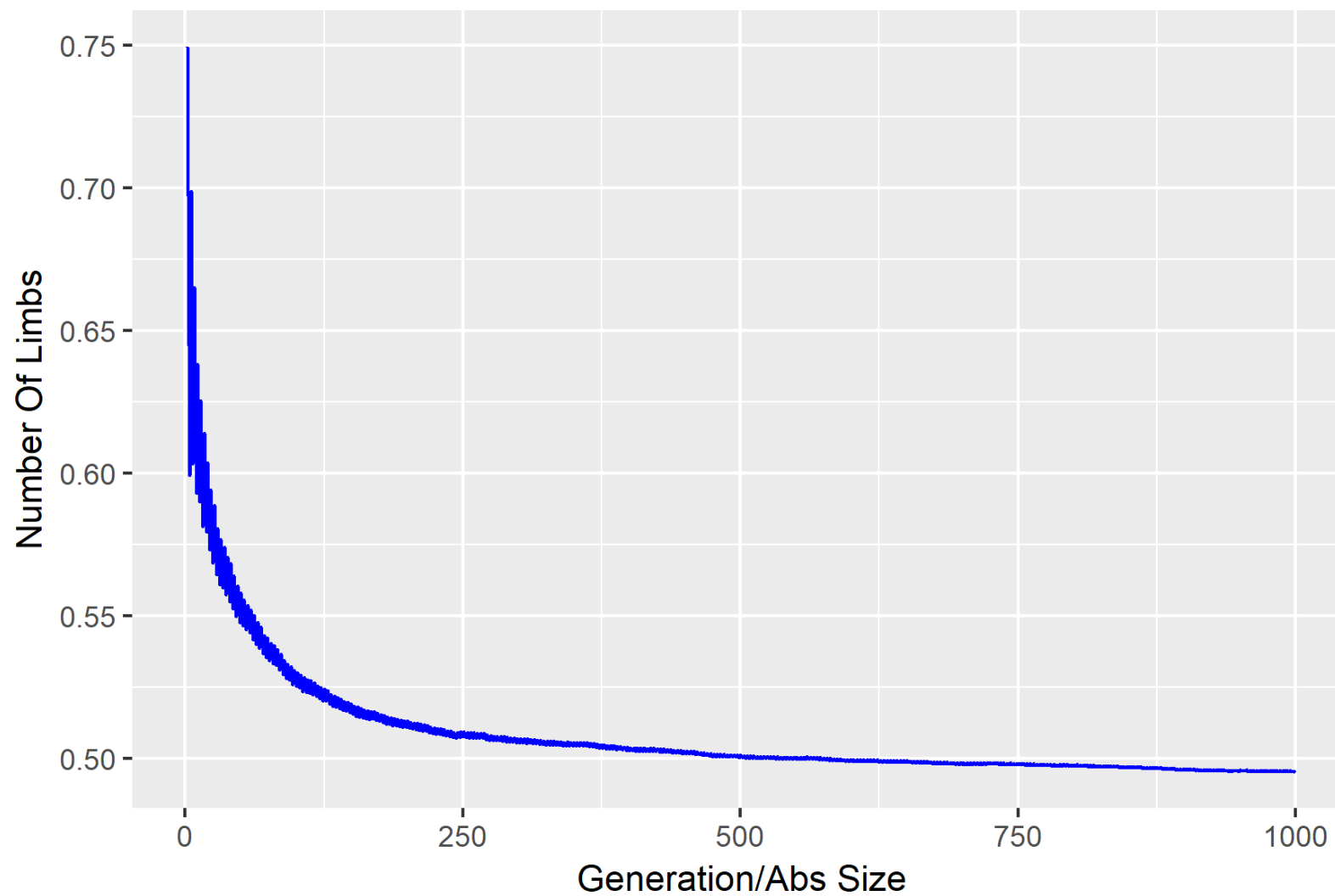- Every generation exactly
  one block added

Experiment

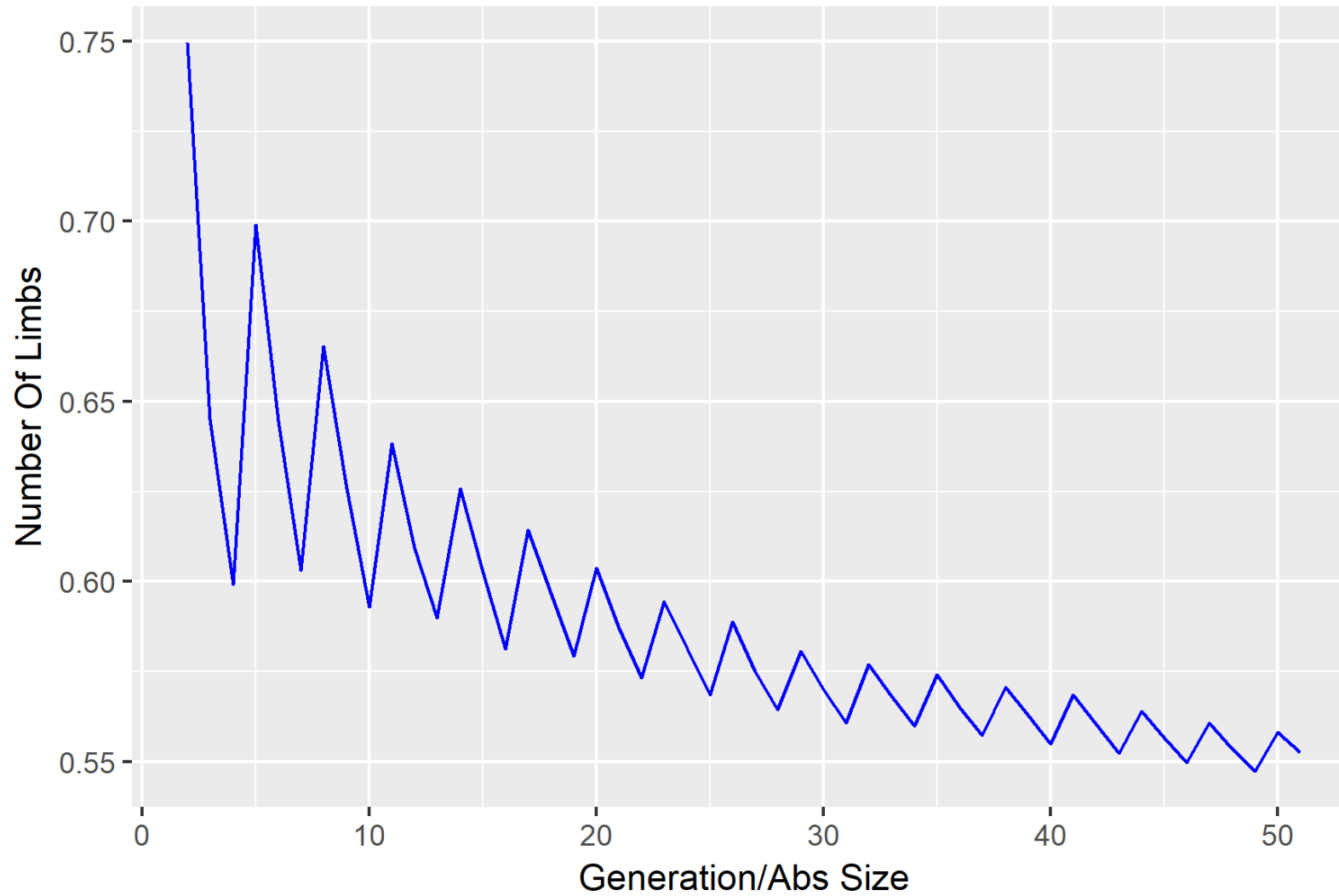| Runs	1
Pop size	1000
Generations	1000

Experiment Notes

- 1 run is sufficient as individuals do not interact

- 1000 generations of 1000 individuals = 1,000,000 individuals

- Generation n only has individuals with abs size n+1

- Feasible due to simple system

Result - All

Result – 50 Gens

Observations

- Decreasing trend; significant by Mann-Kendall

- Alternating higher – lower pattern visible in 50 gens

- Weak observation: even the lowest averages are much higher than found in own experimental set up.

Discussion

- The decreasing trend is significant – is it generalizable to our setup?

- Can/should we explain the alternating pattern?

- Does it say anything that the values are higher than our own experimental setup?