EXPERIMENTS PROCEDURE

DAESEOK LEE

1. TASK-BASED EXPERIMENTS

As explaind in the main paper, these experiments are designed to see whether the creatures attained some specific patterns of behaviors that are appraently related to survival. The patterns are measured in the form of "task". For each task, creatures are provided with some specific circumstance in which some features of the world are set to "off" for controlling purpose, and sometimes they have to behave in an one-to-one context. The performance in either time, amount or distance is measured, and compared with a control group. The "control group" is obtained by applying the mixing input trick and giving them the same circumstance with the experimental group. Then if a siginificant different is observed between the perfomance of experimental and control groups, it could be argued that an adaptation has occured that enhance the chance of the specific behavioral pattern in input-dependent manner.

1.1. overall procedure.

(1) Execute n_{run} runs of the world with map size of (x^i, y^i), $n^i_{population}$ initial population, $n^i_{species}$ initial species and m^i total mass. During the runs at each T_{sample} moment, randomly sample $\min(n_{sample}, \text{population})$ genes from the gene pool, and keep the samples.

(2) Each initial run is terminated at T^i moment, or earlier if a complete extinction occurs.

(3) For each task, for each initial run, for each set of samples in the run, for $n_{iteration}$ times,

    (a) Configure a testworld based on "offed features", "context" and the set of samples. If the "context" was "normal", then the same map size, intial number of population, initial total mass is used, and the sampled genes are provided to the population with at most one difference in number. Otherwise, if the "context" was "one-to-one", map size of (x^t, y^t) and m^t initial total mass is used. In this case, there's one "subject" and one "object" creature, where the "subject" is the subject of the behavior to measure and the "object" is fixed in a position and object of the behavior to measure. Both of them have gene chosen among the set of samples.

    (b) Run the testworld until the "terminating criteron" is met. If "terminating criterion" is "time limit", then it means to terminate when either moment T^t is ahieved or a complete extinction occured.

    (c) Measure the performance based on "performance measure".

1.2. food consumption.
- offed features : aging, birth, death by lack of energy, excretion, hunting
- context : normal
- terminating criterion : only 10 percent of the total mass is remaining as food.
- performance measure : moment spent

1.3. intercourse inclination.
- offed features : aging, birth, death by lack of energy, hunting
- context : normal
- terminating criterion : time limit
- performance measure : number of times sexual intercourse has occured

1.4. offspring spreading.
- offed features : nothing
- context : normal
- terminating criterion : time limit
- performance measure : total number of population existed until the termination

1.5. hunting.
- offed features : aging, birth, eating food, death by lack of energy, excretion
- context : one-to-one
- terminating criterion : When the subject hunts the object.
- performance measure : Total distance that the subject has traveled.
- specific info : subject and object have size s_{hunt} and o_{hunt} respectively .

1.6. raping.
- offed features : aging, birth, eating food, death by lack of energy, excretion, hunting
- context : one-to-one
- terminating criterion : When the subject tries sexual intercourse against the object for t_{rape} times.
- performance measure : Total distance that the subject has traveled.
- specific info : subject ad object have size s_{hunt} and o_{hunt} respectively.

1.7. choice of parameters. These are choices made by authors.
- n_{run} :
- (x^i, y^i) :
- $n_{population}^i, n_{species}^i, m^i$:
- T_{sample}, n_{sample} :
- T^i :
- $n_{iteration}$:
- (x^t, y^t) :
- m^t :
- T^t :
- $t_{hunt}, s_{hunt}, o_{hunt}$:
- $t_{rape}, s_{rape}, o_{rape}$:

2. HARSH ENVIRONMENT EXPERIMENTS