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# Retirement simlified model
# Rationals, Imitators, Randoms

# N-population size, G-number of generations
N=2000;G=25;

#initialize left and right neighbor vars and i initialization
LN=RN=i=0

#payoff matrix
RET=t(array(c(9,0,0,1),dim=c(2,2)))

#population array: fitness, type, behavior
pop=array(0,dim=c(N,3))

# starting fitness (ensured to be always positive)
pop[1:N,1]=0

# starting probabilities
p1=0.05; p2=0.8; p3=0.15

# Lottery initialization
Lottery=array(0,dim=c(N,3))

# starting population given p1, p2, p3
Lottery=t(rmultinom(N, size = 1, prob=c(p1,p2,p3)))
pop[1:N,2]=max.col(Lottery)

# initial behavior is random
pop[1:N,3]=rbinom(N,1,0.5)+1
pop[pop[1:N,2]==1,3]=1

#data array to record proportions of types and actual behaviors
# percent choosing to Retire
data=array(0,dim=c(G,1))

#cycle of generations
for (g in 1:G) {

#cycle of individuals in the population
for (x in 1:N) {

# left and right neighbors on a circle
LN=x-1; if (LN==0) LN=N
RN=x+1; if (RN==N+1) RN=1

#interaction
pop[x,1]=pop[x,1]+RET[pop[x,3],pop[LN,3]]
pop[LN,1]=pop[LN,1]+RET[pop[LN,3],pop[x,3]]
pop[x,1]=pop[x,1]+RET[pop[x,3],pop[RN,3]]
pop[RN,1]=pop[RN,1]+RET[pop[RN,3],pop[x,3]]
}

#local imitation for type 2 (only!)
for (i in 1:N) {

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if (pop[i,2]==2) {
# left and right neighbors on a circle
LN=i-1
if (LN==0) LN=N
RN=i+1
if (RN==N+1) RN=1
if (pop[i,1]<pop[LN,1] | pop[i,1]<pop[RN,1]) {
if (pop[LN,1]>pop[RN,1]) pop[i,3]=pop[LN,3] else pop[i,3]=pop[RN,3]
}
}
}

#reset starting fitness(es)
pop[1:N,1]=0

#save the data on behavior
data[g,1]=(sum(pop[1:N,3]==1))/N
}

plot(1:G,data,type="l")

#code to save data
#NOTE! If you use Vista, make sure to run R as ADMINISTRATOR!
#NOTE! The file will be saved in your R folder!
#write.csv(data, file = "filename.csv")
done=1

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