

JPrison Applet Examples

Obvious dominance of one strategy over another

Strategies: all_d, all_c

Invasion of a strategy

(Figures in parentheses indicate the initial population of the corresponding strategy.)

Adding tit_for_tat(x) to all_c(100), all_d(100), with $x \leq 5$ slightly changes equilibrium

Adding tit_for_tat(x) to all_c(100), all_d(100), with $x > 6$ radically changes equilibrium

** Note - This is a pretty nice visualization of "tipping". You can see the point where all_d is about to overwhelm tit_for_tat as before, but tit_for_tat sticks around just long enough to get past the critical point and then take over.**

Highest scoring strategy in tournament doesn't win evolution

Strategies: all_c, per_ccd, pavlov, tf2t, hard_tft, slow_tft, hard_majo

per_ccd wins the tournament, but doesn't meet the conditions for dominance: it's not the case that $E(\text{per_ccd}, \text{per_ccd}) > E(I, \text{per_ccd})$ for all other strategies I . So per_ccd "collapses under its own weight." As per_ccd begins to dominate, the fitness of pavlov and hard_tft becomes greater than that of per_ccd since $E(\text{pavlov}, \text{per_ccd}) > E(\text{hard_tft}, \text{per_ccd}) > E(\text{per_ccd}, \text{per_ccd})$. As per_ccd begins to die out, hard_tft dominates over pavlov because of its slight advantage in fitness due to the presence of hard_majo.

Another similar interesting example: tit_for_tat, per_ddc, per_ccd, mistrust, hard_majo
per_ccd wins the tournament, but tit_for_tat meets the dominance conditions, so it wins. If tit_for_tat is eliminated, no one dominates, the evolution goes back and forth.

Two strategies meet the dominance condition

Strategies: all_d, per_ddc, per_ccd, per_cd, hard_tft, random

Both all_d and hard_tft meet the dominance condition: $E(\text{all_d}, \text{all_d}) > E(I, \text{all_d})$ and $E(\text{hard_tft}, \text{hard_tft}) > E(I, \text{hard_tft})$ for all other strategies I . hard_tft wins the evolution since it does better head to head. If hard_tft is eliminated, all_d wins.

No strategies meet the dominance condition

Strategies: all_c, all_d, soft_majo, per_ddc, per_ccd, mistrust

No strategy dominates and the evolution is chaotic. The strategy that wins the tournament doesn't win.

Network configurations can change evolution

Strategies: per_ccd, mistrust, per_cd

With all connections, per_cd wins evolution, but when it is disconnected from per_ccd, it loses.

Network configurations can overcome dominance condition

Strategies: all_d, per_ddc, per_ccd

With all connections, dominant all_d wins. Cut off all_d from per_ccd to ruin all_d and save per_ccd and per_ddc so that per_ddc dominates.

Another similar example: all_c, per_ddc, pavlov, slow_tft

With all connections, dominant per_ddc wins. Cut off per_ddc from all_c and slow_tft and it loses.

Network configurations can make each strategy win

Strategies: all_c, all_d, soft_majo, per_ccd, per_ddc

Changing the network connections (requiring that each strategy have an edge with itself) can allow each strategy to win:

all_c wins by disconnecting it from all_d, per_ddc

all_d wins with all connections

per_ccd wins by disconnecting it from all_d from all_c

soft_majo wins by connecting it only to all_c and itself

per_ddc wins by disconnecting from all_d, soft_majo

A cool example:

Strategies: all_c, all_d, soft_majo, per_ccd, per_ddc, mistrust

Adjust the network as follows: disconnect all_c from per_ddc, per_ccd; disconnect all_d from per_ccd, mistrust; disconnect per_ddc from mistrust.

This looks like a dying patient to me.